STANDARD SPECIFICATIONS AND DETAILS

FOR

ASOTIN COUNTY PUBLIC UTILITY DISTRICT

ASOTIN COUNTY, WASHINGTON

MAY 2016

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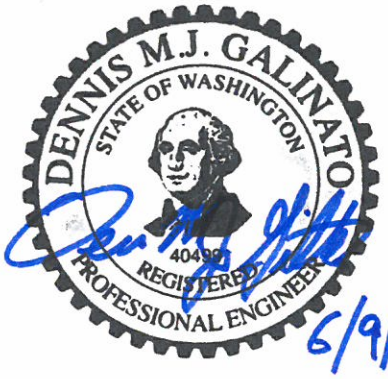

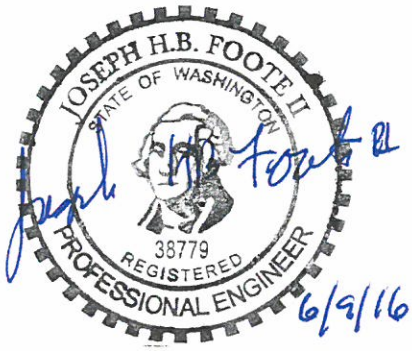

These Standard Specifications and Details shall be as the basis of design used on all Asotin County PUD water and sewer capital improvement projects and development projects located within the jurisdiction of the Asotin County service area.

It is the intention of the undersigned that these Standard Specifications and Details will not replace the requirement for a licensed professional engineer to prepare plans, specifications and supervise construction for all public works projects. It is the sole responsibility of the Registered Professional Engineer who is referencing these Standard Specifications and Details to ensure they are used appropriately and meet the requirements of the project. The Registered Professional Engineer is responsible for modifications to these standards as required with review and acceptance of Asotin County PUD.

Wherever in these Standard Specifications and Details, reference is made to "Standard Specifications for Municipal Construction", said reference shall be understood as referring to the Washington State Department of Transportation, Standard Specification for Road, Bridge and Municipal Construction, which applicable parts are incorporated herein and made part of these Documents by specific reference thereto. If requirements contained in the Standard Specifications for Municipal Construction are modified or in conflict with the requirements in these Standard Specifications and Details, the requirements in these Standard Specifications and Details shall prevail.

Should you have any questions regarding these design standards and specifications, please contact Asotin County PUD at (509) 758-1010.

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STANDARD SPECIFICATIONS AND DETAILS
FOR
ASOTIN COUNTY PUD

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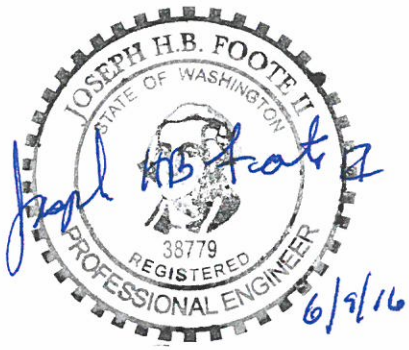
FOR

ASOTIN COUNTY PUD

MAY 2016



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SECTION 100

DEWATERING

PART 1 GENERAL

1.1 Description

The CONTRACTOR shall provide all labor, materials, and equipment necessary to dewater trench and structure excavations, in accordance with the requirements of the Contract Documents. The CONTRACTOR shall secure all necessary permits to complete the requirements of this Section of the Specifications.

1.2 Submittals

The CONTRACTOR shall submit a dewatering plan to be reviewed by the Asotin County PUD prior to the beginning of construction activities requiring dewatering. Review by the ENGINEER or Asotin County PUD of the CONTRACTOR's design shall not be construed as a detailed analysis of the adequacy of the dewatering system, nor shall any provisions of the above requirements be construed as relieving the CONTRACTOR of its overall responsibility and liability for the work.

1.3 Quality Control

A. It shall be the sole responsibility of the CONTRACTOR to control the rate and effect of the dewatering in such a manner as to avoid all objectionable settlement and subsidence.

B. All dewatering operations shall be adequate to assure the integrity of the finished project and shall be the responsibility of the CONTRACTOR.

C. Where the critical structures or facilities exist immediately adjacent to areas of proposed dewatering, reference points shall be established and observed at frequent intervals to detect any settlement which may develop. The responsibility for conducting the dewatering operation in a manner which will protect adjacent structures and facilities rests solely with the CONTRACTOR. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the CONTRACTOR.

PART 2 PRODUCTS

2.1 Equipment

Dewatering, where required, may include the use of well points, sump pumps, temporary pipelines for water disposal, rock or gravel placement, and other means. Standby pumping equipment shall be maintained on the jobsite.

PART 3 EXECUTION

3.1 Dewatering

A. The CONTRACTOR shall provide all equipment necessary for dewatering. The CONTRACTOR shall have on hand, at all times, sufficient pumping equipment and machinery in good working condition and shall have available, at all times, competent workers for the operation of the pumping equipment. Adequate standby equipment shall be kept available at all times to insure efficient dewatering and maintenance of dewatering operation during power failure.

B. Dewatering for structures and pipelines shall commence when groundwater is first encountered, and shall be continuous until such times as water can be allowed to rise in accordance with the provisions of this Section or other requirements.

C. At all times, site grading shall promote drainage. Surface runoff shall be diverted from excavations. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and be pumped or drained by gravity from the excavation to maintain a bottom free from standing water.

D. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.

E. If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, the affected areas shall be excavated and replaced with drain rock at no additional cost to the Asotin County PUD.

F. The CONTRACTOR shall maintain the water level below the bottom of excavation in all work areas where groundwater occurs during excavation construction, backfilling, and up to acceptance.

G. Flotation shall be prevented by the CONTRACTOR by maintaining a positive and continuous removal of water. The CONTRACTOR shall be fully

responsible and liable for all damages which may result from failure to adequately keep excavations dewatered.

H. If well points or wells are used, they shall be adequately spaced to provide the necessary dewatering and shall be sandpacked and/or other means used to prevent pumping of fine sands or silts from the subsurface. A continual check by the CONTRACTOR shall be maintained to ensure that the subsurface soil is not being removed by the dewatering operation.

I. The CONTRACTOR shall dispose of water from the work in a suitable manner without damage to the environment or adjacent property. The CONTRACTOR shall be responsible for obtaining any permits that may be necessary to dispose of water. No water shall be drained into work built or under construction without prior consent of the Asotin County PUD. Water shall be filtered using an approved method to remove sand and fine sized soil particles before disposal into any drainage system. Erosion control shall be provided in accordance with Asotin County and City of Clarkston Erosion Control Requirements.

J. The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill and prevent flotation or movement of structures, pipelines, and sewers.

K. Dewatering of trenches and other excavations shall be considered as incidental to the construction of the work and all costs thereof shall be included in the various contract prices in the bid forms.

END OF SECTION

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SECTION 101

EARTHWORK

PART 1 GENERAL

1.1 Description

Work covered in this section includes general excavation, fill and backfill work. Additional requirements for excavation and backfill for utilities are specified in Section 102 - Excavating, Backfilling and Compacting for Utilities.

1.2 Submittals

A. Name, qualifications and prior experience of two inspection and testing laboratories/firms for material gradation testing, proctor development and in-place density testing. Asotin County PUD will review and identify the firm to be used.

B. Certified gradation analysis, standard proctor tests and in-place density testing results for all backfill material.

C. Mix proportions for Controlled Low Strength Material (CLSM). The proposed mix design shall be strength tested in accordance with ASTM D 4832 at 7, 14 and 28 days age and results submitted to the Asotin County PUD. The CONTRACTOR shall submit to the Asotin County PUD batch weights of each batch of CLSM used during construction.

1.3 Reference Specifications, Codes and Standards

A. Commercial Standards

ASTM C 94	Specification for Ready-Mixed Concrete
ASTM C 403	Test Method for Time of Setting Concrete Mixtures by Penetration Resistance
ASTM D 422	Method for Particle-Size Analysis of Soils
ASTM D 698	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb (2.49-kg) Rammer and 12-inch (304.8-mm) Drop (AASHTO T-99)
ASTM D 2487	Classification of Soils for Engineering Purposes

ASTM D 4253	Test Methods for Maximum Index Density of Soils Using a Vibratory Table
ASTM D 4254	Test Methods for Minimum Index Density of Soils and Calculation of Relative Density
ASTM D 4832	Preparation and Testing of Controlled Low Strength Material Test Cylinders
AASHTO T 310	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

B. Reference Standards

References herein to the "Standard Specifications for Municipal Construction" shall mean the most recent edition of the Washington State Department of Transportation Standard Specifications for Road, Bridge, and Municipal Construction. References herein to "AASHTO" shall mean Association of American State Highway Transportation Officials.

1.4 Classification of Excavation

A. Unclassified Excavation

Unclassified excavation is defined as all excavation, regardless of the type, character, composition or condition of the material encountered and shall further include all debris, junk, broken concrete, and all other material. All excavation shall be unclassified unless provided for otherwise elsewhere in these specifications.

B. Classified Excavation

1. Common Excavation

Common excavation is defined, as the excavation of all material not classified as Rock Excavation.

2. Rock Excavation

Rock excavation is defined as the removal of rock by systematic and continuous drilling and blasting, if allowed, and hammering, breaking, splitting or other approved methods. Rock is defined as material including boulders, solid bedrock, or ledge rock, which, by actual demonstration, cannot be reasonably excavated with suitable power excavation equipment. Suitable machinery is defined as a track-mounted hydraulic excavator of the 52,800 to 72,500 pound class equipped with a single shank ripper. The

Asotin County PUD may waive the demonstration if the material encountered is well-defined rock. The term "rock excavation" shall be understood to indicate a method of removal and not a geological formation.

If material which would be classified as rock by the above definition is mechanically removed with equipment of a larger size than specified, it shall be understood that any added costs for the removal of material by this method shall be included in the unit price for common excavation.

Before the removal of rock by the methods described above will be permitted, the CONTRACTOR shall expose the material by removing the common material above it and then notify the Asotin County PUD who, with the CONTRACTOR or his representative, will measure the amount of material to be removed.

In trench excavations, boulders or pieces of concrete below grade larger than one half (1/2) cubic yard will be classified as rock if blasting, hammering, breaking or splitting actually required and used for their removal from the trench. If material, which would be classified as rock by the definition above and elsewhere within these specifications, is mechanically removed without blasting, hammering, breaking or splitting, it will be considered common excavation. If equipment larger than the "suitable machinery" as defined above is brought on the project site for the sole purpose of rock removal without blasting, hammering, breaking or splitting, then such removal will be considered rock excavation.

CONTRACTOR shall verify if the use of explosives for excavation of rock is allowed on this project.

1.5 Quality Assurance

A. Soil Testing -- Soil sampling and testing to be by an independent laboratory approved by the Asotin County PUD. The frequency of testing is specified in Part 3 of Section 102. All soil testing shall be paid for by the CONTRACTOR.

B. Compaction Tests -- Maximum density of optimum moisture content by ASTM D698 (AASHTO T-99). In-place density in accordance with Nuclear Testing Method AASHTO 310. The frequency of testing is specified in Part 3 of Section 102.

C. Soil Classification -- All imported materials, classification in accordance with ASTM D2487.

D. Allowable Tolerances -- Final grades shall be plus or minus 0.04 foot.

E. In Place Testing of CLSM -- CLSM shall be tested in accordance with ASTM C 403.

F. Compressive Tests of CLSM -- CLSM shall be compressive tested in accordance with ASTM D 4832.

1.6 Site Conditions

A. Quantity Survey -- CONTRACTOR shall be responsible for calculations of quantities of cut and fill from existing site grades to finish grades established under these Standard Specifications and Details as indicated on the plans or specified and shall include the cost for all earthwork in the total basic bid.

B. Dust Control -- Must meet Washington State Department of Ecology and Local requirements. Protect persons and property from damage and discomfort caused by dust. Water as necessary and when directed by Asotin County PUD to quell dust.

C. Soil Control -- Soil shall not be permitted to accumulate on surrounding streets or sidewalks nor to be washed into sewers. Erosion control shall be provided in accordance with Asotin County and City of Clarkston Erosion Control Requirements.

D. Existing Underground Utilities -- Protect active utilities encountered and notify persons or agencies owning same. Remove inactive or abandoned utilities from within the project grading limits to a depth at least twelve (12) inches below subgrade established under this contract. All abandoned piping to be plugged as specified in Part 3 of Section 102.

PART 2 PRODUCTS

2.1 Crushed Rock

Crushed rock with 3/4 inch, 1 inch, and 1 1/2 inch gradation as shown on the plans shall meet the gradation and other requirements of the Standard Specifications for Municipal Construction Section 9-03.9(3).

2.2 Controlled Low Strength Material (CLSM)

CLSM shall be composed of cement, pozzolans, fine aggregate, water, and admixtures. CLSM shall have a low cement content, be non-segregating, self consolidating, free-flowing and excavatable material which will result in a hardened, dense, non-settling fill and a compressive strength at 28 days of 100 to 200 psi if not otherwise shown or specified.

2.3 Select Native Fill

Select native fill shall consist of approved earth obtained from on-site excavations, free of peat, humus, vegetative matter, organic matter, and rocks greater than 12 inches in diameter, processed as required to be placed in the thicknesses prescribed and at the optimum moisture content to obtain the level of compaction required by these specifications.

2.4 Imported Fill

Imported fill material shall consist of approved imported earth substantially free of organic material and foreign debris. Imported fill material shall meet the requirements for select native fill as defined above and shall be approved by the Asotin County PUD.

2.5 Topsoil

Top 6-12 inches of existing soil containing organic matter. Asotin County PUD's decision shall be final as to determination of what is of topsoil quality. Topsoil shall be stockpiled on site for later use in landscaping. Care shall be taken in collection of topsoil so as to preserve native seed stocks, which are valuable to restoring native species as part of finish landscaping.

2.6 Spoils

All excess material not suitable or not required for backfill and grading shall be hauled off site and disposed of at a location approved by the Asotin County PUD. The CONTRACTOR shall make arrangements for disposal of the material at no additional cost to the Asotin County PUD. Landfill permit to be obtained by the CONTRACTOR and provided to Asotin County PUD prior to commencement of disposal.

PART 3 EXECUTION

3.1 General

A. Prior to work in this section, become familiar with site conditions. In the event discrepancies are found, notify the Asotin County PUD as to the nature and extent of the differing conditions.

B. Do not allow or cause any work performed or installed to be covered up or enclosed prior to required tests and approvals. Should any work be enclosed or covered up, uncover at CONTRACTOR's expense.

3.2 Topsoil Stripping and Stockpiling

A. Site within clearing limits shall be stripped of topsoil to depths approved by the Asotin County PUD, as required to obtain additional topsoil necessary to complete work indicated on plans or specified.

B. Topsoil shall be free of sticks, large rocks, clods, and subsoils.

C. Stockpile topsoil at locations approved by Asotin County PUD for redistribution as specified. Grade surface of stockpiles remaining over winter months to prevent ponding of water. Cover stockpile to minimize the infiltration of water. Provide erosion control as required by Asotin County.

3.3 Excavation

A. Excavate material of every nature and description to the lines and grades as indicated on the drawings and/or as required for construction of the facility.

B. Provide and maintain equipment to remove and dispose of water during the course of the work of this section and keep excavations dry and free of frost or ice.

C. Project dewatering is specified elsewhere. Coordinate drainage requirements with this work. Provide temporary drainage ditches as required and regrade as indicated at completion of project.

D. Excavated material not approved for use in the embankments or in excess of that needed to complete the work shall be hauled off site and disposed of at no expense to the Asotin County PUD.

3.4 Rock Excavation

A. Where the bottom of the excavation encounters ledge rock and/or boulders and large stones which meet the definition of “rock” as described herein, said rock shall be removed to provide 12 inches of clearance on each side and below all structures, pipe and appurtenances.

B. Excavations below subgrade in rock shall be backfilled to subgrade with approved bedding material and thoroughly compacted.

C. If explosives are allowed on this project, the CONTRACTOR shall comply with the requirements for the use and security of explosives as specified in the special provisions.

D. Wherever the use of explosives is required during the course of the work, and if the use of explosives are allowed on this project, the CONTRACTOR shall

conform to the recommendations of the Manual of Accident Prevention in Construction, published by AGC, in regard to Section 5, Explosives. Prior to commencing use of explosives, the CONTRACTOR shall submit a certificate of insurance showing coverage of blasting operating and blasting product liability to the limits required by the General Conditions. Coverage for this extra hazard shall be maintained during all blasting operations.

E. The CONTRACTOR shall provide all necessary approved types of tools and devices required for loading and using explosives, blasting caps and accessories, and conform to and obey all federal, state, and local laws that may be imposed by any public authority.

F. When blasting rock, cover the area to be shot with blasting mats or other approved types of protective material that will prevent the scattering of rock fragments outside the excavation. The CONTRACTOR shall give ample warning to all persons within the vicinity before blasting, station people and provide signals of danger in suitable places to warn people and vehicles before firing any blasts. Fire all blasts with an electric blasting machine which shall be connected to the circuit immediately prior to the time for firing, and only then by the person who will operate the blasting machine.

G. The CONTRACTOR shall assume all liability and responsibility connected with or accruing from blasting, or the use of explosives or dangerous material of any kind whatsoever. Such liability shall extend to include, but not be limited to, damage to work or adjacent property, injuries, lawsuits, complaints and all other adverse results, whether actual, alleged, inferred or implied.

H. The cost of waiting or "down time" for the CONTRACTOR to mobilize required equipment when rock is encountered shall be borne by the CONTRACTOR without additional cost to the Asotin County PUD or liability to the Asotin County PUD. If the CONTRACTOR encounters rock, which will prevent construction and are not shown on the plans, the CONTRACTOR shall notify the Asotin County PUD before continuing with the work in order that the Asotin County PUD may make such field revisions as necessary to avoid conflict with the existing conditions. The Asotin County PUD will provide field revisions within one half work day of notification to address conflicts with existing conditions. The cost of waiting or "down time" during such field revisions shall be borne by the CONTRACTOR without additional cost to the Asotin County PUD or liability to the Asotin County PUD. If the CONTRACTOR fails to so notify the Asotin County PUD when a conflict of this nature is encountered, but proceeds with construction despite this interference, the CONTRACTOR shall do so at the CONTRACTOR's own risk with no additional payment.

3.5 Grading and Filling

A. General -- Grading and filling operations shall not take place when weather conditions and moisture content of fill materials prevent the attainment of specified density. Vertical curves or roundings at abrupt changes in slope shall be established as approved by Asotin County PUD. Bring all graded areas to a relatively smooth, even grade and slope by blading or dragging. Remove high spots and fill depressions.

B. For areas receiving surface structures or existing paved areas to be constructed or replaced by the CONTRACTOR or by others, such as railways, roadways, driveways, parking lots, and sidewalks, place clean well-graded gravel fill material (3/4 inch) in 6-inch lifts and compact with vibratory equipment to 95 percent maximum density unless otherwise specified.

C. Embankment Construction -- Place fill material shown or specified in 8-inch loose lifts and compact with approved equipment. All fill material within 3 feet of top of fill elevations shall be compacted with vibratory equipment to 95 percent maximum density unless otherwise specified. All fill material below the 3-foot limit shall be compacted with vibratory equipment to 90 percent maximum density unless otherwise specified.

3.6 Topsoil Fill

A. Scarify prepared subgrade to depth of four inches immediately prior to placing topsoil.

B. Place topsoil in areas to be seeded to depths indicated, minimum depth of six inches. Place loose; do not compact, do not place in wet or muddy conditions.

3.7 Controlled Low Strength Material (CLSM)

A. At time of placement, the CLSM must be at least 40 degrees F and ambient air temperature must be at least 34 degrees F and rising. Subgrade on which CLSM is to be placed shall not be frozen and free of disturbed or soft material, debris and water.

B. After CLSM is placed, further construction proceeding upon it will be permitted only after initial set is attained, as measured by ASTM C 403. No traffic or construction equipment shall be allowed on CLSM for at least 24 hours after placement.

3.8 Dust Control

See Section 110 for dust control requirements

END OF SECTION

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SECTION 102

EXCAVATING, BACKFILLING AND COMPACTING FOR UTILITIES

PART 1 GENERAL

1.1 Description

A. Work covered in this Section includes trench excavation for pipe, utility vaults and other utilities, pipe and utility vault bedding, and trench and utility vault backfill. Additional requirements for general excavation and backfill work are specified in Section 101 - Earthwork.

B. Excavation for Utilities Includes

1. Work of making all necessary excavations for the construction of all contract work.
2. Furnishing, placing and use of sheeting, shoring, and sheet piling necessary in excavating for and protecting the work and workmen.
3. Performing all pumping and work necessary to keep the trenches free from water.
4. Providing for uninterrupted flow of existing rivers, treatment plant processes, drains, and sewers and the temporary disposal of water from other sources during the progress of the work.
5. Damming and coffer damming where necessary.
6. Supporting and protecting all structures, pipes, conduits, culverts, railroad tracks, posts, poles, wires, fences, buildings, and other public and private property adjacent to the work.
7. Removing and replacing existing sewers, culverts, pipelines, and bulkheads where necessary.
8. Removing after completion of the work all sheeting and shoring not necessary to support the sides of excavations.
9. Removing all surplus excavated material.
10. Performing all backfilling and rough grading of compacted backfill to limits specified or ordered by the Asotin County PUD.
11. Restoring all property damaged as a result of the work involved in this contract.

C. The work includes obtaining and transporting suitable fill material from off-site when suitable on-site material is not available.

D. The work includes transporting surplus excavated material not needed for backfill at the location where the excavation is made, to other parts of the work where filling is required, or disposal of all surplus material on other sites provided by the CONTRACTOR.

E. Backfill and Fill Compaction: Test consolidated backfill material in trenches around pipes and structures in conformance with "Compaction Tests" specified herein. Where tests indicate insufficient values, perform additional tests as required by the Asotin County PUD. Testing shall continue until specified values have been attained by additional compaction effort.

F. The work includes furnishing and installing temporary facilities to treat and dispose of any water pumped from the trench or utility vault excavations in a proper and approved manner in accordance with all laws and regulations.

1.2 Submittals

A. Certified gradation analysis, standard proctor tests and in-place density testing results for all backfill material.

1.3 Protection

A. Exploratory Test Pits -- The CONTRACTOR shall dig such exploratory test pits as may be necessary in advance of excavation to determine the exact location and elevation of subsurface structures, pipelines, duct banks, conduits, and other obstructions which are likely to be encountered or need to be connected to and shall make acceptable provision for their protection, support, and maintenance of their continued operation.

B. Sheeting, Shoring and Bracing

1. The CONTRACTOR shall furnish and install adequate sheeting, shoring, and bracing to maintain safe working conditions, and to protect newly built work and all adjacent and neighboring structures from damage by settlement or other ground movement.
2. Bracing shall be arranged so as not to place a strain on portions of completed work until the construction has proceeded far enough to provide ample strength. Sheeting and bracing may be withdrawn and removed at the time of backfilling, but the CONTRACTOR shall be responsible for all damage to newly built work and adjacent and neighboring structures.

C. Construction Sheeting Left in Place

1. The CONTRACTOR shall furnish, install, and leave in place construction sheeting and bracing when specified or when indicated or shown on the Drawings.
2. Construction sheeting and bracing, placed by the CONTRACTOR to protect adjacent and neighboring structures, may be left in place if desired by the CONTRACTOR. All such sheeting and bracing left in place shall be included in the cost for excavation.
3. Any construction sheeting and bracing which the CONTRACTOR has placed to facilitate its work may be ordered in writing by the Asotin County PUD to be left in place. The right of the Asotin County PUD to order sheeting and bracing left in place shall not be construed as creating an obligation on its part to issue such orders. Failure of the Asotin County PUD to order sheeting and bracing left in place shall not relieve the CONTRACTOR of its responsibility under the contract.

D. Removal of Water

1. The CONTRACTOR shall at all times during construction provide and maintain ample means and devices for dewatering. See Section 100 - Dewatering.
2. The CONTRACTOR shall dispose of water from the work in a suitable legal manner without damage to adjacent property or structures.

1.4 Definitions

A. Classification of Excavated Material

Excavated materials are defined within Section 101 - Earthwork.

B. Foundation Stabilization

Foundation stabilization is defined as removing unsuitable native material below the design grade of the area being excavated and replacing and compacting with crushed rock to the dimensions shown on the trench detail, as approved by the Asotin County PUD, or as otherwise directed by the Asotin County PUD. Foundation stabilization material shall be placed in lifts not to exceed eight (8) inches and compacted to 95 percent of the maximum density at optimum moisture content.

C. Bedding and Pipe Zone Backfill

Bedding and pipe zone backfill is defined as the furnishing, placing and compacting of material below, around and above the top of the pipe barrel to the dimensions shown in the Standard Details. The compaction requirement for the pipe bedding and pipe zone shall not be less than that required for the trench backfill above the pipe zone.

D. Trench Backfill Zone

Trench backfill is defined as the furnishing, placing and compacting of material in the trench above the pipe zone, up to bottom of the pavement base rock, ground surface or surface material.

E. Backfill Classification

Class A: Backfill with suitable native excavated material. Place the material in lifts with mechanical compaction sufficient to insure that no bridging occurs. Mound the excess material over the trench.

Class B: Backfill with suitable native excavated material. Place the material in lifts and mechanically compact to a relative density as shown on the Drawings or specified herein. Remove and dispose of excess material.

Class C: Backfill with suitable native excavated material. Place the material in the trench and water settle to a relative density as shown on the Drawings or specified herein. Remove and dispose of excess material.

Class D: Backfill with approved imported granular material. Place the material in lifts and mechanically compact to a relative density as shown on the Drawings or specified herein. Remove and dispose of excess material.

Class E: Backfill with controlled low strength material (CLSM). See Section 101 - Earthwork.

1.5 Quality Assurance

A. Compaction Requirements

In place dry density of compacted material shall be at the percent of maximum dry density specified or shown at optimum moisture content determined on the basis of the latest edition of AASHTO T-99.

B. Testing Requirements

An independent laboratory retained by the CONTRACTOR and approved by the Asotin County PUD will perform all soil sampling and testing. Testing locations and frequencies shall be per Part 3 of this specification section. All testing will be paid for by the CONTRACTOR.

1.6 References

References herein to the "Standard Specifications for Municipal Construction" shall mean the most recent edition of the Washington State Department of Transportation Standard Specifications for Road, Bridge, and Municipal Construction. References herein to "AASHTO" shall mean Association of American State Highway Transportation Officials

PART 2 MATERIALS

2.1 Native Backfill Material

Native backfill material shall be select excavated native material free from roots or other organic material, trash, mud, muck, frozen material and large stones and shall comply with the select native fill specification within Section 101 - Earthwork.

2.2 Crushed Rock Backfill Material

Crushed rock used for backfill material in the bedding, pipe, and backfill zones shall be maximum aggregate size shown in the standard details. All gradations of crushed rock shall comply with Section 101 - Earthwork.

2.3 Foundation Stabilization Material

Foundation stabilization material shall be 6-inch to 2-inch or 4-inch to 2-inch gravel, free from clay balls and organic debris, and being well crushed gravel or crushed rock graded with less than 8 percent by weight passing the 1/4-inch sieve, as approved by the Asotin County PUD.

PART 3 EXECUTION

3.1 Preparation

A. The site of an open cut excavation shall be first cleared of all obstructions preparatory to excavation. Wherever paved or surfaced streets are cut, saw wheel or approved cutting devices shall be used. Any cut or broken pavement shall be removed from site during excavation.

B The CONTRACTOR shall maintain street traffic at all times and erect and maintain barricades, warning signs, traffic cones, and other safety devices during construction in accordance with the latest edition of Manual of Uniform Traffic Control Devices (MUTCD), Part 6, to protect the traveling public in any area applicable. Provide flaggers as required during active work in roadway areas.

C. Intent of specifications is that all streets, structure, and utilities be left in condition equal to or better than original condition. Where damage occurs and cannot be repaired or replaced, CONTRACTOR shall purchase and install new material, which is satisfactory to Asotin County PUD. Plans and/or specifications cover and govern replacement and restoration of foreseeable damage.

D. The CONTRATOR's operations shall be confined to rights-of-way and easements provided. Avoid encroachment on, or damage to, private property or existing utilities unless prior arrangements have been made with copy of said arrangement submitted to Asotin County PUD.

3.2 Obstructions

This item refers to obstructions, which may be encountered and do not require replacement. Obstructions to the construction of the trench such as tree roots, stumps, abandoned piling, abandoned buildings and concrete structures, logs, rubbish, and debris of all types shall be removed without additional compensation from the Asotin County PUD. The Asotin County PUD may, if requested, make changes in the trench alignment to avoid major obstructions, if such alignment changes can be made within the perpetual easement and right-of-way and without adversely affecting the intended function of the facility or increased costs to the Asotin County PUD.

3.3 Interfering Structures or Roadways

A. The CONTRACTOR shall remove, replace and/or repair any damage done by the CONTRACTOR during construction to fences, buildings, cultivated fields, drainage crossings, and any other properties at its own expense and without additional compensation from the Asotin County PUD. The CONTRACTOR shall replace or repair these structures to a condition as good or better than their pre-construction condition prior to commencing work in the area.

B. If the CONTRACTOR encounters existing structures, which will prevent construction and are not shown on the plans, the CONTRACTOR shall notify the Asotin County PUD before continuing with the work in order that the Asotin County PUD may make such field revisions as necessary to avoid conflict with the existing conditions. The cost of waiting or "down time" during such field revisions shall be borne by the CONTRACTOR without additional cost to the Asotin County PUD or liability to the Asotin County

PUD. If the CONTRACTOR fails to so notify the Asotin County PUD when a conflict of this nature is encountered, but proceeds with construction despite this interference, the CONTRACTOR shall do so at the CONTRACTOR's own risk with no additional payment.

3.4 Easements

A. Where portions of the work are located on private property, easements and permits will be obtained by the Asotin County PUD. Easements shall provide for the use of property for construction purposes to the extent indicated on the easements. Copies of these easements and permits will be available from the Asotin County PUD for inspection by the CONTRACTOR. It shall be the CONTRACTOR's responsibility to determine the adequacy of the easement obtained in every case. The CONTRACTOR shall confine its construction operations to within the easement limits or street right-of-way limits, or make special arrangements with the property owners for the additional area required and notify the Asotin County PUD of any such conditions.

B. Any damage to private property, either inside or outside the limits of the easements provided by the Asotin County PUD, shall be the responsibility of the CONTRACTOR. Before the Asotin County PUD will authorize final payment, the CONTRACTOR will be required to furnish the Asotin County PUD with written releases from the property owners, where the CONTRACTOR has obtained special agreements or easements or where the CONTRACTOR's operations, for any reason, have not been kept within the construction right-of-way obtained by the Asotin County PUD. Any such special agreements must be in written form and shall not involve the Asotin County PUD or Asotin County PUD as to liabilities in any way.

3.5 Trench and Utility Vault Excavation

A. Excavation for trenches in which pipelines are to be installed shall provide adequate space for workers to place and joint the pipe properly and safely, but in every case the trench shall be kept to a minimum width. The width of trench at the top of the pipe shall not exceed the limits specified or as shown on the Drawings. Excavation for manholes and other structures shall be wide enough to provide a minimum of 12 inches between the structure surface and the sides of the excavation.

B. Unless otherwise permitted by the Asotin County PUD, trenching operations shall not be performed beyond the distance which will be backfilled and compacted the same day.

C. In general, backfilling shall begin as soon as the pipe or conduit is in approved condition to receive it and shall be carried to completion as rapidly as possible. New trenching shall not be started when earlier trenches need backfilling or

the surfaces of streets or other areas need to be restored to a safe and proper condition.

D. Where the excavation activities require the removal of portions of an abandoned pipeline, masonry plugs shall be installed in the open ends of the pipe, unless otherwise noted on the plans or by the Asotin County PUD. Coordinate with the Asotin County PUD prior to plugging. For plugs less than 36 inches in diameter, 8-inch deep masonry units shall be used. For plugs in larger pipelines, 12-inch deep masonry units shall be used.

E. Excavated material shall be placed at locations and in such a manner that it does not create a hazard to pedestrian or vehicular traffic, or interfere with the function of existing drainage facilities or system operation. The CONTRACTOR shall make arrangements for and dispose of all excess material not required elsewhere on the project at no cost to the Asotin County PUD.

F. The CONTRACTOR shall provide the materials, labor and equipment necessary to protect trenches at all times. The trench protection shall provide safe working conditions in the trench and protect the work, existing property, utilities, pavement, etc. The method of protection shall be according to the CONTRACTOR's design. The CONTRACTOR may elect to use a combination of shoring, overbreak, tunneling, boring, sliding trench shields, or other methods of accomplishing the work provided the method meets the approval of all applicable local, state and federal safety codes. Damages resulting from improper shoring, improper removal of shoring or from failure to shore shall be the sole responsibility of the CONTRACTOR.

G. The CONTRACTOR shall remove and dispose of existing abandoned sewer pipe, structures, and other facilities as necessary to construct the improvements. The cost of such removal will be considered incidental to trench excavation and backfill.

H. Trench excavation for piping, utility vaults and other utilities shall be performed to the alignment and grade as indicated on the plans or as required by the Asotin County PUD. Where grades are not shown, pipe or other utilities shall be laid to grade between control elevations shown on the plans.

I. The trench at all times shall be kept free from water to facilitate fine grading, the proper laying and joining of pipe, and prevention of damage to completed joints. Water in the trench shall not be allowed to flow through the pipe while construction work is in progress unless special permission to do so has been given by the Asotin County PUD. An adequate screen shall be provided to prevent the entrance of objectionable material into the pipe. See Section 100 - Dewatering.

J. For pipe or utility vaults to have bedding material, excavate to the depth below the bottom of the pipe or utility vault that is specified on the plans. Care shall be taken not to excavate below depths required. If over digging occurs, the trench bottom shall be filled to grade with compacted bedding material. The width of the pipe trench at and below the top of the pipe shall be such that the clear space between the barrel of the pipe and the trench shall not exceed 12 inches on either side of the pipe. The width of the trench above that level may be as wide as necessary for sheeting and bracing and the proper performance of the work.

3.6 Excavation Below Grade

If the trench bottom is unsuitable below the depth required for bedding, the Asotin County PUD may require additional excavation. This extra excavation shall be backfilled with compacted foundation stabilization material. This backfill shall be placed in lifts not to exceed 8 inches and compacted to 95 percent of the maximum density at optimum moisture content.

3.7 Directional Drilling

See Section 121 - Directional Drilling.

3.8 Pipe Bedding

Following the excavation of the trench, compacted pipe bedding material shall be placed the full width of the excavated trench to a depth as shown on the trench detail. The bottom of the trench shall be accurately graded and rounded to fit the bottom quadrant of the pipe to provide uniform bearing and support for each section of pipe. Depressions for jointing shall be only of such length, depth and width necessary for the proper making of the joint.

3.9 Pipe Zone and Trench Backfill

A. All backfill except CLSM shall be placed and compacted in 6-inch lifts. Backfill shall be carefully placed around the pipe and thoroughly compacted in 6-inch lifts or in a manner satisfactory to the Asotin County PUD so as to achieve the specified compaction requirements. When placing pipe zone backfill, the CONTRACTOR shall prevent pipe from moving either horizontally or vertically during placement and compaction of pipe zone material.

B. Backfill Immediately: All trenches and excavations shall be backfilled immediately after pipe is laid therein and necessary testing is complete, unless otherwise directed by the Asotin County PUD. Under no circumstances shall water be permitted to rise in open trenches after pipe has been placed. See Section 100 - Dewatering.

C. Trench backfill under existing or future structures, paved areas, road shoulders, driveways or sidewalks:

1. Class B unless otherwise specified on the plans.
2. Backfill shall be compacted to 95 percent of maximum density at optimum moisture content.

D. Trench backfill outside existing or future structures, paved areas, road shoulders, driveways or sidewalks.

1. Class B unless otherwise specified on the plans.
2. Backfill shall be compacted to not less than 85 percent of maximum density at optimum moisture content.

3.10 Compaction Testing

A. Compaction tests will be required to show that specified densities of compacted backfill are being achieved by the CONTRACTOR's compaction methods.

B. Tests of pipeline backfill materials shall be made on each lift of fill for every 200 feet of pipeline trench as measured along the pipe centerline. After the Asotin County PUD is satisfied that the CONTRACTOR's method of compaction consistently meets specified compaction requirements, the testing frequency may be reduced to not less than one test per lift of fill for every 1,500 feet of pipeline trench. The Asotin County PUD may direct testing at a higher frequency at no additional cost to the Asotin County PUD upon failure to obtain specified densities or if the CONTRACTOR changes compaction equipment or methods of compaction. The Asotin County PUD shall determine all test locations if the Asotin County PUD determines a higher frequency of testing is required.

3.11 Utility Crossings

A. Vertical clearance between the new pipe and existing utilities shall be 12 inches minimum, unless otherwise noted on the plans or specified. Where existing utility lines are damaged or broken, the utility shall be repaired or replaced, care being taken to insure a smooth flow line and absolutely no leakage at the new joints. Unless otherwise specified herein, all expenses involved in the repair or replacement of leaking or broken utility lines that have occurred due to the CONTRACTOR's operations shall be borne by the CONTRACTOR and the amount thereof shall be absorbed in the unit prices of its bid.

B. Water Line Separation from Non-Potable Lines

Whenever water lines cross non-potable lines (sanitary sewers, reclaimed water piping, irrigation lines and other uses), the CONTRACTOR shall comply with the Washington State Department of Health (DOH) requirements and the requirements listed below.

1. Water lines crossing non-potable lines --Wherever possible, the bottom of the water line shall be 1.5 feet or more above the top of sewer pipe and one full length of the water line pipe shall be centered at the crossing. For clearances less than 1.5 feet or if the potable water line must cross under the non-potable line, the potable line shall be cased and sealed in a pressure rated pipe that exceeds potable water line construction standards extending at least 10 feet to either side of the crossing.

2. Water lines in parallel with non-potable line -- Whenever possible, the water line shall maintain a 10-foot horizontal and 18-inch vertical separation above nonpotable pipelines. The 18-inch vertical separation is the measured distance between the closest sides of the two pipes.

   If site conditions do not allow such minimum separations, pipelines may be closer to each other if the following criteria are met:

   a. The lines shall be laid in separate trenches.
   b. The non-potable line should be made of materials and joints that meet or exceed water line construction standards and it should be pressure tested to ensure it is watertight prior to backfilling.
   c. There should be at least 5 feet of horizontal and 12 inches of vertical separation between potable water lines and non-potable lines.

3. Potable and non-potable pipelines may be in a common trench if the horizontal spacing between outer pipe walls is at least 5 feet and the vertical spacing is at least 18 inches from the invert wall of the potable line to the crown wall of the non-potable line. Both the potable and non-potable lines should be on a “bench” of undisturbed soil with the non-potable line below the potable line. If site conditions do not allow these minimum separation distances, both pipelines should be built with casing pipes of pressure-rated pipe material designed to withstand a minimum static pressure of 150 psi. Additional mitigation efforts include impermeable barriers such as encasement with Portland cement or concrete.

3.12 Disposal of Unsuitable and Surplus Material

A. All excavated materials which are unsuitable for use in backfilling trenches or around structures, and excavated materials that are in excess of that required for backfilling and for constructing fills and embankments as shown on the drawings, shall be disposed of by the CONTRACTOR at its own expense and

at disposal sites provided by the CONTRACTOR as may be required; except that the Asotin County PUD reserves the right to require the CONTRACTOR to deposit such surplus at locations designated by the Asotin County PUD within a 2-mile radius.

B. Surplus excavated material shall be disposed of by the CONTRACTOR in a legal manner, in full compliance with applicable codes and ordinances.

3.13 Surface Restoration and Clean-Up

A. At the end of each work day, all open trenches shall be backfilled and all trenches within streets shall be temporarily surfaced or covered to the satisfaction of the Asotin County PUD and local transportation agency. Temporary paving shall be replaced with permanent street paving, at completion of construction within street rights-of-way or sooner if deemed necessary by the Asotin County PUD and local transportation agency.

B. Where trenches cross lawns, garden areas, pastures, cultivated fields, or other areas on which reasonable topsoil conditions exist, the CONTRACTOR shall remove the topsoil to the specified depth and place the material in a stockpile. The CONTRACTOR shall not mix the topsoil with other excavated material. After the trench has been backfilled, the topsoil shall be replaced.

C. The CONTRACTOR shall clean up and remove all excess materials, construction materials, debris from construction, etc. The CONTRACTOR shall replace or repair any fences, mailboxes, signs, landscaping, or other facilities removed or damaged during construction. The CONTRACTOR shall replace all lawns, topsoil, shrubbery, flowers, etc., damaged or removed during construction. The CONTRACTOR is to be responsible for seeing that lawns, shrubs, etc. remain alive and leave premises in condition equal to original condition before construction.

D. See Section 110 - Pavement and Surface Restoration for dust control requirements

END OF SECTION

SECTION 103

CONTROL OF WORK

PART 1 GENERAL

1.1 Description

The work consists of developing, implementing, and maintaining a quality control system to ensure that the specified quality is achieved for all materials and work performed

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 Authority of Asotin County PUD and Inspectors

The Asotin County PUD may appoint assistants and inspectors to assist in determining that the work and materials meet the Standard Specifications and Details requirements. Assistants and inspectors have the authority to reject defective material and suspend Work that is being done improperly, subject to the final decisions of the Asotin County PUD.

Assistants and inspectors are not authorized to accept work, to accept materials, to issue instruction, or to give advice that is contrary to the Standard Specifications and Details. Work done or material furnished which does not meet the Standard Specifications and Details requirements shall be at the Contractor's risk and shall not be a basis for a claim even if the inspectors or assistants purport to change the Standard Specifications and Details.

Inspectors may advise the Contractor of any faulty work or material or infringements of the terms of the Contract; however, failure of the Asotin County PUD or the assistants or inspections to advise the Contractor does not constitute acceptance or approval.

3.2 Inspection of Work and Materials

Any inspection, tests, measurements, or other actions by Asotin County PUD employees serve only one purpose: to assure the Asotin County PUD that work, materials, progress rate, and quantities comply with Standard Specifications and Details terms. Such work by Asotin County PUD employees shall not relieve the Contractor

from doing any Standard Specifications and Details assigned work or from determining whether Standard Specifications and Details requirements are being met. The Contractor shall correct any substandard Work or materials.

3.3 Removal of Defective and Unauthorized Work

The Asotin County PUD will not pay for unauthorized or defective work. Unauthorized or defective work includes: Work and materials that do not conform to Standard Specifications and Details requirements; Work done beyond the lines and grades set by the Plans; and extra work and materials furnished without the Asotin County PUD's written approval. At the Asotin County PUD's order, the Contractor shall immediately remedy, remove, replace, or dispose of unauthorized or defective work or materials and bear all costs of doing so.

3.4 Guarantees

The Contractor shall furnish to the Asotin County PUD any guarantee or warranty furnished as a customary trade practice in connection with the purchase of any equipment, materials, or items incorporated into the project.

END OF SECTION

SECTION 110

PAVEMENT AND SURFACE RESTORATION

PART 1 GENERAL

1.1 Scope

This section covers the work necessary to replace all pavements, pavement base, curbs, sidewalks and other surface features damaged directly or indirectly during construction.

1.2 Reference Standards

A. References herein to "AASHTO" shall mean Association of American State Highway Transportation Officials.

B. Standard Specifications: Where the term "Standard Specifications for Municipal Construction" is used, such reference shall mean the current edition of the Washington State Department of Transportation Standard Specifications for Road, Bridge, and Municipal Construction. Where reference is made to a specific part of the Standard Specifications, such applicable part shall be considered as part of this section of the Specifications. In case of a conflict, the more stringent specification shall apply.

1.3 Quality Assurance

A. All testing to determine compliance with the specifications shall be performed by an independent testing laboratory approved by the Asotin County PUD. All testing costs shall be borne by the CONTRACTOR.

B. The surface smoothness of the replaced pavement shall be such that when a 10-foot straightedge is laid longitudinally across the patched area between the edges of the old surfacing and surface of the new pavement, the new pavement shall not deviate from the straightedge more than 1/8 inch and surface drainage shall be maintained. Additionally, paving must conform to the grade and crown of the adjacent pavement and contain no abrupt edges, low or high areas or any other imperfections as determined by the Asotin County PUD. Pavement trench construction not meeting these requirements will be repaired by grinding the existing pavement to a 1-1/2 inch depth and replacing with a 1/2-inch dense graded, PG 64-22 Hot Mix Asphaltic (HMA) the full width of the previous trench patch plus 4 inches on each side at no cost to the Asotin County PUD.

1.4 Submittals

Provide material submittals as specified in Division 5 of the Standard Specification for Municipal Construction

PART 2 PRODUCTS

2.1 Aggregate Material

See requirements for crushed rock in Section 101 - Earthwork.

2.2 Asphalt Concrete Pavement

A. Hot Mix Asphalt

Use 1/2-inch dense graded, PG 64-22 HMA conforming to 9-02 and 9-03.8 of the Standard Specification for Municipal Construction.

B. Cold Mix Asphalt Concrete (Temporary Patch)

Use cold mix asphalt concrete and 1/2-inch-No.4 gradation with either CMS-2, CMS-2S or CSS-1.

C. Asphalt Prime Coat

Liquid asphalt for use as a prime coat under asphalt concrete shall be MC 250 liquid asphalt, CMS-2S or CSS-1.

D. Seal and Cover Coat

Asphalt material shall be CRS-2 cationic emulsified asphalt conforming to 9-02.1(6) of the Standard Specification for Municipal Construction. Cover stone shall conform to size 3/8-inch - #10 aggregate in Standard Specification for Municipal Construction.

2.3 Cement Concrete Pavement

Cement concrete pavement shall have a compressive strength of 4,000 psi conforming to 5-05 of the Standard Specification for Municipal Construction.

2.4 Pavement Marking and Signage

Materials shall conform to the following sections of the Standard Specification for Municipal Construction:

A. 8-09: Raised Pavement Markers

B. 8-21: Permanent Signing

C. 8-22: Pavement Marking

D. 8-23: Temporary Pavement Marking

2.5 Topsoil

Topsoil shall be imported from approved sources, and shall be approved by the Asotin County PUD. The topsoil shall be a sandy loam free of subsoil, grass, noxious weeds and any material deleterious to plant health.

2.6 Sod shall be strongly rooted, free of pernicious weeds, mow to a height of 3 inches maximum before lifting, deliver to the site in strips 12 inches wide at least 3 feet long, rolled, and with a uniform thickness between 3/8-inch and 5/8-inch of soil. Sod shall be Kentucky Bluegrass and Perennial Rye Grass of the mix shown below:

Species	Proportion by Weight
Perennial Rye Grasses Caddie Delray NK 200 Pennfine	30 percent
Kentucky Bluegrasses Aspen Kelly Rugby Adelphi Trenton	70 percent

2.7 Seed shall be fresh, clean new-crop seed that complies with the tolerance for purity and germination established by Official Seed Analysts of North America. Seed mix shall be the same as for sod.

PART 3 EXECUTION

3.1 Surface Restoration, General

A. All areas disturbed as a result of construction shall be restored to their original condition as nearly as possible, or surfaced as shown on the Plans. All excess material shall be removed from the site. Any damaged concrete walks or driveways shall be restored. All dirt and debris that accumulates from the

CONTRACTOR's operations shall be removed from inlets, catch basins, connecting pipelines and similar structures. Any material entering manholes or ditch culverts from street resurfacing and trenching work shall be removed. Daily clean up of all visible mud and debris is required.

B. All open fields, unpaved public rights-of-way or easements, and other areas not used as driveways, as shown on the Plans or as directed by the Asotin County PUD, shall be restored by placement of 12 inches of topsoil, fine grading and hydroseeding

1. Seeding shall be completed as specified in these Specifications.
2. Settlement of 2 inches or more within one year of substantial completion shall require repairs and re-seeding as directed by the Asotin County PUD and at the CONTRACTOR'S expense.
3. Restorations occurring on private property shall be seeded to match existing conditions and coordinate with the Asotin County PUD and private property owner.

3.2 Aggregate Pavement Base

A. Place pavement base to the depth shown on the plans or as specified in all cases, pavement base shall be compacted to a minimum depth of 6 inches. Bring the top of the pavement base to a smooth, even grade at a distance below finished grade equivalent to the required pavement depth.

B. Compact the pavement base with mechanical vibratory or impact tampers to a density of not less than 95 percent of the maximum density, as determined by AASHTO T-99.

3.3 Temporary Surfacing

Before replacement of the temporary surfacing (crushed rock or cold mix asphalt), the CONTRACTOR shall continuously maintain the trenches in a condition acceptable to the Asotin County PUD and/or local transportation agency at no additional cost to the Asotin County PUD.

3.4 Asphalt Concrete Pavement

A. CONTRACTOR shall conform to the requirements for prime coat and tack coat in 5-04.3 of the Standard Specifications for Municipal Construction. Tack coat all edges of existing pavement, manhole and clean out frames, inlet boxes and like items. When rate is not specified, asphalt will be applied at the rate of 0.1 gallon per square yard.

B. Asphalt Concrete Placement

1. Except as specifically modified herein, conform to the requirements for construction in Standard Specifications for Municipal Construction. All trench cuts shall be kept in a smooth condition throughout the duration of the project.
2. The limits of the restoration shall include all damaged or undermined surfacing.
3. Provide a smooth tee cut by saw cutting the existing pavement parallel to the trench and beyond the sides of the trench excavation as shown on the plans. Remove any pavement which has been damaged or which is broken and unsound outside this area by making alternating traverse and parallel saw cuts. Parallel cuts must be a minimum of 25 feet long, unless otherwise directed by the Asotin County PUD. Provide a smooth, sound edge for joining the new pavement.
4. Place the asphalt concrete to the specified depth on the prepared subgrade over the trench. When depth is not specified, place asphalt concrete to the depth of the adjacent pavement, up to a maximum of 6 inches, at the direction of the Asotin County PUD. Minimum depth of pavement shall be 3 inches. When a prime coat is specified, place asphalt concrete after the prime coat has set. Maximum thickness for any one lift of pavement shall not exceed 2 inches. Spread and level the asphalt concrete with hand tools or by use of a mechanical spreader.
5. When the utility trench is placed closer than 3 feet inside the edge of existing pavement, the remaining pavement must be removed and replaced with the trench repair. When the trench is under the existing edge of pavement, additional pavement shall be removed to allow a three (3) foot minimum width of repair and to maintain the original street width.
6. Settlement of 1/4-inch or greater for asphalt concrete patches, occurring within one year of substantial completion, shall require repair or replacement as directed by the Asotin County PUD at the CONTRACTOR'S expense.

3.5 Concrete

A. Replace concrete driveways, sidewalks and curbs to the same section, width, depth, line and grade as that removed or damaged. Saw broken or jagged ends of existing concrete on a straight line and to a vertical plane. Place new concrete only on approved compacted trench.

B. Replace concrete driveways and sidewalks between scored joints and make replacement to prevent a patched appearance. Unless otherwise shown,

provide a minimum 2-inch thick compacted leveling course of clean 3/4-inch minus crushed aggregate.

C. All replaced concrete driveways, sidewalks and curbs shall be constructed in accordance with ADA and applicable Asotin County or City of Clarkston standards.

3.6 Pavement Marking and Signage

Pavement marking and signage shall be replaced to match existing. Replacement of pavement marking and signage shall conform to the following sections of the Standard Specification for Municipal Construction:

A. 8-08: Rumble Strips

B. 8-09: Raised Pavement Markers

C. 8-21: Permanent Signing

D. 8-22: Pavement Marking

E. 8-23: Temporary Pavement Marking

3.7 Rock Surfacing

Place rock surfacing only where shown on Plans or as directed by the Asotin County PUD on streets, driveways, parking areas, street shoulders and other areas disturbed by the construction. Rock surfacing shall be 1 1/4 inches, or ¾ inch crushed aggregate, as directed by the Asotin County PUD. Spread the rock surfacing to conform to adjacent existing grades and surfaces as directed. Compact as directed with mechanical vibratory or impact tamper.

3.8 Landscaping Restoration

Restore all landscaped areas, yards and areas specifically identified on the drawings damaged as a result of construction as follows:

A. Place 8 inches of topsoil.

B. Removed landscaped material shall be replaced in-kind.

C. Yard areas shall be restored and sod placed immediately upon completion of backfilling.

D. Seed/Sod Maintenance: Begin maintenance immediately after each portion of grass is planted and continue for 8 weeks after all planting is completed.

E. Seed/Sod Guarantee: If, at the end of the 8-week maintenance period, a satisfactory stand of grass has not been produced, the CONTRACTOR shall renovate and reseed the grass or unsatisfactory portions thereof immediately, or, if after October 15, during the next planting season. If a satisfactory stand of grass develops by July 1 of the following year, it will be accepted. If it is not accepted, a complete replanting shall be required during the planting season meeting all of the requirements specified.

F. A satisfactory stand is defined as grass or section of grass that has:

1. No bare spots larger than 1 square foot.
2. Not more than 10 percent of total area with bare spots.

3.9 Dust Control

When the weather is dry and when, in the estimation of the Asotin County PUD, the dust becomes a nuisance, the CONTRACTOR shall sprinkle water on surface streets twice a day in order to keep the dust down. This sprinkling shall be maintained until the project is accepted. On paved streets when the backfilling has been completed, the streets shall be washed to remove all dirt and debris. If the dust becomes a nuisance before backfilling is completed, the CONTRACTOR shall wash the streets to the satisfaction of the Asotin County PUD and local transportation agency.

END OF SECTION

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SECTION 120

CASINGS AND APPURTENANCES

PART 1 GENERAL

1.1 Description

A. Work under this section includes all labor, equipment and materials required for constructing cased crossings by tunneling/boring/jacking and open trench installation, as shown on the Plans. The CONTRACTOR shall furnish and install steel casings, carrier pipe, sand fill, and grout, complete and in place, all in accordance with these provisions.

B. If the CONTRACTOR is not ready to place the carrier pipe in the casing upon completing the casing installation, the casing ends shall be bulkheaded. In addition, all trenches and pits in public streets, private property, and within City, County or State right-of-way shall be backfilled, temporary or permanent surfacing placed thereon, and the affected area reopened to traffic, as necessary.

C. The CONTRACTOR shall be responsible for maintaining the specified line and grade of the casing and carrier pipe.

D. The plans and these specifications indicate a specific type (tunneled/bored/ jacked or open trench), size, wall thickness and other required characteristics of casing to be installed at each cased crossing. The CONTRACTOR may propose to install casing types and sizes other than those specified on the plans and in these specifications. No changes will be allowed without the prior approval of the Asotin County PUD. The CONTRACTOR's attention is directed to the measurement and payment section. Measurement and payment shall be made for the size and type of casing identified on the plans only, regardless of any Asotin County PUD-approved changes. If the CONTRACTOR receives approval by the Asotin County PUD to install casing types and sizes other than those specified on the plans and in these specifications, it is the CONTRACTOR's responsibility to ensure that casing types and sizes are fully compatible with project constraints, including traffic control, project work limits, roadway and utility system shut down requirements, work hour limitations, and adjacent structures.

1.2 Reference Specifications, Codes, and Standards

ANSI/AWS D1.1	Structural Welding Code
ANSI/AWWA C200	Standards for Steel Water Pipe (6 inches and larger)

ANSI/AWWA C151/A21.51	Ductile Iron Pipe, Centrifugally Cast, for Water or Other Liquids
ANSI/AWWA C111/A21.11	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
ANSI/AWWA C600	Installation of Ductile-Iron Water Mains and Their Appurtenances
ASTM C76	Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe

1.3 Submittals

A. The CONTRACTOR shall submit Shop Drawings of casings. Shop Drawings shall include the following:

1. Safety Plan
2. Casing installation schedules, including excavation, pipeline installation and backfill operations
3. Geotechnical investigation with a summary of subsurface conditions
4. Material list, including diameter, thickness and class of steel casings, and the type of insulators to be used
5. Method of grouting
6. Layout of work area
7. Pipe assembly procedures and laying plan
8. Location of insertion and receiving pits
9. Plan for pumping and disposal of dewatering
10. Erosion control plan

B. The CONTRACTOR shall submit a plan to be approved by the Asotin County PUD for preventing loss-of-ground or settlement during all casing installation and related work. This plan shall also include the CONTRACTOR's method for monitoring surface settlement of existing ground above the casing alignment during all casing installation and related work.

C. The CONTRACTOR shall furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section which shall include the physical and chemical properties of all steel.

C. All expenses incurred in making samples for certification of tests shall be borne by the CONTRACTOR.

1.4 Quality Assurance

A. The CONTRACTOR shall give the Asotin County and right-of-way owner one (1) week advance notice prior to the start of any excavation.

B. All work shall be performed in the presence of the Asotin County PUD, unless the Asotin County PUD has granted prior approval to perform such work in their absence.

D. All shop and field welding procedures used to fabricate steel casings shall be prequalified under the provisions of ANSI/AWS D1.1. Welding procedures shall be required for, but not necessarily limited to, longitudinal and girth or special welds for pipe cylinders, casing joint welds, reinforcing plates and grout coupling connections.

D. All welding shall be done by skilled welders, welding operators, and tackers who have had adequate experience in the type of materials, welds, and positions to be used. Welders shall be qualified under the provisions of ANSI/AWS D1.1 by an independent, local approved testing agency prior to commencing work on the casing or pipeline. Machines and electrodes similar to those used in the work shall be used in qualification tests. The CONTRACTOR shall furnish all materials and bear the expense of qualifying welders.

1.5 Safety

It shall be the CONTRACTOR's responsibility to see that the work is done in conformance with all applicable federal, state, and local safety requirements.

PART 2 PRODUCTS

2.1 General

The CONTRACTOR shall use the types of materials as designed and specified herein for all required cased crossing construction.

2.2 Casing

A. Tunneled/bored/jacked casings shall be steel. Open trench installed casings shall be steel as shown on the drawings or herein specified.

B. The steel casing pipe shall be the minimum diameter and wall thickness shown on the plans or herein specified and shall be furnished complete with welded joint ends. The casing shall conform to ANSI/AWWA C200. Larger pipe diameter or greater wall thickness may be substituted at the CONTRACTOR's option and with the approval of the Asotin County PUD. All CONTRACTOR proposals for changing the casing and appropriate insulator modifications shall be submitted to the Asotin County PUD for approval prior to installation. It shall be the CONTRACTOR's responsibility to provide casings with a wall thickness capable of withstanding jacking stresses.

C. The steel casing shall be fabricated in sections with field-welded full penetration butt weld joints. It shall be the CONTRACTOR's responsibility to provide joints capable of withstanding jacking stresses.

2.3 Casing Insulators

The carrier pipe shall be installed with casing insulators banded to it for guides and support as shown on the plans. Insulators shall be a minimum of 12 inches wide. A minimum of two (2) insulators shall be installed on each pipe length at a maximum spacing of 12 feet, unless closer spacing is recommended by the manufacturer. The casing insulator shall be constructed of heat-fused plastic coated galvanized steel with built up PVC lining and multi-segmented to attach firmly around the pipeline. Insulators shall be fabricated for a carrier-pipe-centered configuration with a minimum of two (2) skids on top and two (2) on the bottom. Insulator skids shall be sized to provide clearance of carrier pipe bell coupling, or retainer gland and not more than 1-1/2 inch of clearance from the top skids to the inside top of the casing. The casing insulators shall be M-12 Series, as manufactured by Calpico, Inc. or approved equal. Insulators shall be sized to fit and attach to the carrier pipe material including any identified special coatings without damage.

2.4 Cement Grout

Cement grout shall consist of one (1) part Portland cement, three (3) parts clean, well-graded sand and a minimum amount of water.

2.5 Carrier Pipe

Carrier pipe shall be as provided for elsewhere in these specifications and as shown on the drawings.

PART 3 EXECUTION

3.1 General

A. Unless otherwise provided, the CONTRACTOR shall furnish and install all fittings, closure pieces, jointing materials and all appurtenances as shown and as required to provide a complete and workable installation. All fabrication and testing shall comply with the requirements listed herein.

B. The CONTRACTOR's attention is directed to the site plans which show the close proximity of adjacent structures and utilities to the proposed boring and casing areas. The CONTRACTOR shall be responsible for providing all shoring as may be required to maintain a safe excavation and shall at all times provide sufficient support and protection for existing structures and utilities, all at no additional expense to the Asotin County PUD. The CONTRACTOR shall keep the size of boring, jacking, receiving, and push pits to a minimum.

C. The CONTRACTOR shall carefully study the plans and specifications applicable to the work involved, and contact the Asotinc County PUD about any irregularities or difficulties, and become familiarized with the conditions, nature of excavation, and difficulties involved with installing pipe and casings.

D. Failure on the part of the CONTRACTOR to properly assess the factors, conditions and difficulties involved in the performance of the work will not entitle extra compensation of any kind, nor relieve any obligation for executing all details of the work as specified and planned. The CONTRACTOR shall assess push pits associated with open trench installed casings, as well as boring, jacking, and receiving pits.

E. Prior to moving the bore machine from the project, the CONTRACTOR shall verify that the installed casings are of sufficient length to facilitate construction of all drawing details. The plans identify the approximate casing length only. It is solely the CONTRACTOR’s responsibility to field verify that the casing ends terminate at a location which will facilitate the construction of all drawing details.

F. The CONTRACTOR shall monitor surface settlement of existing ground above the casing alignment during all casing installation and related work.

3.2 Installation of Casings

A. Allowable grade deviations in horizontal and vertical alignments shall be no greater than 0.2 feet per 100 feet in any direction over the length of the casing to a maximum deviation of 0.5 feet.

B. The CONTRACTOR shall backfill all pits excavated for casings with compacted material (select backfill, native or imported as required for adjacent trench or as otherwise specified or shown on the drawings) once construction is completed. Backfill shall be placed and compacted in accordance with Section 102. – Backfilling and Compacting for Utilities:

C. Compensation will be made for the casing installation as defined in the measurement and payment provisions located elsewhere in these specifications and regardless of the material encountered - unclassified material and rock.

3.3 Installation of Carrier Pipe

A. Installation of carrier pipe shall be in accordance with ANSI/AWWA C600. All joints of the carrier pipe within the casing shall be push-on or restrained joints as shown on the plans and shall be in accordance with the specification sections for the type of pipe material installed. Application of any coatings to the interior and exterior joints shall be performed in accordance with the requirements provided for elsewhere in these specifications.

B. Installation of insulators onto carrier pipe and the subsequent installation of carrier pipe shall not damage, rupture or tear any carrier pipe or coatings. In the event of such damage, the CONTRACTOR shall repair or replace pipe or coating systems.

C. Testing of carrier pipe shall be performed in accordance with the Section 300 - Pipeline Testing and Disinfection.

3.4 Applications of Cement Grout

After installation of the carrier pipe and sand fill, the ends of the casing pipe shall be sealed with cement grout to prevent moisture from entering the casing. The cement grout shall consist of one (1) part Portland cement, three (3) parts clean, well-graded sand and a minimum amount of water. Cement grout plugs shall extend a minimum of 12-inches into casings.

3.5 Grouting of Voids around Casing Pipe

A. The CONTRACTOR shall immediately notify the Asotin County PUD during jacking and boring operations of any situation resulting in or expected to result in the creation of voids external to the casing pipe. Upon the Asotin County PUD's approval, voids outside the casing pipe shall be noted and recorded for subsequent filling with cement grout.

B. After the casing has been jacked into position, pressure grout to fill all noted voids, as approved by the Asotin County PUD. Grout shall be applied outside the casing pipe through 1-inch grout holes drilled through the casing pipe at

the spring line (both sides) and the crown. Hole spacing shall be as required for each noted void area. Grout filling shall proceed as follows:

1. Start grouting at the springline hole at one end.
2. Pump grout until grout appears in the grout hole at the crown.
3. Start grouting the opposite springline hole and proceed until grout appears at the crown.
4. Grout through the crown hole until grout appears in one of the next set of holes.
5. Plug the holes.
6. Move to the next set of holes and repeat grouting sequence until grout has been applied in all the holes.
7. Finish grouting the last set of holes when grout can no longer be pumped into the crown. Grouting commenced in any approved area shall be completed without stopping.
8. Grouting pressure shall be controlled to avoid deformation of the casing pipe.

END OF SECTION

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SECTION 121

DIRECTIONAL DRILLING

PART 1 GENERAL

1.1 Scope of Work

A. Work under this specification includes all labor, equipment and materials required for installation of pipe or conduit by horizontal directional drilling. The horizontal directional drilling will be completed in two phases. The first phase consists of drilling a small diameter pilot hole along the designed directional path as shown on the Plans. The second phase consists of enlarging the pilot hole to a diameter suitable for installation of the pipe or conduit, and pulling the pipe or conduit through the enlarged hole.

B. The CONTRACTOR shall be responsible for maintaining the specified line and grade.

1.2 Horizontal Directional Drilling Contractor Qualifications

A. Contractor Qualifications - The horizontal directional drilling contractor shall have at least five (5) years of experience with the installation of horizontal directionally drilled pipeline crossings at least 500 feet in length and at least 12 inches in pipeline diameter.

B. Superintendent Qualifications - The Superintendent/Foreman of each drilling crew shall have successfully completed at least three (3) installations of horizontal directionally drilled pipeline crossings at least 500 feet in length and at least 12 inches in pipeline diameter.

1.3 Contractor Submittals

All procedures or material descriptions requiring the Asotin County PUD and local transportation agency approval shall be submitted not less than three (3) weeks prior to commencing any horizontal directional drilling activities at the crossing location. Submittals shall include, but are not limited to, the following:

A. Safety Plan

B. Drilling schedule

D. Erosion control plan

E. Geotechnical investigation with a summary of subsurface conditions

F. List of equipment used for drilling

G. Layout of work area

H. Drilling procedure

I. Pipe assembly procedures and laying plan

J. Location of insertion and receiving pits

K. Plan for pumping and disposal of dewatering

L. Plan for minimizing and disposal of drilling fluids

M. A "frac-out" detection and emergency response plan suitable for approval by all regulatory agencies with authority over the directional drilling operation at the project location. The plan shall include a discussion and description of the "frac-out" potential on the project and shall include proposed conservation measures.

1.4 Protection of Underground Facilities

A. The CONTRACTOR shall coordinate with the Asotin County PUD in locating all existing lines, cables, or other underground facilities including exposing any facilities which are located within 10 feet of the designed drill path.

B. The CONTRACTOR shall be responsible for locating any and all underground facilities regardless of the Asotin County PUD's previous efforts in this regard. The CONTRACTOR shall be responsible for all losses and repairs to underground facilities resulting from drilling operations.

1.5 Quality Assurance

The CONTRACTOR shall give the Asotin County PUD a minimum of one (1) week advance notice prior to the start of any directional drilling.

1.6 Safety

The CONTRACTOR shall be responsible in seeing that the work is done in conformance with all applicable federal, state and local safety requirements.

PART 2 PRODUCTS

2.1 General

All materials and equipment used in the drilling systems shall be of high quality and generally accepted in the industry. Horizontal directional drilling shall be performed according to the standards of the industry and these specifications and shall include all labor, equipment and consumables necessary to complete the work as shown on the plans.

PART 3 EXECUTION

3.1 General

A. Unless otherwise provided, the CONTRACTOR shall furnish and install all fittings, closure pieces, jointing materials and all appurtenances as shown and as required to provide a complete and workable installation. All fabrication and testing shall comply with the requirements listed herein.

B. The CONTRACTOR shall carefully study the plans and specifications applicable to the work involved, contact the Asotin CountyPUD's representative about any irregularities or difficulties, and be familiarized with the conditions, nature of excavation, and difficulties involved with horizontal directional drilling under the highway.

C. Failure on the part of the CONTRACTOR to properly appraise the factors, conditions and difficulties involved in the performance of the work will not entitle extra compensation of any kind, nor relieve any obligation of executing all details of the work as specified and planned. Buried logs and unmapped abandoned piling are existing site conditions that shall be anticipated by the CONTRACTOR. No time extension shall be granted and no additional compensation shall be made for difficulties encountered in drilling through or around these anticipated obstructions.

3.2 Work Area

A. The available work area is limited to the area designated within the construction limits as shown on the Plans.

B. The CONTRACTOR will be responsible for constructing any required temporary work pad for directional drilling in accordance with all applicable permits and local ordinances.

C. The CONTRACTOR shall contain the drilling fluid at all times and prevent the flow of drilling fluid out of the construction limits.

3.3 Pilot Hole

A. The pilot hole shall be drilled along the path shown on the drawings to the tolerances listed below:

1. Alignment - Within 3 feet from centerline of alignment shown.
2. Exit point Location - Plus or minus 10 feet of the length shown on the drawings.

B. During directional drilling the CONTRACTOR shall survey the location of the pilot hole every 20 feet. Upon the completion of the pilot hole drilling, the CONTRACTOR shall provide a tabulation of coordinates, referenced to the drilled entry point or to another approved suitable point that can be used to create an accurate as-built plan and profile of the pilot hole.

3.4 Ream and Pull Back

A. Pre-reaming operations shall be conducted at the discretion of the CONTRACTOR. All provisions of this specification relating to simultaneous reaming and pulling back operations shall also pertain to pre-reaming operations.

B. The maximum allowable pull load imposed on the High Density Polyethylene (HDPE) pressure pipe shall be calculated by the CONTRACTOR and submitted to the Asotin County PUD for review. All pulling loads shall be monitored and recorded.

3.5 Drilling Fluids

A. The composition of all drilling fluids proposed for use shall be submitted to the Asotin County PUD for review and approval. No fluid will be approved or utilized that does not comply with permit or environmental regulations.

B. The CONTRACTOR is responsible for obtaining, transporting and storing any water required for drilling fluids.

C. The CONTRACTOR shall maximize recirculation of drilling fluid surface returns. The CONTRACTOR shall provide solids control and fluid cleaning equipment of a configuration and capacity that can process surface returns and produce drilling fluid suitable for reuse. The Asotin County PUD will review standards for solids control and cleaning equipment performance or for treatment of excess drilling fluid and drilled spoil.

D. Disposal of excess drilling fluids is the responsibility of the CONTRACTOR and shall be conducted in compliance with all environmental requirements.

3.6 Instrumentation

The CONTRACTOR shall provide and maintain instrumentation at all times which will accurately locate the pilot hole, measure drill string axial and torsional loads, and measure drilling fluid discharge rate and pressure. The Asotin County PUD will have access to these instruments and their readings at all times.

END OF SECTION

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NOTES:

1. RETAIN AND PROTECT ALL EXISTING UTILITIES. PRIVATE UTILITIES (PHONE, GAS, POWER) THAT REQUIRE RELOCATION FOR PROPOSED IMPROVEMENTS SHALL BE COMPLETED THROUGH COORDINATION WITH THE PRIVATE UTILITY.

2. PRIOR TO BACKFILLING A MANHOLE, FITTINGS, TAPPING SADDLE, SEWER STUB, CLEAN OUT, CALL PUD FOR ACCEPTANCE INSPECTION AND SURVEY SHOT.

3. THE EXISTING UTILITY PIPE SIZE, TYPE, LOCATION, AND ELEVATION ARE APPROXIMATE. EXISTING UTILITIES WERE LOCATED FROM SURVEYED FIELD MARKINGS OR OTHER MARKINGS PROVIDED BY PUD. EXACT LOCATION MAY VARY FROM THAT SHOWN. CONTRACTOR TO FIELD VERIFY SIZE AND LOCATION OF EXISTING UTILITIES. IF EXISTING UTILITIES ARE IN CONFLICT WITH NEW UTILITIES, CONTRACTOR SHALL CONTACT PUD REGARDING MINOR REALIGNMENT. COSTS FOR MINOR ADJUSTMENTS TO BE INCLUDED IN CONTRACTOR'S UNIT PRICES.

4. ALL WATER SERVICES AND EXISTING WATER MAINS SHALL BE LEFT IN SERVICE UNTIL THE NEW WATER MAIN IS TESTED AND ACCEPTED BY THE PUD. COORDINATE ALL WATER MAIN AND SERVICE SHUTDOWNS WITH THE PUD. A MINIMUM 72-HOUR ADVANCED NOTICE IS REQUIRED.

5. CONTRACTOR IS RESPONSIBLE FOR DISPOSING OF FLUSHING AND TESTING WATER.

6. DEFLECT PIPE AND FITTING JOINTS AS REQUIRED TO ACHIEVE ALIGNMENT SHOWN. MAXIMUM PIPE JOINT DEFLECTION SHALL NOT EXCEED 50% OF THE MANUFACTURER'S ALLOWABLE JOINT DEFLECTION.

7. ALL BACKFILL MATERIAL SHALL BE DRY AND NOT FROZEN.

8. CONTRACTOR TO MAINTAIN INGRESS/EGRESS FROM ALL PRIVATE PROPERTY DRIVEWAYS DURING CONSTRUCTION.

9. GRIP RING PIPE RESTRAINER IS REQUIRED AT ALL MJ FITTINGS PER THE STANDARD SPECIFICATIONS.

10. STREET REPAIR SECTION PER STANDARD DRAWINGS 1-4A,1-4B, 1-4C, 1-8A, 1-8B AS INDICATED ON DRAWINGS OR AS DIRECTED BY THE PUD.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

GENERAL NOTES

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	1-0

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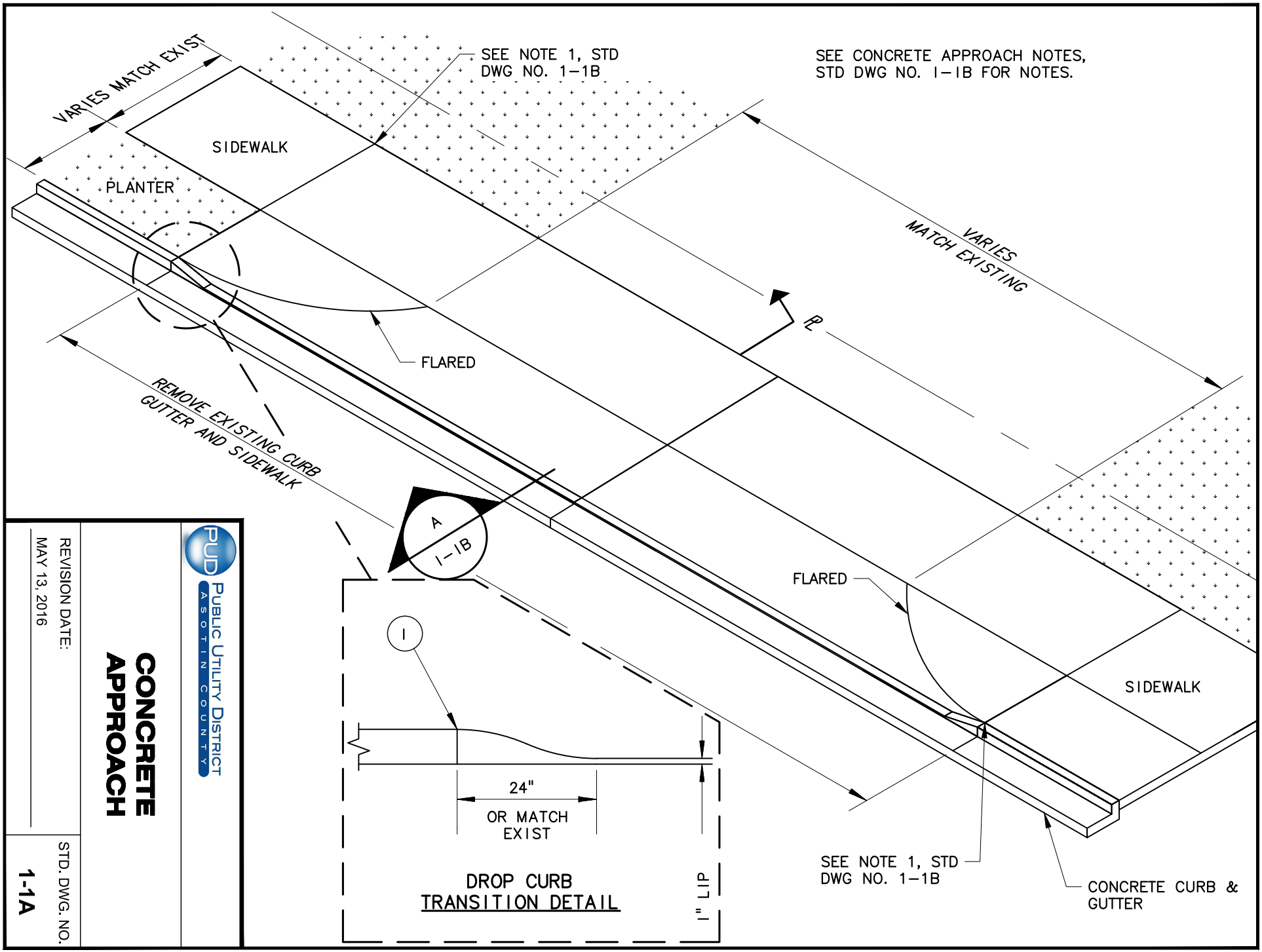

PUD Public Utility District Asotin County

CONCRETE APPROACH

REVISION DATE: MAY 13, 2016

STD. DWG. NO. 1-1A

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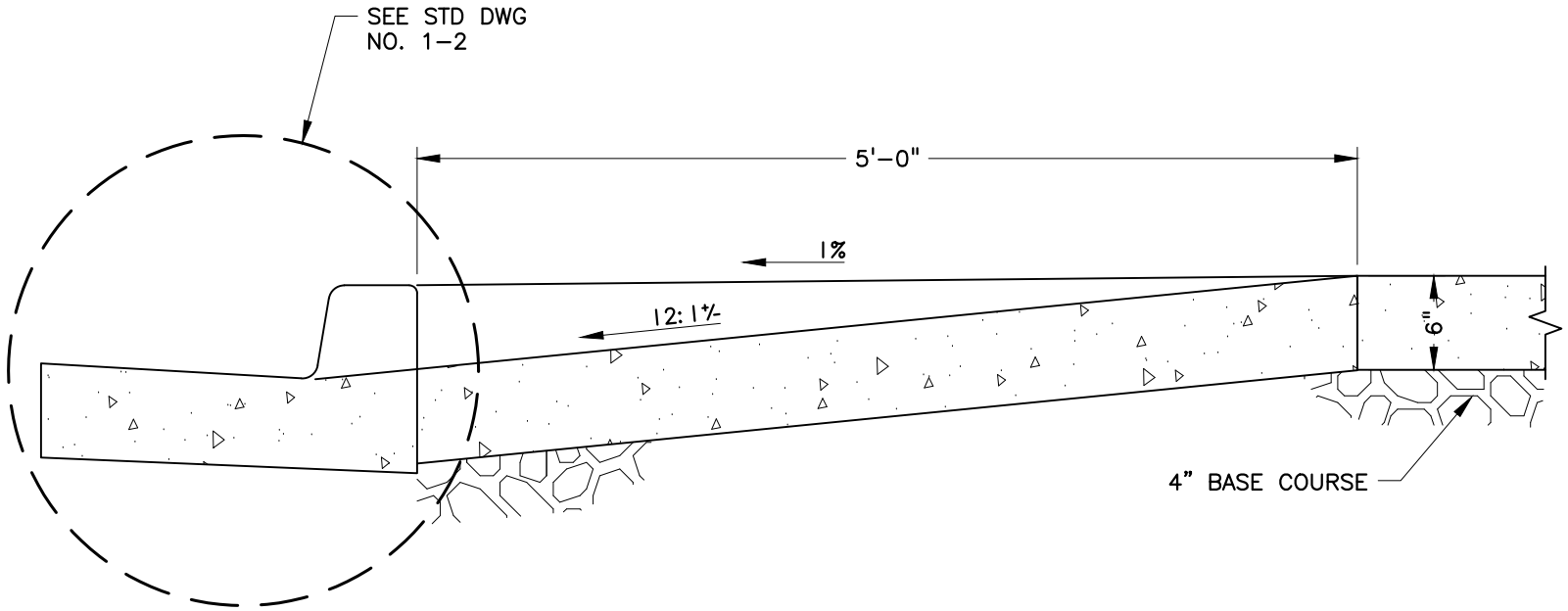

NOTES:

1. FULL DEPTH EXPANSION JOINT, 3/8" MINIMUM THICKNESS.
2. DRIVEWAY SECTION WITHIN PUBLIC RIGHT–OF–WAY IS TO BE SURFACED WITH ASPHALT OR CONCRETE.
3. DRIVEWAY CEMENT CONCRETE DEPTH SHALL BE A MINIMUM OF 6" AND PLACED ON COMPACTED GRADE. DEPENDING ON VEHICLE LOADING, A STRUCTURAL DESIGN OF THE DRIVEWAY MAY BE REQUIRED BY THE ENGINEER.
4. CLEAN AND EDGE ALL JOINTS.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

CONCRETE APPROACH NOTES

REVISION DATE: MAY 13, 2016

STD. DWG. NO. 1-1B

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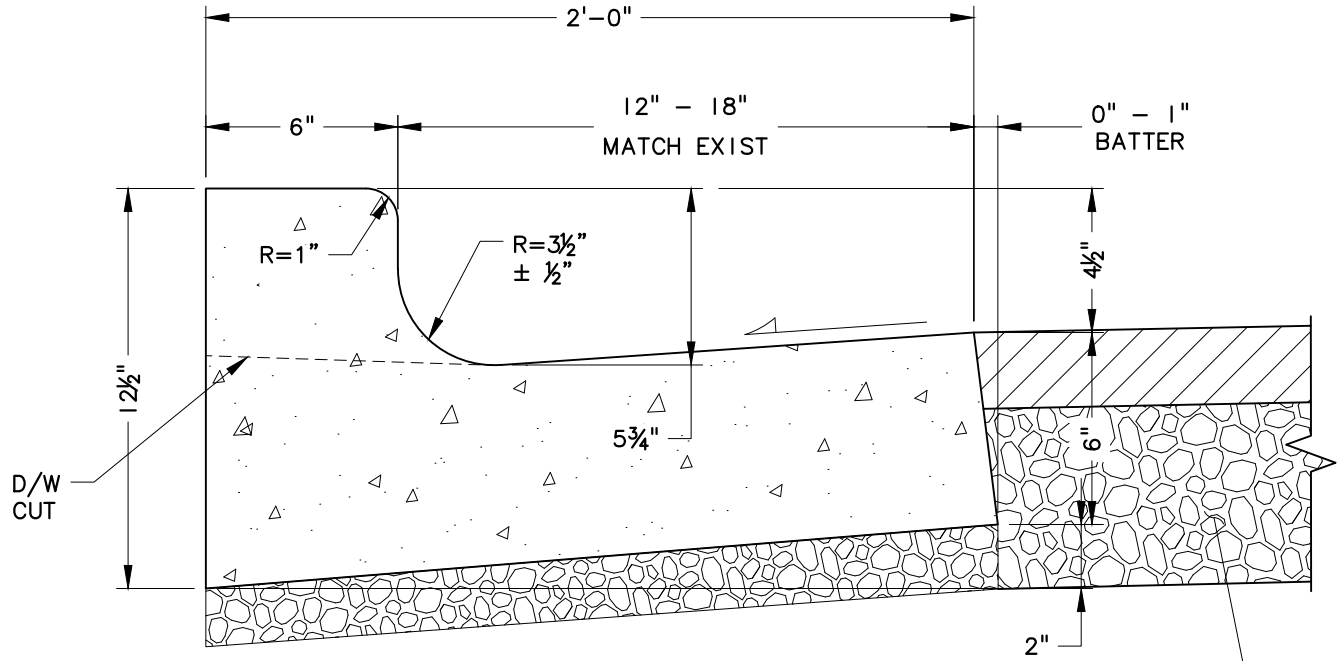
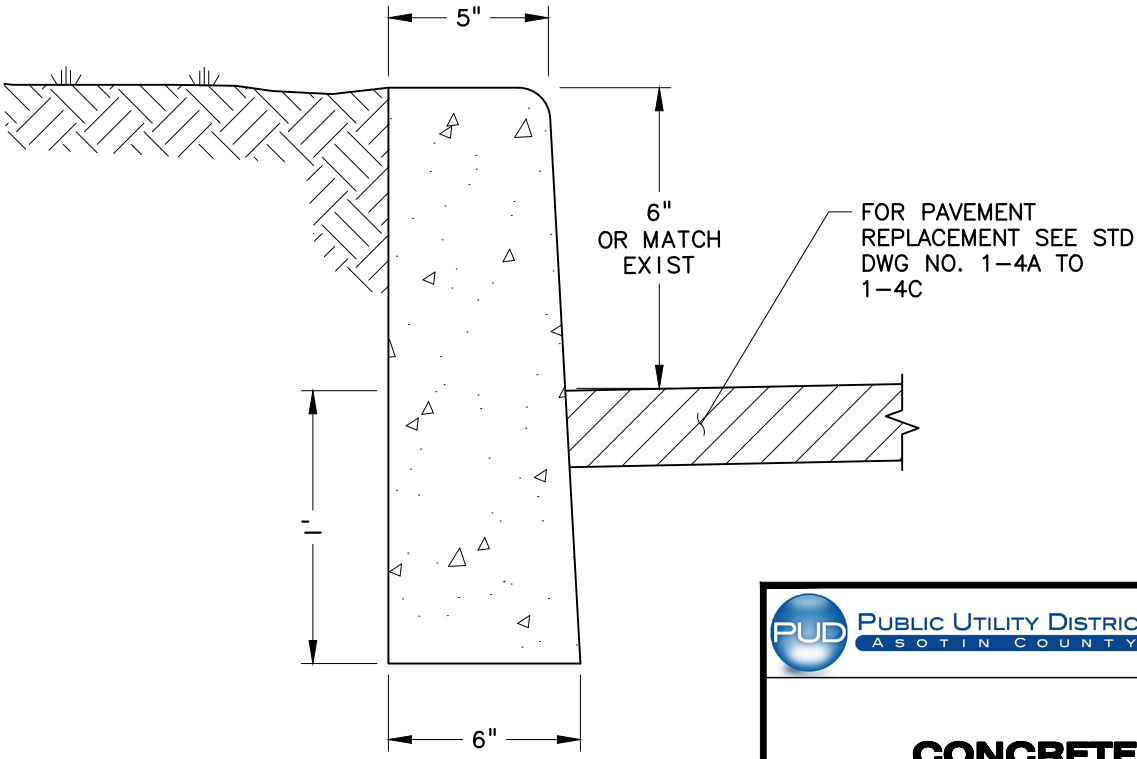


CONCRETE CURB AND GUTTER

FOR PAVEMENT REPLACEMENT SEE STD DWG NO. 1-4A TO 1-4C



CONCRETE VERTICAL CURB

PUBLIC UTILITY DISTRICT
ASOTIN COUNTY

CONCRETE CURB

REVISION DATE:	STD. DWG. NO.
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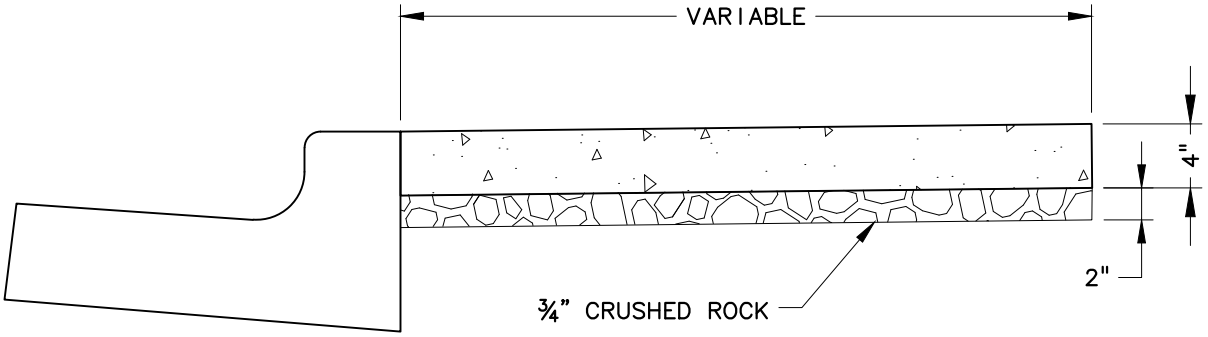
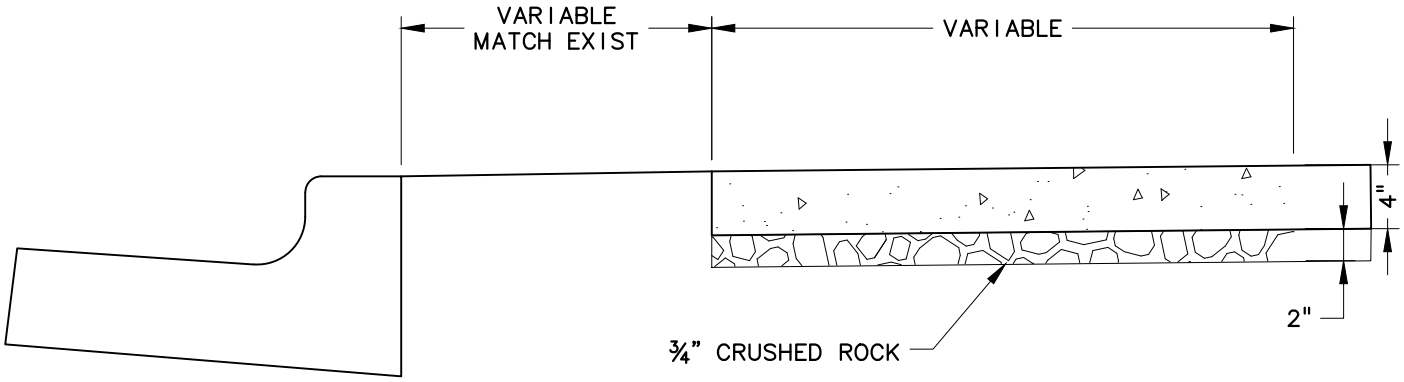


CONCRETE SIDEWALK
@ BACK OF CURB



CONCRETE SIDEWALK SEPARATE

NOTES:

1. AN APPROVED BOND PREVENTER SHALL BE PROVIDED BETWEEN SIDEWALK AND CURB WHEN POURED ADJACENT TO EACH OTHER. WHEN CONSTRUCTION NEW SIDEWALK ADJACENT TO CURB OR OLD SIDEWALK, THE JOINTS SHALL FALL IN THE SAME LINE.

2. SIDEWALK CONSTRUCTION JOINTS SHALL BE CONSTRUCTED AT 4' OR 5' SPACING TO MATCH EXISTING. APPROXIMATELY ⅛" WIDE, ¾" IN DEPTH, AND FINISHED AND EDGED SMOOTH. EXPANSION JOINTS TO BE AS SPECIFIED.

3. ALL SIDEWALK REMOVAL SHALL REQUIRE SAWED JOINTS.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

CONCRETE SIDEWALK

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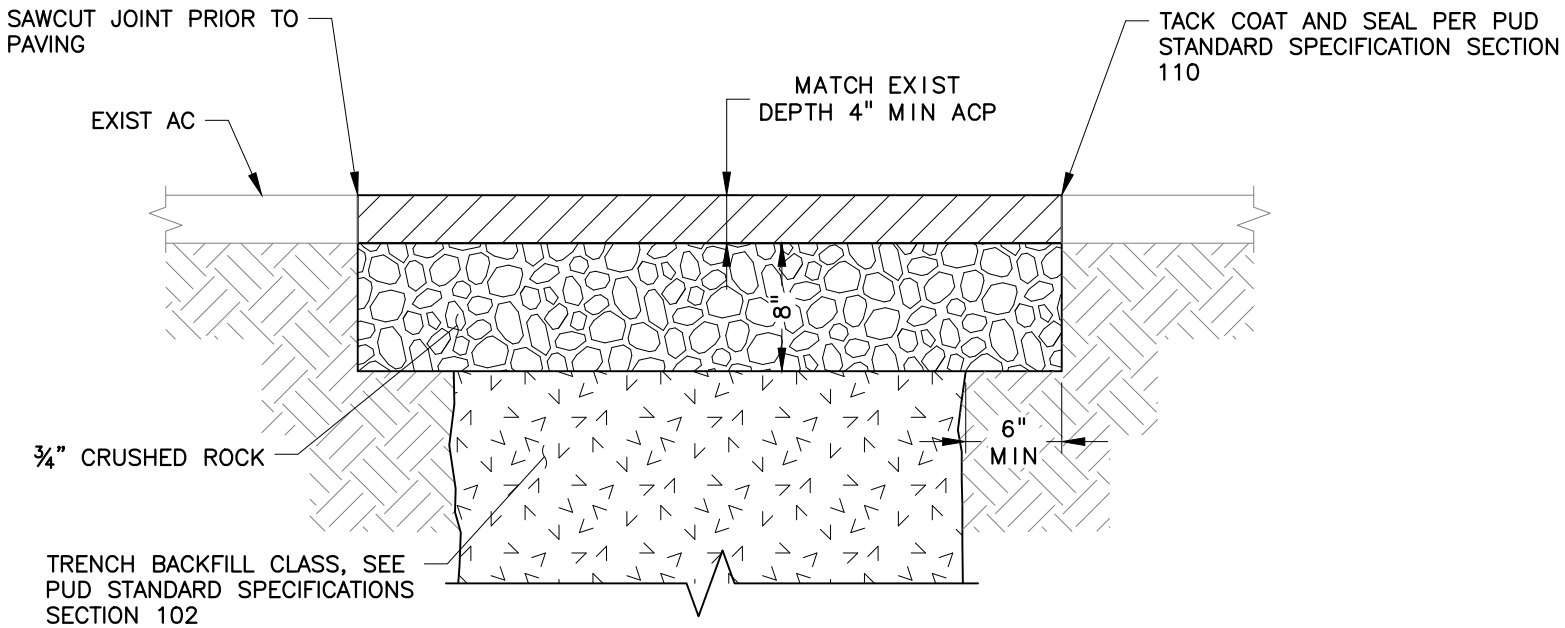

NOTES:

1. COMPLY WITH PUD STANDARD SPECIFICATION SECTION 110, PAVEMENT AND SURFACE RESTORATION.

2. SAWCUT LOCATIONS SHOWN ARE AT MINIMUM SETBACKS FROM TRENCH EDGE. EXTEND SAWCUT LOCATION TO EDGE OF PAVING IF WITHIN 3' TO THE EDGE OF PAVING OR AS REQUIRED TO REMOVE PAVEMENT DAMAGED BY CONSTRUCTION ACTIVITIES.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

ASOTIN COUNTY STREET REPAIR - AC TYPE "A"

REVISION DATE: MAY 13, 2016

STD. DWG. NO. 1-4A

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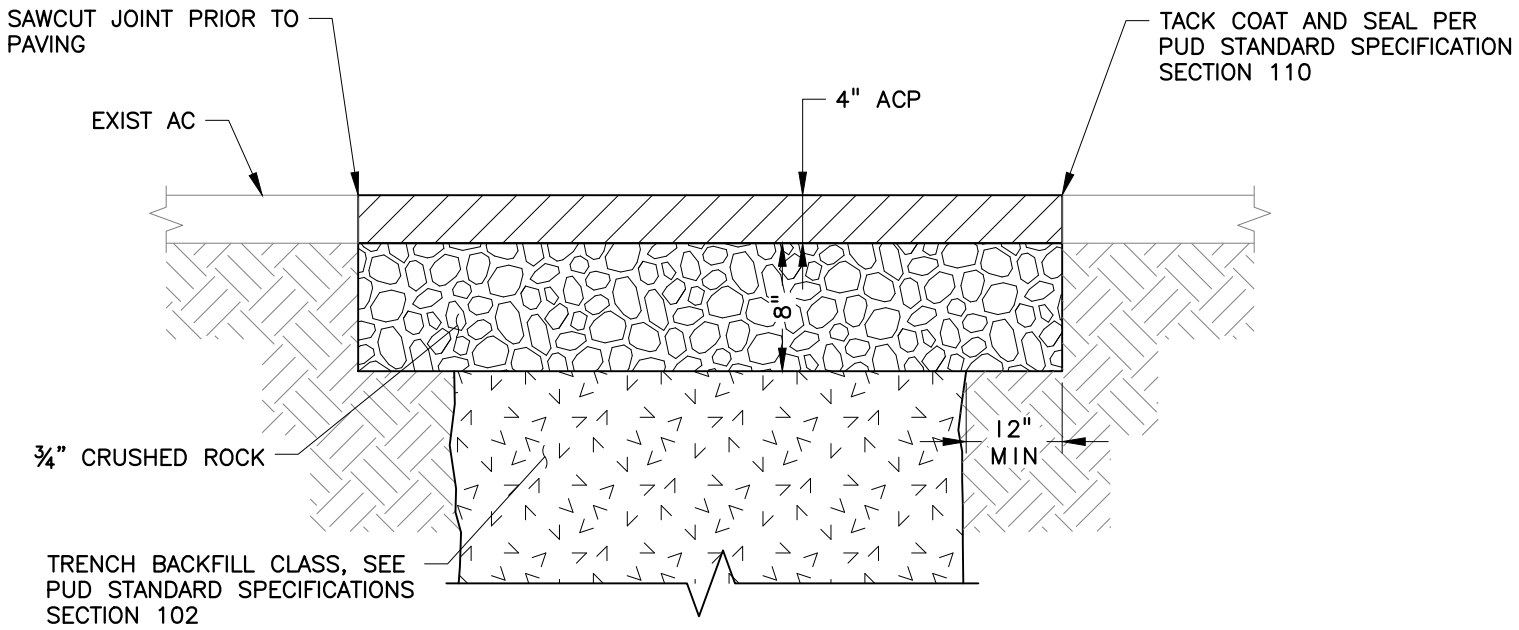

NOTES:

1. COMPLY WITH PUD STANDARD SPECIFICATION SECTION 110, PAVEMENT AND SURFACE RESTORATION.

2. SAWCUT LOCATIONS SHOWN ARE AT MINIMUM SETBACKS FROM TRENCH EDGE. EXTEND SAWCUT LOCATION TO EDGE OF PAVING IF WITHIN 3' TO THE EDGE OF PAVING OR AS REQUIRED TO REMOVE PAVEMENT DAMAGED BY CONSTRUCTION ACTIVITIES.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

CITY OF CLARKSTON STREET REPAIR - AC TYPE "B"

REVISION DATE: MAY 13, 2016

STD. DWG. NO. 1-4B

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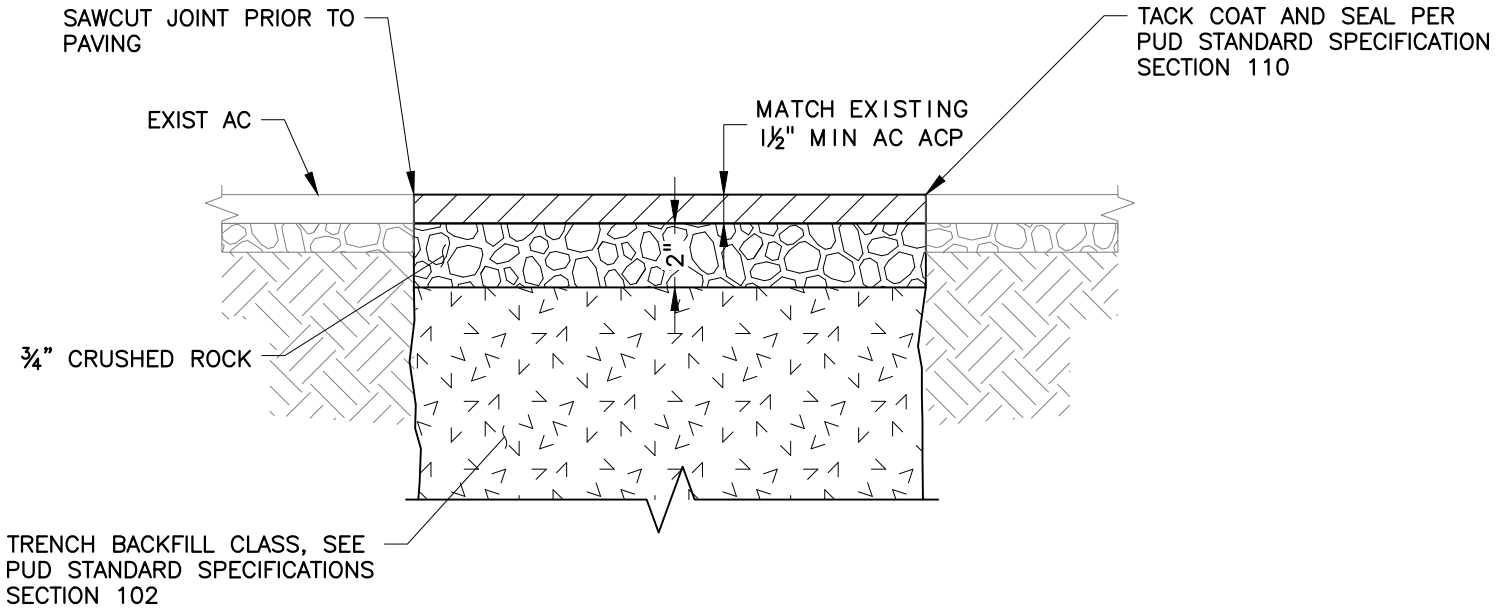

NOTES:

1. COMPLY WITH PUD STANDARD SPECIFICATION SECTION 110 PAVEMENT AND SURFACE RESTORATION.

2. SAWCUT LOCATIONS SHOWN ARE AT MINIMUM SETBACKS FROM TRENCH EDGE. EXTEND SAWCUT LOCATION TO EDGE OF PAVING IF WITHIN 3' TO THE EDGE OF PAVING OR AS REQUIRED TO REMOVE PAVEMENT DAMAGED BY CONSTRUCTION ACTIVITIES.

PUD Public Utility District Austin County

AC PARKING AREA REPAIR - AC TYPE "C"

REVISION DATE: MAY 13, 2016

STD. DWG. NO. 1-4C

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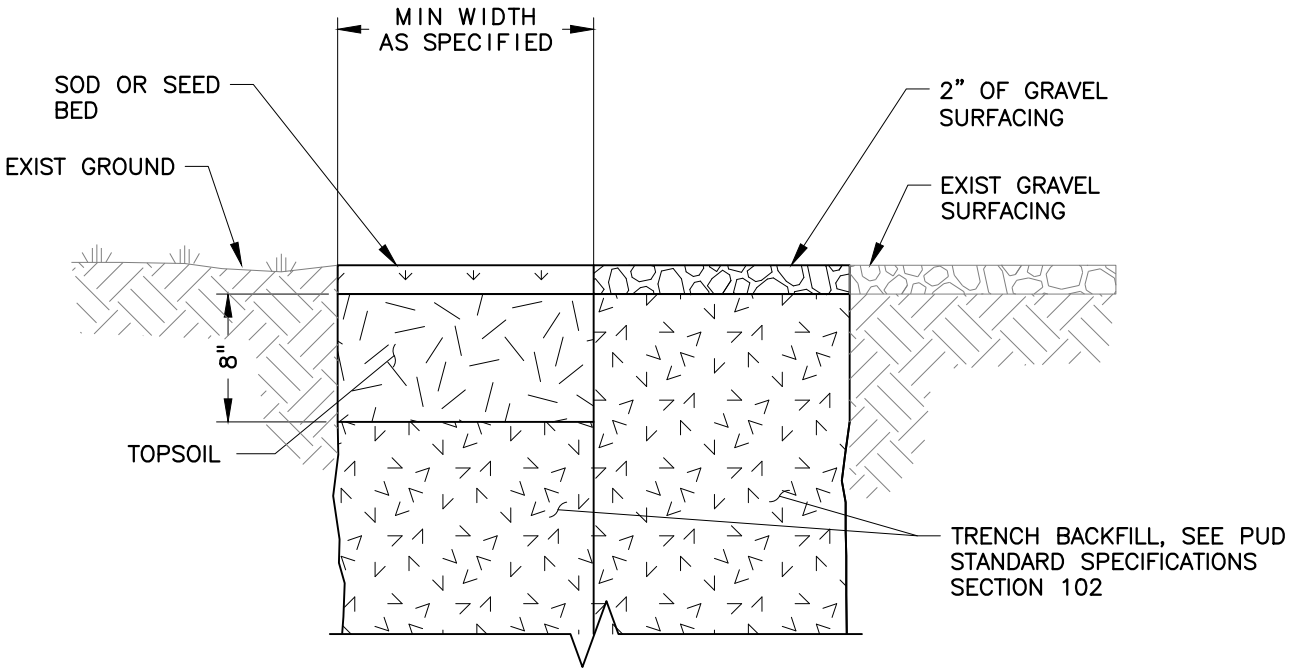

NOTES:

1. COMPLY WITH PUD STANDARD SPECIFICATION SECTION 110, PAVEMENT AND SURFACE RESTORATION.

2. SOD SHALL BE INSTALLED IN ALL DEVELOPED LAWNS DISTURBED BY CONSTRUCTION. SEED SHALL BE APPLIED IN PASTURES AND UNDEVELOPED AREA.

PUBLIC UTILITY DISTRICT
ASOTIN COUNTY

UNIMPROVED SURFACE RESTORATION

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	1-5

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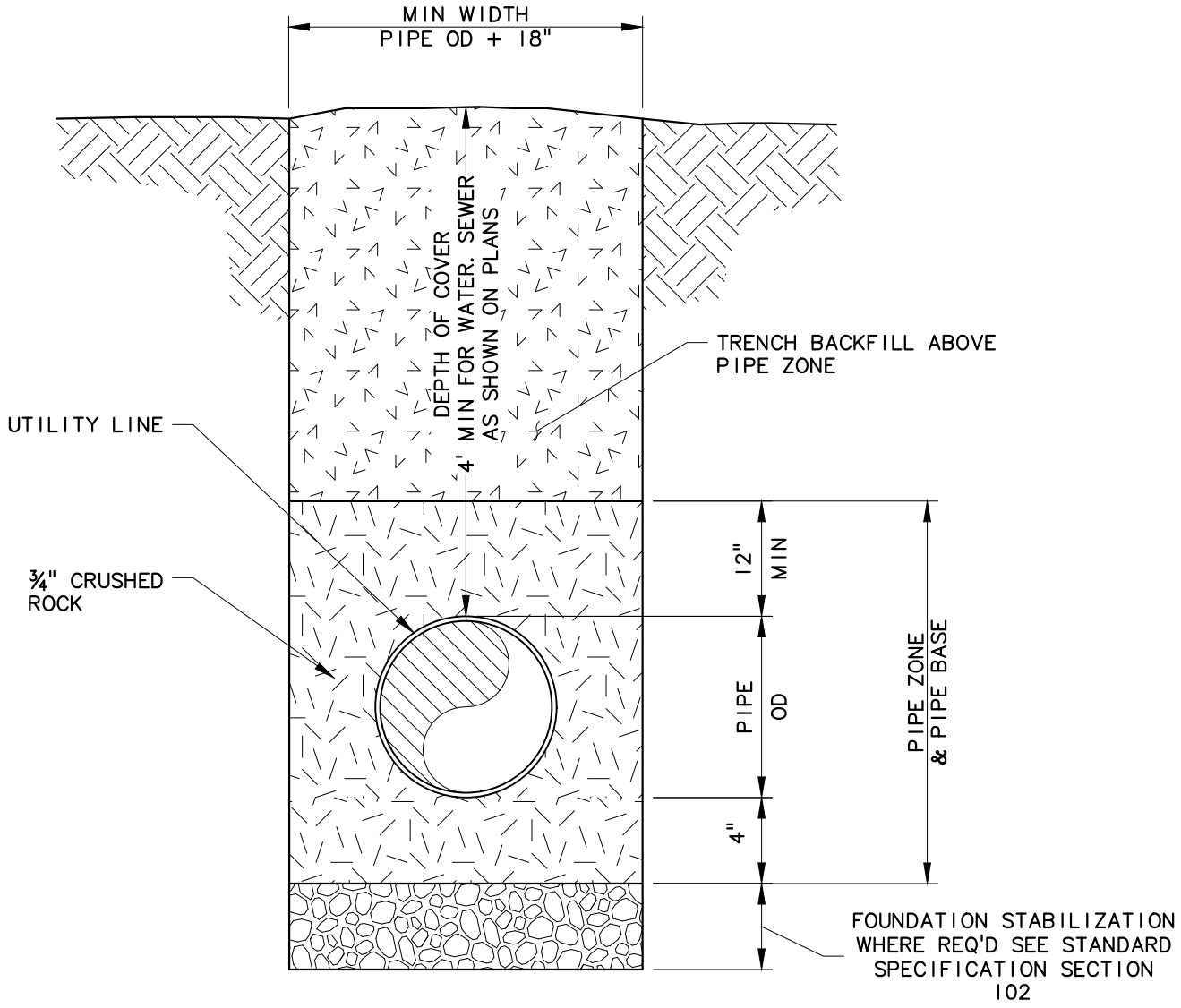

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

TYPICAL TRENCH

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	1-6

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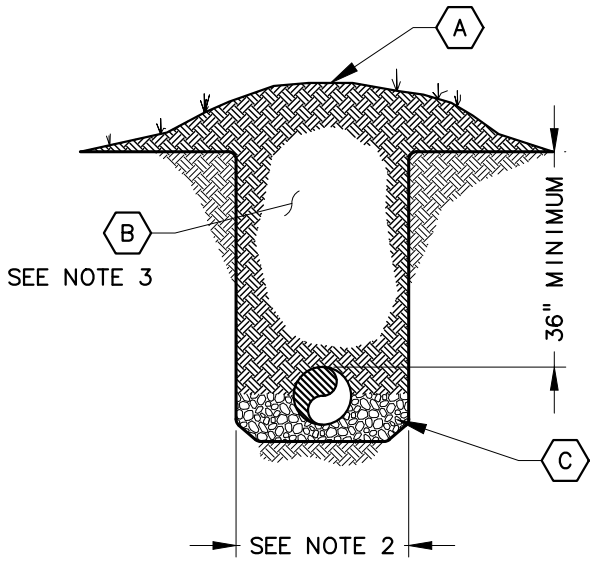

TRENCH CROSS SECTION

LEGEND

A — SURFACE RESTORATION WILL MATCH EXISTING ADJACENT TREATMENT (SEEDING, BARK, ETC).

B — NATIVE MATERIAL OR AS DIRECTED BY WSDOT.

C — BEDDING MATERIAL BENEATH PIPE/CASING SHALL BE SIX (6) INCHES. ADDITIONAL PIPE BEDDING SHALL BE EQUAL TO HALF THE DIAMETER OF THE PIPE/CASING OR SIX (6) INCHES, WHICHEVER IS LESS.

NOTES:

1. TRENCHING AND PIPE INSTALLATION SHALL MEET THE REQUIREMENTS OF WSDOT STANDARD SPECIFICATION 7-08.
2. MAXIMUM TRENCH WIDTH SHALL NOT EXCEED CASING/PIPE DIAMETER PLUS AN ADDITIONAL ONE (1) FOOT ON EITHER SIDE.
3. COMPACTION SHALL BE METHOD 'C' PER WSDOT STANDARD SPECIFICATION SECTION 2-03.3(14)(C).
4. CASING PIPES SHALL EXTEND A MINIMUM OF SIX (6) FEET BEYOND THE TOE OF FILL SLOPES, BOTTOM OF DITCHLINE, OR OUTSIDE OF CURB.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

OPEN TRENCH IN WSDOT RIGHT-OF-WAY

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	1-7

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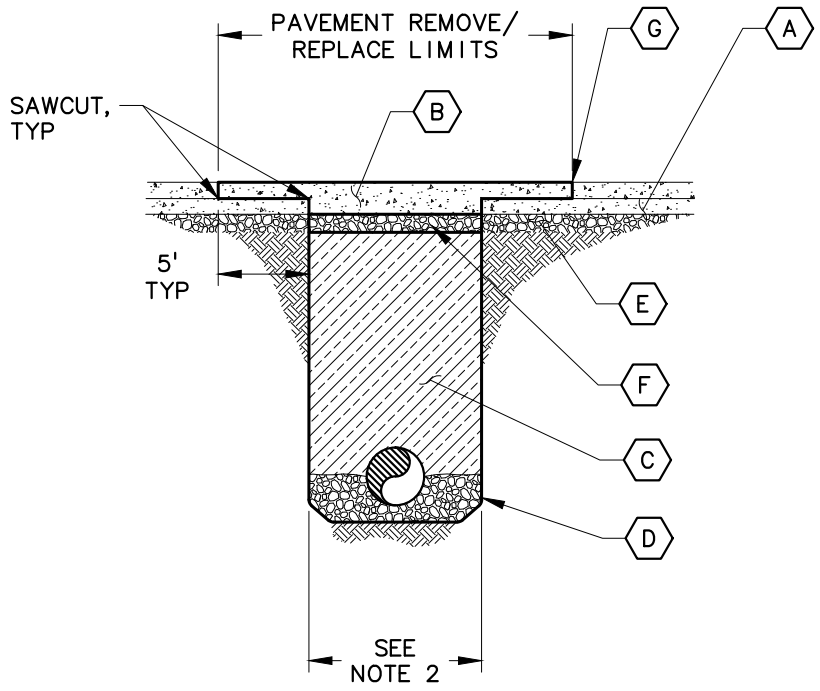
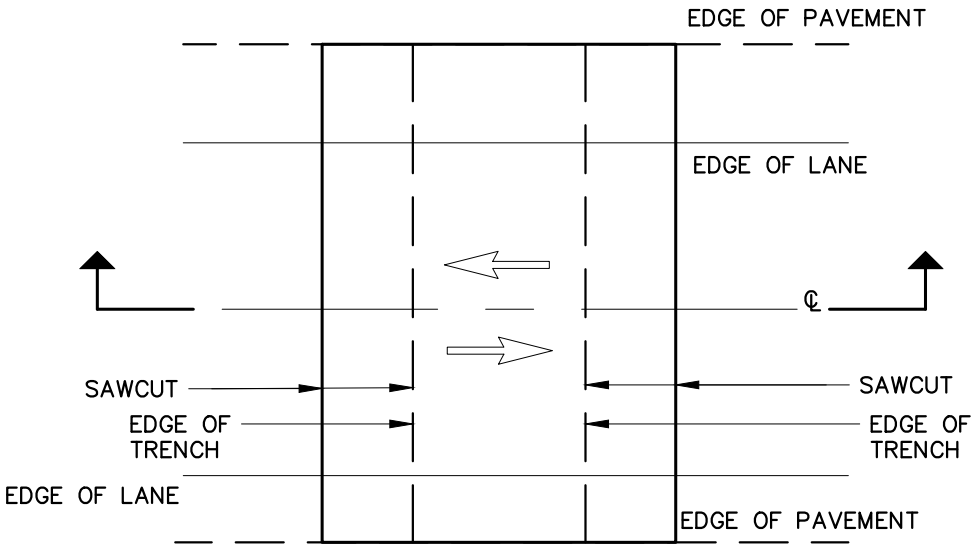


OPEN CUT CROSS SECTION



PLAN VIEW

SEE OPEN CUT CROSSING IN WSDOT RIGHT-OF-WAY NOTES AND LEGEND IN STD DWG NO. 1-8B

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

OPEN CUT CROSSING IN WSDOT RIGHT-OF-WAY

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	1-8A

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NOTES:

1. TRENCHING AND PIPE INSTALLATION SHALL MEET THE REQUIREMENTS OF WSDOT STANDARD SPECIFICATION 7-08.
2. MAXIMUM TRENCH WIDTH SHALL NOT EXCEED CASING/PIPE DIAMETER PLUS AN ADDITIONAL ONE (1) FOOT ON EITHER SIDE.
3. COMPACTION SHALL BE METHOD 'C' PER WSDOT STANDARD SPECIFICATION SECTION 2-03.3(14)(C).
4. MINIMUM DEPTH SHALL BE SIXTY (60) INCHES FROM THE FINISHED SURFACE TO THE TOP OF CASING.
5. PCCP SHALL BE REPLACED TO THE NEXT PANEL JOINT IN EACH DIRECTION AS APPROVED BY WSDOT. ALL WORK SHALL BE AS SPECIFIED IN WSDOT STANDARD SPECIFICATION SECTION 5-01.3(4).
6. WHEN CONNECTING TO AN EXISTING FACILITY UNDER THE PAVEMENT, PAVEMENT RESTORATION MAY, AT THE DEPARTMENT'S DISCRETION, INCLUDE THE FULL LANE WIDTH AND ENCROACHED SHOULDER.
7. CASING PIPES SHALL EXTEND A MINIMUM OF SIX (6) FEET BEYOND THE TOE OF FILL SLOPES, BOTTOM OF DITCHLINE, OR OUTSIDE OF CURB.
8. TACK ASPHALT PER WSDOT STANDARD SPECIFICATION 5-4.3(5)A.

LEGEND

(A) EXISTING HMA (HOT MIX ASPHALT) OR PCCP (PORTLAND CEMENT CONCRETE PAVEMENT).

(B) HMA CLASS ½ INCH OR PCCP: DEPTH AND MATERIAL SHALL MATCH EXISTING PAVEMENT 4" MIN. REMOVAL AND REPLACEMENT LIMITS OF PAVEMENT TO BE DETERMINED AT THE TIME OF UTILITY PERMIT/FRANCHISE REVIEW.

(C) APPROVED BACKFILL MATERIAL OR CDF (CONTROL DENSITY BACKFILL) OR AS SPECIFIED BY WSDOT. SEE NOTE 3.

(D) BEDDING MATERIAL BENEATH PIPE/CASING SHALL BE SIX (6) INCHES. ADDITIONAL PIPE BEDDING SHALL BE EQUAL TO HALF THE DIAMETER OF THE PIPE/CASING OR SIX (6) INCHES, WHICHEVER IS LESS.

(E) EXISTING CRUSHED SURFACING BASE COURSE.

(F) CRUSHED SURFACING BASE COURSE DEPTH SHALL MATCH DEPTH OF EXISTING CRUSHED SURFACING BASE COURSE 8" MIN.

(G) HMA BUTT JOINT REQUIRES TACK SEAL AND SAND. FOR PCCP, REFER TO GENERAL NOTE 5.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

OPEN CUT CROSSING IN WSDOT RIGHT-OF-WAY NOTES & LEGEND

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	1-8B

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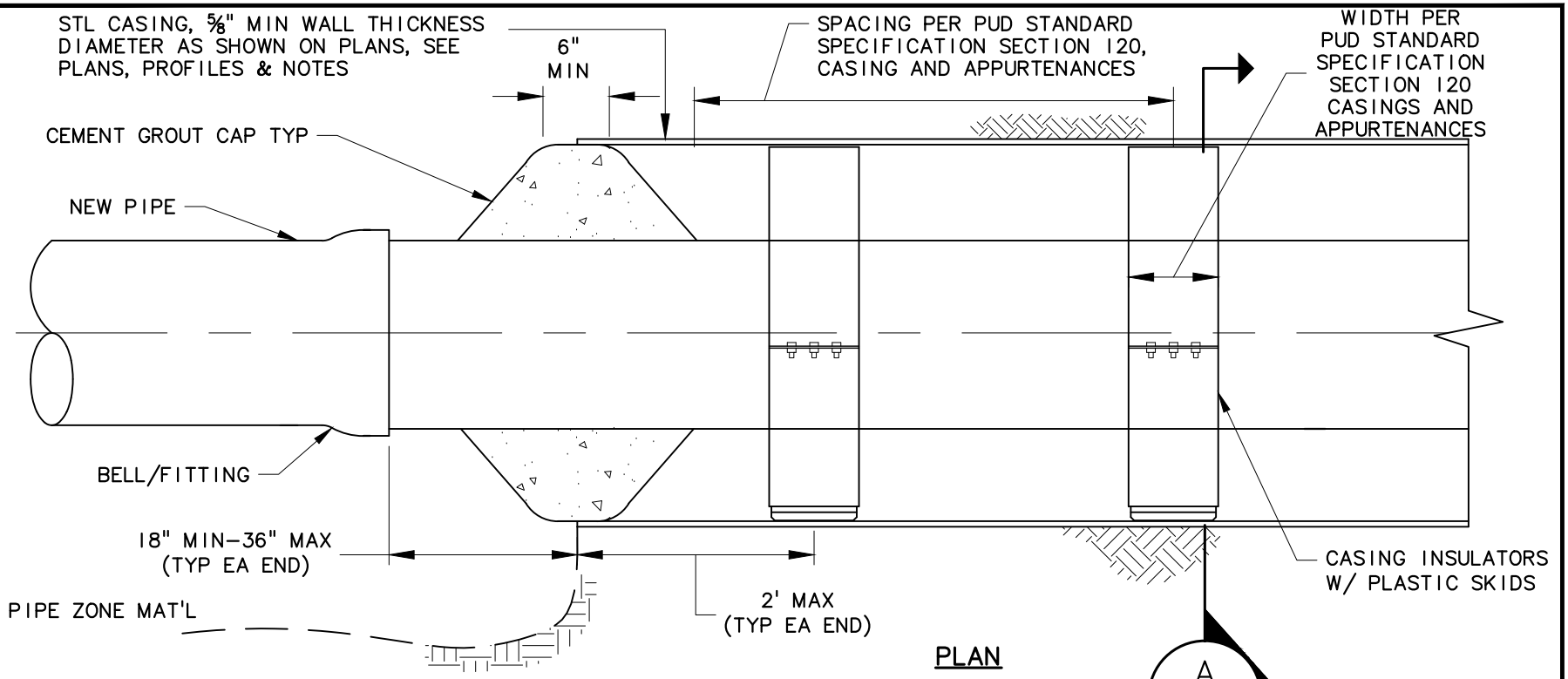
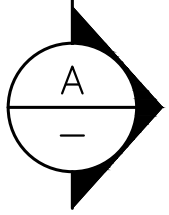
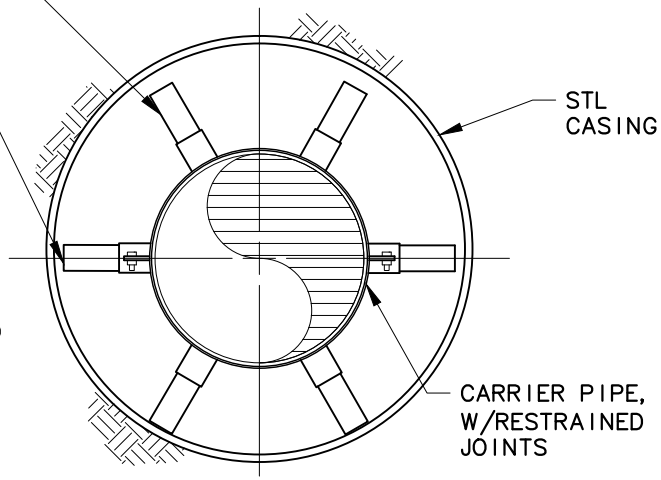


PLAN



CASING INSULATOR W/ CENTER CONFIGURATION SKIDS SEE NOTE 3 NAD PUD STANDARD SPECIFICATION 02340, CASING AND APPURTENANCES

PROVIDE MAX CLR BETWEEN CASING & TOP OF SKIDS PER MFR REQUIREMENTS OR RECOMMENDATIONS



SECTION A

CASING NOTES:

1. ANSI/AWWA C200 STEEL CASING.
2. PROVIDE 2" MINIMUM CLEARANCE BETWEEN CASING AND CARRIER PIPE BELLS AND APPURTENANCES.
3. CONTRACTOR TO VERIFY CASING SIZES PRIOR TO SIZING AND ORDERING CASING INSULATORS.
4. CARRIER PIPE INSTALLED WITHIN BORE PITS SHALL BE INSTALLED WITH THE SAME BEDDING AND BACKFILL REQUIREMENTS AS PIPELINES SEE TYPICAL TRENCH SECTION.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

CASING DETAIL

REVISION DATE: MAY 13, 2016

STD. DWG. NO. 1-9

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STANDARD SEWER SPECIFICATIONS AND DETAILS

FOR

ASOTIN COUNTY PUD

MAY 2016

MURRAY, SMITH & ASSOCIATES, INC.
345 Bobwhite Court, Suite 230
Boise, ID 83706
208.947.9033

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SECTION 200

PVC PIPE FOR STORM DRAINAGE & SANITARY SEWER

PART 1 GENERAL

1.1 Scope

A. This section covers polyvinyl chloride (PVC) for gravity storm drainage and sanitary sewer systems. PVC pipe shall be furnished complete with all fittings, joint materials and appurtenances.

B. Materials to be furnished and installed includes, but is not limited to:

1. All pipe, fittings, bends, beveled pipe, adapters, bulkheads, stoppers, plugs, joints restraints, joints and jointing materials and pipe supports.
2. Make connections to all existing and/or new facilities and provide temporary services.
3. Test and clean pipelines.

1.2 References

A. ASTM F402: Practice for safe handling of solvent cements and primers used for joining thermoplastic pipe and fittings.

B. ASTM D1784: Specification for rigid Poly Vinyl Chloride (PVC) compounds and chlorinated Poly Vinyl Chloride (CPVC) compounds.

C. ASTM D2564: Solvent Cements for Poly Vinyl Chloride (PVC) plastic pipe and fittings.

D. ASTM D2855: Making Solvent-Cemented joints with Poly Vinyl Chloride (PVC) pipe and fittings.

E. Reference Standards

References herein to the "Standard Specifications for Municipal Construction" shall mean the most recent edition of the Washington State Department of Transportation Standard Specifications for Road, Bridge and Municipal Construction.

1.3 Delivery, Storage and Handling

A. Comply with requirements of these Specifications.

B. Protect the pipe from the sun and provide adequate ventilation.

1.4 Submittals

A. Submit shop Drawings showing: layout plan and dimensions, schedule of pipe fittings and specials, materials and class for each size and type of pipe, joint details, pipe supports and any special provisions required for assembly.

B. Product Data: Provide data on pipe, fittings and accessories.

C. Provide the pipe manufacturer's certificate stating that the materials have been sampled and tested in accordance with the provision for and meet the requirements of the designated specification. The certificate shall be signed by an authorized agent of the manufacturer.

D. When requested by the Asotin County PUD, certified copies of physical and chemical test results shall be submitted for the materials to be provided.

E. Testing results.

PART 2 PRODUCTS

2.1 Materials

A. Pipe

1. In non-pressurized systems, PVC pipe shall be manufactured from rigid polyvinyl chloride compounds conforming to ASTM D-1784, Class 12454-B. PVC pipe and fittings four (4) inches to fifteen (15) inches in diameter shall meet the requirements of ASTM D-3034, SDR 35. PVC pipe eighteen (18) inches and larger in diameter shall conform to ASTM F-679, PS-46. Pipe shall have a minimum stiffness of 46 psi.
2. If indicated on the plans (e.g. at potable water crossings), pipe shall be water class pipe and conform to SECTION 301 DUCTILE IRON PIPE, FITTINGS, AND SPECIAL ITEMS and SECTION 302 PVC PRESSURE PIPE, FITTINGS AND SPECIAL ITEMS.

B. Joints

1. Non pressurized PVC pipe joints shall be integral bell push-on type meeting the requirements of ASTM D-3212. Gaskets shall be rubber ring type meeting the requirements of ASTM F477. Rubber gaskets shall be factory installed.
2. Joints for water class pipe shall conform to SECTION 301 DUCTILE IRON PIPE, FITTINGS AND SPECIAL ITEMS and SECTION 302 PVC PRESSURE PIPE, FITTINGS AND SPECIAL ITEMS.

PART 3 EXECUTION

3.1 Product Handling

A. Care shall be taken in handling and transporting to avoid damaging pipes and their coatings. Loading and unloading shall be accomplished with the pipe under control at all times and under no circumstances shall the pipe be dropped. Pipe shall be securely wedged and restrained during transportation and supported on blocks when stored in the shop or field.

B. Storage: Store all pipe on a flat surface so as to support the barrel evenly. It is not recommended that pipe be stacked higher than four (4) feet. Plastic pipe, if stored outside, shall be covered with an opaque material to protect it from the sunlight.

3.2 Inspection

A. All pipe sections, specials and jointing materials shall be carefully examined for defects and no piece shall be laid that is known to be defective. Any defective piece installed shall be removed and replaced with a new pipe section in a manner satisfactory to the Asotin County PUD at the CONTRACTOR's expense.

B. Defective material shall be marked with a lumber crayon and removed from the job site before the end of the day.

3.3 Preparation

A. Excavate trenches and prepare and maintain subgrade as described in these Specifications and shown on the Plans. Pipe base shall be inspected prior to placement of the pipe. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.

B. All pipe trenches shall be excavated below the proposed pipe invert as required to accommodate the depths of pipe bedding material as scheduled on the Drawings.

C. Remove dirt and foreign material, inside and outside, from pipe and fitting materials before assembly.

D. Make straight field cuts without chipping or cracking pipe.

3.4 Installation

A. Install pipe and accessories in accordance with manufacturer's instructions.

B. Lift or roll pipe into position. Do not drop or drag pipe over prepared bedding.

C. Joints: All joints shall be gasketed: No joints in right-of-way shall be chemically welded or joined with flexible coupling, e.g. Fernco style coupling. Just prior to joining the pipes, the surfaces of the joint rings shall be wiped clean and the joint rings and rubber gaskets shall be liberally lubricated with an approved type of vegetable oil soap. The spigot end, with the gasket placed in the groove, shall be entered into the bell of the pipe already laid, making sure that both pipes are properly aligned. Before the joint is fully "home," the position of the gasket in the joint shall be determined by means of a suitable feeler gauge supplied by the pipe manufacturer. If the gasket is found not to be in proper position, the pipes shall be separated and the damaged gasket replaced. The pipe is then forced "home" firmly and fully. In its final position, the joint between the pipes shall not be deflected more than 1/2-inch at any point.

D. Install pipe and fittings to the line and grade specified on the Drawings with bell end upstream, joints centered, spigots home, pipe properly supported and restrained against movement and all valve stems plumb.

E. Lay pipe from the low end toward the high point. Provide a continuous, smooth invert. Bell holes shall be dug where necessary and the pipe shall be placed and supported on bedding material the full length of the barrel.

F. All loose dirt shall be removed from the bottom and the trench backfilled with specified bedding material to pipe laying grade.

G. Variance from the established line and grade shall not be greater than 1/32-inch per inch of pipe diameter and shall not exceed 1/2-inch for line and 1/4-inch for grade, providing that such variation does not result in a level or reverse-sloping invert. Variation in the invert elevation between adjoining

ends of pipe, including fittings, shall not exceed 1/64-inch per inch of pipe diameter, or 1/2-inch maximum.

H. The open ends of all pipes and special castings shall be plugged or otherwise closed with a watertight plug before leaving the work for the night, and at other times of interruption of the work. All pipe ends which are to be permanently closed shall be plugged or capped and restrained against internal pressure.

I. Side sewers shall be constructed with a maximum joint deflection not to exceed the manufacturer's printed recommendations and in no case shall exceed two (2) inches per foot in any joint. Larger changes in direction shall be made by use of standard ⅛ bends.

J. Side sewers shall be connected to the tee, wye or riser provided in the public sewer, where such is available, utilizing approved fittings or adapters. Where no tee, wye or riser is provided or available, connection shall be made by machine made tap and approved saddle.

K. Side sewers shall not be constructed on private property prior to completion and acceptance of the main line and side sewer on public Right of Way or easement unless approved in writing by the Asotin County PUD.

L. The location of side sewers at the property line shall be marked by the CONTRACTOR with a two (2) by four (4) inch wooden stake four (4) feet long buried in the ground a depth of three (3) feet. The low end shall have a 2 by 4-inch cleat nailed to it to prevent withdrawal of the stake. The exposed end shall be painted traffic white and the depth to the side sewer or tee shall be indicated in black paint on the two (2) by four (4). In addition, a length of 12-gage galvanized wire shall be provided to extend from the plugged end of the side sewer or tee. The upper end shall emerge at the 4-foot stake, but shall not be fastened to it.

M. Side sewer cleanouts shall be provided at the property line and for each total change of 90 degrees of grade or alignment and in no case shall the spacing of cleanouts exceed 100 feet. No cleanout will be required at the connection of the side sewer to a riser on the public sewer. Cleanouts shall consist of a wye branch in the side sewer.

All cleanouts located in public rights of way shall be extended to grade.
The extension of cleanouts to grade on private property will be optional with the property owner. When extended to grade, cleanouts shall be full side sewer diameter and shall be extended per Standard Drawing 2-8. A 1/8 bend shall be used to deflect the side sewer upward at a cleanout where the terminal end of the side sewer lies upstream from the last point of connection.

3.5 Pipeline Inspection

A. General: All sanitary sewer lines shall be inspected by the use of a television camera before final acceptance. The sewerline shall be hydro flushed immediately prior to television camera inspection. Remove debris at the nearest downstream manhole rather than washing them downstream. The costs incurred in making the initial inspection shall be borne by the owner of the sanitary sewer.

B. The CONTRACTOR shall bear all costs incurred in correcting any deficiencies found during television inspection, including the cost of any additional television inspection that may be required by the Asotin County PUD to verify the correction of said deficiency. The CONTRACTOR shall be responsible for all costs incurred in any television inspection performed solely for the benefit of the CONTRACTOR.

C. Acceptance Criteria:

If standing water in pipeline is observed due to grade defects, use the following table to determine allowable depth of standing water in relationship to the design slope of pipe.

Pipeline Slope (ft/ft)	Allowable standing Water Depth (inch)
Slope < 0.001	≤ 5/8”
0.001 ≤ Slope ≤ 0.002	≤ 1/2”
0.002 ≤ Slope ≤ 0.004	≤ 3/8”
0.004 ≤ Slope ≤ 0.006	≤ 1/4”
0.006 ≤ Slope ≤ 0.008	≤ 1/8”
Slope > 0.008	No Standing Water

3.6 Pipeline Testing

A. General: All pipelines shall be subject to acceptance tests. The CONTRACTOR shall provide necessary utilities, labor and facilities for testing and shall dispose of waste, including water.

Sewers and appurtenances shall be cleaned and tested after backfilling by either the exfiltration or low pressure air method at the option of the CONTRACTOR, except where the ground water table is such that the Asotin County PUD may require the infiltration test. For either the infiltration or exfiltration test, all lateral or side sewer branches included in the test section shall be taken into account in computing allowable leakage. An allowance of

0.2 gallons per hour per foot of head above invert shall be made for each manhole included in a test section. Upon final acceptance of the work all sewers, side sewers and fittings shall be open, clean and free draining.

All work involved in cleaning and testing sewer lines between manholes or rodding inlets shall be completed within fifteen (15) working days after backfilling of sewer lines and structures. Any further delay will require the written consent of the Asotin County PUD. The CONTRACTOR shall furnish all labor, materials, tools and equipment necessary to make the test, clean the lines and perform all incidental work. The CONTRACTOR shall perform the tests under the direction and in the presence of the Asotin County PUD. Precautions shall be taken to prevent joints from drawing during tests, and any damage resulting from these tests shall be repaired by the CONTRACTOR at no expense to the Asotin County PUD. The manner and time of testing shall be subject to approval by the Asotin County PUD.

All wyes, tees and stubs shall be plugged with flexible jointed caps, or acceptable alternate, securely fastened to withstand the internal test pressure. Such plugs or caps shall be readily removable, and their removal shall provide a socket suitable for making a flexible jointed lateral connection or extension.

If any sewer installation fails to meet the requirements of the test method used, the CONTRACTOR shall determine, at no expense to the Asotin County PUD, the source or sources of leakage and shall repair or replace all defective materials or workmanship at no expense to the Asotin County PUD. The complete pipe installation shall meet the requirements of the test method used before being considered acceptable.

B. Side Sewers: Shall be tested after backfilling and if constructed in conjunction with the main sewer shall, for purposes of testing, have a 6-inch tee fitting pipe placed at the point where the side sewer crosses the street or other public Right of Way margin. The tee opening shall be positioned perpendicular to the side sewer slope, unless otherwise directed by the Asotin County PUD.

When side sewers are not tested simultaneously with the testing of the main sewer, the CONTRACTOR, at no expense to the Asotin County PUD, shall furnish and place an additional tee in the first pipe out of the main sewer tee or wye branch, so that an inflatable rubber ball can be inserted for sealing off the side sewer and thus permit separate tests.

Testing side sanitary sewers shall be, for their entire length, from the public sewer in the street to the connection with the building's plumbing. Their testing shall be as required by the local sanitary agency but in no case shall it be less thorough than that of filling the pipe with water before backfilling and

visually inspecting the exterior for leakage. The decision of the Asotin County PUD as to acceptance of the side sanitary sewer shall be final.

C. Testing

1. Exfiltration Test

Prior to making exfiltration leakage tests, the CONTRACTOR may fill the pipe with clear water to permit normal absorption into the pipe walls provided, however, that after so filling the pipe, the CONTRACTOR shall complete the leakage test within 24 hours after filling. When under test, the allowable leakage shall be limited according to the provisions that follow. Specified allowances assume pre-wetted pipe.

Leakage shall be no more than 0.28 gph per inch diameter per 100 feet of sewer, with a hydrostatic head of six (6) feet above the crown at the upper end of the test section, or above the natural ground water table at the time of test, whichever is higher. The length of pipe tested shall be limited so that the pressure at the lower end of the section tested does not exceed 16 feet of head above the invert, and in no case shall be greater than 700 feet or the distance between manholes when greater than 700 feet.

Where the test head is other than six (6) feet, the maximum leakage shall not exceed the amount determined from the following equation:

$$\text{Maximum leakage (in gallons per hour)} = 0.28 \times (\sqrt{H}/\sqrt{6}) \times D \times (L/100)$$

Where: D = diameter (in.)
L = length of pipe (ft.)
H = test head (ft.)

When the test is to be made one joint at a time, the leakage per joint shall not exceed the computed allowable leakage per length of pipe.

2. Infiltration Test

Where the natural ground water head over the pipe is two (2) feet or less above the crown of pipe at the upper end of the test section, the infiltration test leakage shall not exceed 0.16 gallons per hour per inch of diameter per 100 feet of pipe length. The length of pipe tested shall not exceed 700 feet or the distance between manholes when greater than 700 feet.

Where the natural ground water head is greater than two (2) feet, the maximum leakage shall not exceed the amount determined from the following equation:

$$\text{Maximum leakage (in gallons per hour)} = 0.16 \times (\sqrt{H}/\sqrt{6}) \times D \times (L/100)$$

Where: D = diameter (in.)
L = length of pipe (ft.)
H = test head (ft.)

When a suitable head of ground water exists above the crown of the pipe and when the pipe is large enough to work inside, acceptance may be based on the repair of visible leakage by means satisfactory to the Asotin County PUD.

3. Low Pressure Air Test

Low pressure air testing may be used on pipes 30 inches in diameter and smaller. The test equipment to be used shall be furnished by the CONTRACTOR and shall be inspected and approved by the Asotin County PUD prior to use. The Asotin County PUD may at any time require a calibration test of gauges or other instrumentation that is incorporated into the test equipment. Calibration tests shall be certified by an independent testing laboratory.

Plugs used to close the pipe for the air test must be securely braced to prevent the unintentional release of a plug, which can become a high velocity projectile. Gauges, air piping manifold and valves shall be located at the top of the ground. No one shall be permitted to enter a manhole or catch basin where a plugged pipe is under pressure. Air testing apparatus shall be equipped with a pressure release device, such as a rupture disk or a pressure relief valve, designed to activate when the pressure in the pipe exceeds two (2) psig above the required test pressure.

If the pipe to be tested is submerged by groundwater, the backpressure on the pipe created by the groundwater submergence must be determined. All gauge pressures described in the test shall be increased by that amount.

The first section of pipe installed by each crew shall be tested in order to qualify the crew and material. A successful test for the section shall be a prerequisite to further installation by that crew. Following the initial test, pipes shall be tested from manhole to manhole, catch basin to catch basin or such shorter lengths as determined by the CONTRACTOR.

Air shall be slowly supplied to the plugged pipe section until the internal air pressure reaches four (4) psig. Wait at least two (2) minutes to allow for pressure and temperature stabilization to occur within the pipe.

When the pressure decreases to 3.5 psig, the air pressure test shall begin. The test shall consist of measuring the time in seconds for the pressure in the pipe to drop from 3.5 psig to 2.5 psig. Acceptance for pipe constructed of air permeable materials, shall be if the time in seconds for the pressure drop is equal to or greater than the required time as calculated below. Acceptance for pipe constructed of non air permeable materials, shall be if the time in seconds for the pressure drop is equal to or greater than four times (4x) the required time as calculated below:

$K = 0.0111d^2L$
$C = 0.0003918dL$

If $C_T < 1$, then time = K_T
If $1 < C_T < 1.75$, then time = K_T/C_T
If $C_T > 1.75$, then time = $K_T/1.75$

Where: d = Pipe diameter (inches)
L = Pipe length (feet)
K = value for each length of pipe of a specific diameter
C = value for each length of pipe of a specific diameter
$K_T = K_1 + K_2 + \ldots$ = sum of all K values
$C_T = C_1 + C_2 + \ldots$ = sum of all C values

Table: Minimum Test Times in Seconds for Pressure Drop From 3.5 to 2.5 psig (1 psig)

Distance Between Manholes (feet)	Nominal Pipe Diameter (inch)									
	6	**8**	**10**	**12**	**15**	**18**	**21**	**24**	**27**	**30**
100	40	71	111	160	250	360	490	639	765	850
150	60	107	167	240	375	510	595	680	765	856
200	80	142	222	320	425	510	595	731	925	1142
250	100	178	278	340	425	514	699	913	1156	1427
300	120	213	283	340	428	617	839	1096	1387	1713
350	140	227	283	340	500	719	979	1279	1618	1998
400	160	227	283	365	571	822	1119	1461	1850	2283
450	170	227	285	411	642	925	1259	1644	2081	2569
500	170	227	317	457	714	1028	1399	1827	2312	2854
550	170	227	349	502	785	1130	1538	2009	2543	3140
600	170	244	381	548	856	1233	1678	2192	2774	3425

This method was developed based on an allowable air loss rate of 0.003 cubic feet per minute (cfm) per square foot of internal pipe surface, with the total air loss rate not less than 2 cfm nor greater than 3.5 cfm. At the CONTRACTOR's option, the pipe may be tested without pre-wetting; however, the allowable air loss rate assumes pre-wetted pipe.

4. Test Results

The CONTRACTOR shall notify the Asotin County PUD three (3) days prior to testing and submit testing data to the Asotin County PUD.

3.7 Pipe and Manhole Abandonment and Removal

Pipe to be removed shall be cut off at the berm intersection or where indicated on plans. Remaining cut end and abandoned pipe shall be properly plugged watertight with fittings or masonry plug. Manholes and structures to be abandoned shall be filled with suitable material as approved by the Asotin County PUD. Any removed salvageable items shall remain the property of the Asotin County PUD, and shall be stored as directed by the Asotin County PUD. The Asotin County PUD may refuse

any items. The CONTRACTOR must properly dispose of such items free of charge to the Asotin County PUD.

3.8 Field Testing

A. All materials, process of manufacturing, and finished pipe shall be subject to inspection and approval.

B. The Asotin County PUD may select one sample of pipe on the job site of each production run of each size and type of pipe to be tested by the laboratory. The CONTRACTOR shall furnish the first test piece or pipe core and any additional samples required because of failures. Should the sample fail to meet specifications, retests shall be conducted by the laboratory in conformance with the specifications.

3.9 Protection

A. Protect finished Work under provisions of these Specifications.

B. Protect pipe and bedding from damage or displacement until backfilling operation is in progress.

3.10 Survey Line and Grade and Survey Monument Replacement

A. Preserve all stakes, markers, etc. Stakes, markers, etc. that are disturbed by the Contractor will be replaced by the CONTRACTOR at CONTRACTOR'S expense.

B. CONTRACTOR shall develop and make all detailed surveys necessary for layout and construction, including exact component location, working points, lines and elevations. The CONTRACTOR shall have the responsibility to carefully preserve bench marks, reference points and stakes, and in the case of destruction thereof by the CONTRACTOR or resulting from its negligence, the CONTRACTOR shall be charged with the expense and damage resulting therefore and shall be responsible for any mistakes that may be caused by the unnecessary loss or disturbance of such bench marks, reference points and stakes.

END OF SECTION

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SECTION 201

PRESSURE SEWER MAINS

PART 1 GENERAL

1.1 Scope

A. This section covers pipeline for pressure sewer for STEP and grinder pump systems. Pipe shall be furnished complete with all fittings, joint materials and appurtenances.

B. Materials to be furnished and installed includes, but is not limited to:

1. All pipe, fittings, bends, beveled pipe, adapters, bulkheads, stoppers, plugs, joints restraints, joints and jointing materials and pipe supports.
2. Make connections to all existing and/or new facilities and provide temporary services.
3. Test and clean pipelines.

1.2 References

A. ASTM F402: Practice for safe handling of solvent cements and primers used for joining thermoplastic pipe and fittings.

B. ASTM D1784: Specification for rigid Poly Vinyl Chloride (PVC) compounds and chlorinated Poly Vinyl Chloride (CPVC) compounds.

C. ASTM D2564: Solvent Cements for Poly Vinyl Chloride (PVC) plastic pipe and fittings.

D. ASTM D2855: Making Solvent-Cemented joints with Poly Vinyl Chloride (PVC) pipe and fittings.

E. ANSI/AWWA C900: Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4-inch Through 12-inch for Water Transmission and Distribution

F. ANSI/AWWA 605: Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water

G. ASTM F477: Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

H. ANSI/AWWA C906: Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4-inch through 63-inch, for Water Distribution and Transmission

I. ASTM D3261: Standard for Butt Heat Fusion Polyethylene Plastic Fittings for Polyethylene Plastic Pipe and Tubing

J. Reference Standards

References herein to the "Standard Specifications for Municipal Construction" shall mean the most recent edition of the Washington State Department of Transportation Standard Specifications for Road, Bridge and Municipal Construction.

1.3 Delivery, Storage and Handling

A. Comply with requirements of these Specifications.

B. Protect the pipe from the sun and provide adequate ventilation per manufacturer's specification.

1.4 Submittals

A. Product Data: Provide data on pipe, fittings and accessories.

B. Provide the pipe manufacturer's certificate stating that the materials have been sampled and tested in accordance with the provision for and meet the requirements of the designated specification. The certificate shall be signed by an authorized agent of the manufacturer.

C. When requested by the Asotin County PUD, certified copies of physical and chemical test results shall be submitted for the materials to be provided.

D. Testing results.

PART 2 PRODUCTS

2.1 General

The nominal diameters of the pipes are as shown on the Drawings.

2.2 Pipe and Fittings

A. PVC Water Class Pipe: ANSI/AWWA C 900

1. Diameter: 4-inch through 12-inch
2. Class: Per Part 3.1 of this specification
3. Fittings: Per Section 301 Ductile Iron Pipe, Fittings and Special Items with 1 mil thick minimum asphaltic external coating and 40 mil thick minimum Protecto 401 ceramic epoxy internal coating manufactured by Pacific States Cast Iron Pipe Co. or approved substitution.
4. Joints: Factory installed rubber gaskets conforming to ASTM F 477 and bell and spigot ends.
5. Cell wall classification: 1234-B per ASTM D 1784

B. PVC Pipe: ASTM-D1785

1. Diameter: 4-inch through 12-inch
2. Class: Schedule 40.
3. Fittings: Conforming to ASTM D 2466
4. Joints: Solvent Weld joints and fittings conforming to ASTM D 2466
5. Cell wall classification: 1234-B per ASTM D 1784.

C. PE Pressure Pipe and Fittings for Water Distribution: ANSI/AWWA C 901/C 906

1. Diameter: 2-inch through 12-inch
2. Class: Per Part 3.1 of this specification
3. Standard PE Designation: PE 3408
4. Fittings: PE 3408, thermal butt-fusion welded per ASTM D 3261
5. Joints: Thermal butt-fusion welded per ASTM D 3261.

2.3 Thrust Blocks

Thrust block per Standard Drawing Number 3-8A. Refer to sizing method per Standard Drawings 3-8B and 3-8C.

2.4 Tracer Wire

Tracer wire shall be 12 gauge single strand copper insulated high molecular weight polyethylene (HMWPE) wire. The HMWPE insulated cover shall be green and shall have a minimum thickness of 45 mils. The wire shall be UL rated for 1400 F.

2.5 Marking Tape

Marking tape shall consist of inert polyethylene plastic that is impervious to all known alkalis, acids, chemical reagents and solvents likely to be encountered in the

soil. The tape shall be a minimum of 6-inches in width. The tape shall be green and shall be imprinted continuously over its entire length in permanent black ink with the words "Caution Buried Sewer Line Below"

PART 3 EXECUTION

3.1 Product Selection

Pipe shall be selected with minimum pressure rating 1.5 times the dead head pressure of the pump.

3.2 Product Handling

A. Care shall be taken in handling and transporting to avoid damaging pipes and their coatings. Loading and unloading shall be accomplished with the pipe under control at all times and under no circumstances shall the pipe be dropped. Pipe shall be securely wedged and restrained during transportation and supported on blocks when stored in the shop or field.

B. Storage: Store all pipe on a flat surface so as to support the barrel evenly. It is not recommended that pipe be stacked higher than four (4) feet. Plastic pipe, if stored outside, shall be covered with an opaque material to protect it from the sunlight.

3.3 Inspection

A. All pipe sections, specials and jointing materials shall be carefully examined for defects and no piece shall be laid that is known to be defective. Any defective piece installed shall be removed and replaced with a new pipe section in a manner satisfactory to the Asotin County PUD at the CONTRACTOR's expense.

B. Defective material shall be marked with a lumber crayon and removed from the job site before the end of the day.

3.4 Preparation

A. Excavate trenches and prepare and maintain subgrade as described in these Specifications and shown on the Plans. Pipe base shall be inspected prior to placement of the pipe. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.

B. All pipe trenches shall be excavated below the proposed pipe invert as required to accommodate the depths of pipe bedding material as scheduled on the Drawings.

C. Remove dirt and foreign material, inside and outside, from pipe and fitting materials before assembly.

D. Make straight field cuts without chipping or cracking pipe.

3.5 Installation

A. Install pipe and accessories in accordance with these specifications and the manufacturer's instructions.

B. Lift or roll pipe into position. Do not drop or drag pipe over prepared bedding.

C. Joints

1. Fusion Joints

a. Sections of PE pipe shall be joined into continuous lengths on the job site above ground per ASTM D3261. The joining method shall be the thermal butt fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations. The butt fusion equipment used in the joining procedures should be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, temperature requirements for 400°F, alignment and 75 psi interfacial fusion pressure.

b. Butt fusion joining shall be 100 percent efficient, providing joint weld strength equal to or greater than the tensile strength of the pipe. Socket fusion will not be allowed. Extrusion welding or hot gas welding of PE shall not be used for pressure pipe applications or in fabrications where shear or structural strength is important.

2. Gasketed Joints. Just prior to joining the pipes, the surfaces of the joint rings shall be wiped clean and the joint rings and rubber gaskets shall be liberally lubricated with an approved type of vegetable oil soap. The spigot end, with the gasket placed in the groove, shall be entered into the bell of the pipe already laid, making sure that both pipes are properly aligned. Before the joint is fully "home," the position of the gasket in the joint shall be determined by means of a suitable feeler gauge supplied by the pipe manufacturer. If the gasket is found not to be in proper position, the pipes shall be separated and the damaged

gasket replaced. The pipe is then forced "home" firmly and fully. In its final position, the joint between the pipes shall not be deflected more than 1/2-inch at any point.

3. Rubber-Ring and Chemically Welded Joints: Pipe jointing surfaces shall be clean and dry when preparing surfaces for joining. Lubricants, primers, adhesives, etc., shall be used as recommended by the pipe or joint manufacturer's specifications. The jointing materials or factory fabricated joints shall then be placed, fitted, joined and adjusted in such a manner as to obtain watertight joint. Trenches shall be kept water free and as dry as possible during bedding, laying and jointing. As soon as possible after the joint is made, sufficient backfill material shall be placed along each side of the pipe to prevent movement of the pipe from any cause.

D. Install pipe and fittings to the line and grade specified on the Drawings with bell end upstream, joints centered, spigots home, pipe properly supported and restrained against movement and all valve stems plumb.

E. Lay pipe from the low end toward the high point. Provide a continuous, smooth invert. Bell holes shall be dug where necessary and the pipe shall be placed and supported on bedding material the full length of the barrel.

F. All loose dirt shall be removed from the bottom and the trench backfilled with specified bedding material to pipe laying grade.

G. The open ends of all pipes and special castings shall be plugged or otherwise closed with a watertight plug before leaving the work for the night, and at other times of interruption of the work. All pipe ends which are to be permanently closed shall be plugged or capped and restrained against internal pressure.

H. Thrust Restraint

All tees, plugs, caps, bends, offsets, as well as other appurtenances which are subject to unbalanced thrust, shall be properly braced with concrete thrust blocks unless otherwise specified in the drawings. CONTRACTOR shall submit calculation for thrust block sizing. Concrete thrust blocks shall have a minimum 28-day compressive strength of 3,000 psi. The concrete blocking shall bear against solid undisturbed earth at the side and bottom of the trench excavation and shall be shaped so as not to obstruct access to the joints of the pipe or fittings. Where shown on the plans or specified elsewhere in the Technical Specifications, the CONTRACTOR shall also provide internal or external joint restraint systems at the fittings and on all joints within the specified or shown distance on each side of the fitting or joint.

I. Tracer Wire

Tracer wire shall be installed per Section 310 Water Service Connections from the upstream to downstream piping connection points.

J. Marking Tape

Marking Tape wire shall be installed per Section 310 Water Service Connections from the upstream to downstream piping connection points.

3.6 Pipeline Testing

A. Testing

1. Per Section 300 Pipeline Testing and Disinfection with the following modifications:

    a. Hydrostatic Test shall be to 1.5 times the normal working pressure of the pipeline.

2. Test Results

    The CONTRACTOR shall notify the Asotin County PUD three (3) days prior to testing and submit testing data to the Asotin County PUD.

3.7 Survey Line and Grade and Survey Monument Replacement

A. Preserve all stakes, markers, etc. Stakes, markers, etc. that are disturbed by the Contractor will be replaced by the CONTRACTOR at CONTRACTOR'S expense.

B. CONTRACTOR shall develop and make all detailed surveys necessary for layout and construction, including exact component location, working points, lines and elevations. The CONTRACTOR shall have the responsibility to carefully preserve bench marks, reference points and stakes, and in the case of destruction thereof by the CONTRACTOR or resulting from its negligence, the CONTRACTOR shall be charged with the expense and damage resulting therefore and shall be responsible for any mistakes that may be caused by the unnecessary loss or disturbance of such bench marks, reference points and stakes.

END OF SECTION

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SECTION 210

SANITARY SEWER MANHOLES AND CLEANOUTS

PART 1 GENERAL

1.1 Scope

A. The work under this Section includes providing all labor, materials, tools and equipment necessary for furnishing and installing sanitary sewer manholes and cleanouts complete, in place. It shall also include raising or lowering existing sanitary sewer manholes and cleanouts to conform to the final grade as shown on the Drawings and Standard Details.

B. Materials to be furnished and installed includes, but is not limited to, manholes and cleanouts, frames and lids, joint seals, pipe connection seals and required bedding.

1.1 References

A. AASHTO M 103, Standard Specification for Steel Castings, Carbon, for General Application.

B. AASHTO M 199, Standard Specification for Precast Reinforced Concrete Manhole Sections.

C. ASTM A48, Standard Specification for Gray Iron Castings.

D. ASTM A536, Standard Specification for Ductile Iron Castings.

E. ASTM A615/ A615M, Standard Specification for Rail-Steel Deformed and Plain Bars for Concrete Reinforcement.

F. ASTM C387, Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.

G. ASTM C478, Standard Specification for Precast Reinforced Concrete Manhole Sections.

H. ASTM C827, Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures.

I. ASTM C923, Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes, and Laterals.

J. ASTM D4101, Standard Specification for Propylene Plastic Injection and Extrusion Materials.

K. CRD-C 621, Corps of Engineers - Specification for Non-Shrink Grout.

L. Reference Standards

References herein to the "Standard Specifications for Municipal Construction" shall mean the most recent edition of the Washington State Department of Transportation Standard Specifications for Road, Bridge and Municipal Construction.

1.3 Submittals

A. Manholes, Cones and Grad Rings: Shop Drawings showing method of construction and reinforcement, invert elevations and overall dimension.

B. Frames, Grates and Steps: Catalogue cuts and materials certification.

C. Gaskets and Coatings: Catalogue cuts and materials certification.

D. Mortar and Non Shrink Grout: Catalogue cuts and materials certification.

E. Pipe Penetration Gaskets: Catalogue cuts and materials certification.

F. Testing Results.

PART 2 PRODUCTS

2.1 Manholes, Cones and Grade Rings

A. All manholes shall consist of precast concrete sections, including integral base section, riser sections, cones and flat slab tops and shall conform to ASTM C478 and the dimensions shown on the Drawings. Minimum wall thickness shall be four (4) inches.

B. All precast sections shall have rubber gaskets joints conforming to ASTM C 443. Interior and exterior of the joints shall be grouted.

C. Cones to be eccentric and have the same wall thickness and reinforcement as riser sections. Reinforcing in transition sections shall be equal to that specified for wall sections of the larger diameter.

D. Grade rings shall be standard product, manufactured particularly for use in manhole construction, sized to fit the cones on which they are placed, and the wall thickness shall be not less than that of the cones. Grade rings shall not be

less than two (2) inches high, nor more than four (4) inches high. Grout inside side of grade rings to form smooth finish.

E. Precast manhole sections shall consist of circular sections in standard nominal inside diameters of 42, 48, 54, 60, 72, 84 or 96 inches. Heights of sections shall be in multiples of 12 inches. Diameter and type shall be as specified on the Plans.

F. Openings for connecting pipes in riser sections, bottom riser sections and integral base sections, and for access in flat slabs shall be preformed or cored by the manufacturer. Pipe penetration gaskets shall be cast into all precast manholes. All rigid non-reinforced pipe entering or leaving the manhole (new or existing manhole) shall be provided with flexible joints within one (1)foot of the manhole structure.

2.2 Frames, Covers and Steps

A. Frames and covers shall be ductile iron, conforming to ASTM A48, Class 30. The cover shall be designed for the appropriate classification of traffic and shall have the word "SEWER' cast into the top with prominent letters. Bearing surfaces between the frame and cover shall be machined to smooth, plane surfaces. Frames and covers shall be D&L Foundry A-2004 or approved equal. When watertight locking devices are specified, the CONTRACTOR shall submit Shop Drawings for approval by the Asotin County PUD.

B. Manhole steps shall be constructed of injection molded copolymer polypropylene shall meet the requirements of ASTM C478 and AASHTO M 199. The polypropylene shall conform to ASTM D4101. They shall be Lane Polypropylene Steps or approved equal.

C. Specified manhole steps shall be factory installed to provide a continuous ladder of 12-inch center-to-center rung spacing. Steps shall be placed in the forms and cast in pipe wall or placed immediately after the pipe is removed from casting and carefully mortared in place with non-shrink mortar to ensure a watertight joint. If the outer surface of the pipe wall is pierced, the patch shall be completely covered with a bituminous sealer.

2.3 Cleanout Frames and Covers

A. Castings:

1. Tough, close-grained gray iron, sound, smooth, clean, free from blisters, blowholes, shrinkage, cold shuts and defects.
2. Ductile Iron: ASTM A536, Grade 65-40-12.
3. Plane or grind bearing surfaces to ensure flat, true surfaces.

4. Cleanout frames and covers shall be D&L Foundry H-8020, or approved equal.

B. Covers: True and seat within frame at all points.

2.4 Miscellaneous

A. All pipes, bends and fittings used in cleanouts, drop connections and pipe stubs for future connections to manholes shall conform to Section 200, PVC PIPE FOR STORM DRAINAGE & SANITARY SEWER.

B. Mortar shall be standard premixed in accordance with ASTM C387, or proportion one part Portland Cement to two parts clean, well-graded sand which will pass a No. 4 screen. Admixtures may be used not exceeding the following percentages of weight of cement; hydrated lime, 10%; diatomaceous earth or other inert material, 5%. Consistency of mortar shall be such that it will readily adhere to the surface. Mortar mixed for longer than thirty minutes shall not be used. A non-shrink mortar may be submitted as a substitute.

D. Non Shrinking Grout: Non-shrink grout shall be Preco-Patch, Sika 212, Euco N-S, Five-Star or approved equal non-metallic cementitious commercial grout exhibiting zero shrinkage per ASTM C827 and CRD-C-621. Grout shall not be amended with cement or sand and shall not be reconditioned with water after initial mixing. Unused grout shall be discarded after 20 minutes and shall not be used.

E. Pipe penetration gasket through the manhole wall shall be made using resilient connectors conforming to ASTM C293. Resilient connectors shall be Kor-N-Seal, A-LOK style or approved equal. Non-shrink grout shall be used for filling the preformed void in the connection gasket.

F. Exterior joint waterproofing for watertight manholes shall be “Bestseal Wrap” joint sealant from Bestfitt Gaskect Co. or approved equal.

G. Watertight manholes shall be a coal tar epoxy Bitumastic® 300M system as manufactured by Carboline, Inc. or approved equal.

H. Imported pipe base, furnish as specified in SECTION 102, EXCAVATING, BACKFILLING AND COMPACTING FOR UTILITIES.

PART 3 EXECUTION

3.1 General

A. The CONTRACTOR shall safely install all precast items with no damage to the precast item or any other structure, piece of equipment, or appurtenance.

B. Precast structures shall be installed in accordance with the manufacturer's recommendations, unless otherwise required by the Drawings and Standard Details.

C. Subgrade Preparation: Subgrade shall be compacted to 95 percent of maximum density and covered with a minimum of six (6) inches, or as shown on the plans, of aggregate base, which is also compacted to 95 percent of maximum density. The aggregate base shall be graded to a uniform, level surface to fully support the structure and to an elevation that will assure proper positioning of the top slab or lid. Remove and keep all water clear from the excavation during construction and testing operations.

D. Place imported pipe base material on undisturbed earth; thoroughly compact with a mechanical vibrating or power tamper.

E. Excavation and backfill as specified in SECTION 102 - EXCAVATING, BACKFILLING AND COMPACTING FOR UTILITIES.

3.2 Installation of Precast Manholes

A. All rigid non-reinforced pipe entering or leaving the manhole (new or existing manhole) shall be provided with flexible joints within one (1) foot of the structure and shall be placed on compacted bedding. PVC pipe shall be connected to manholes using an approved pipe penetration gasket.

B. Precast Concrete Base Installation

1. Precast base sections shall be set on a level base of six (6) inches of compacted imported pipe base, as shown in the Standard Drawings. Bases shall be set at the proper grade to allow pipe openings to match the grades for connecting pipes. Manhole bases shall be set level so that base gravel fully and uniformly supports them in true alignment with uniform bearing throughout full circumference. Do not level the base sections by wedging gravel under the edges. Provisions shall be made to prevent flotation of the manhole in high groundwater areas.
2. Manhole inverts shall be formed as shown on the Drawings, by forming U-shaped channels in the concrete base section. The invert shall be constructed to a section identical with that of the sewer pipe and are flush with the inside of the manhole. Where the size of sewer pipe is changed at the manhole, the invert shall be constructed to form a smooth transition without abrupt breaks or unevenness of the invert surfaces. During construction, the CONTRACTOR shall prevent sewage or water from contacting the new concrete or mortar surfaces to prevent damage to the fresh concrete or mortar until the initial set has been achieved. No mortar or broken pieces of pipe shall be allowed to enter the sewers.

3. Flexible connectors shall be installed in the base section to form a permanently watertight seal.

C. Manhole Riser Sections

1. Precast manhole components may be used to construct standard, drop and carry-through manholes. Manholes less than five (5) feet in depth measured from the spring line of the pipe to the bottom of the lower riser ring shall be flat-top manholes.
2. All manhole riser joints shall be watertight and use rubber gaskets. Rubber gasketed joints installed in accordance with manufacturer's instructions. All joints shall then be filled with non-shrink grout inside and out so as to produce smooth interior and exterior surfaces. All manhole penetrations shall be watertight. Complete manholes shall be rigid. Compact backfill in accordance with the provisions stated in Section 102 - EXCAVATING, BACKFILLING AND COMPACTING FOR UTILITIES.
3. All lift holes shall be thoroughly wetted, completely filled with mortar and smoothed and pointed both inside and out to ensure watertightness.
4. The shortest length of riser section to be incorporated into the manhole shall be installed immediately below the flat slab top or cone.
5. Properly locate and plumb each manhole riser section.
6. Install manhole extensions and top slabs in accordance with manufacturer's specifications and as shown on the plans. Lay section risers with the sides plumb and the tops level. Make joints and penetrations watertight.

D. Preformed Plastic Gaskets:

1. Carefully inspect precast manhole sections to be joined.
2. Do not use sections with chips or cracks in the tongue.
3. Use only pipe primer furnished by gasket manufacturer.
4. Install gasket material in accordance with manufacturer's instructions.
5. Completed manholes shall be rigid and watertight.

E. After completion of the manhole, all plugs shall be completely removed from the sewers and all loose material shall be removed from the manhole.

F. Service connections shall not be installed into manholes unless otherwise shown on the Drawings or directed by the Asotin CountyPUD. Where service connections into manholes are allowed, the top of the service sewer pipe shall be 0.2 feet higher than the top of the downstream main sewer pipe. The manhole invert shall be channeled for the service connection sewers in the same manner as for main sewers.

G. Stubs for future construction shall consist of a section of pipe extending two feet outside the manhole wall, connected as shown on the Drawings and Standard

Details. The manhole fillet shall be formed for future connection. The stubs shall be located as shown on the Drawings.

H. Drop construction at manholes shall be as shown on the Drawings and Standard Details.

3.3 Manhole Frames and Covers

A. Set frames in bed of mortar with mortar carried over flange as shown.

B. Set tops of covers flush with surface of adjoining pavement or ground surface, unless otherwise shown or directed.

3.4 Watertight Manholes

A. All manholes designated for high groundwater conditions shall be coated with two (2) coats of coal tar epoxy to a minimum thickness of 18 mils.

B. All manholes designated for high groundwater conditions shall have a 12-inch wide wrap sealant system on exterior joints and installed as recommended by the system manufacturer.

3.5 Cleanouts

A. Cleanouts shall be constructed as shown on the Drawings and Standard Details. The frame shall be jointed to the riser pipe so that groundwater will be prevented from entering the sewer. Cleanouts shall be tested for watertightness along with the sewers to which they are connected.

3.6 Connect To Existing Manhole

A. CONTRACTOR shall remove or plug existing pipe as applicable, drill hole at new location required for installation of sewer under this contract, install pipe, seal the pipe penetration, form channeled inverts, install drop connections as required and backfill as required.

B. Connection to existing manholes shall be made in such a manner that the modified manhole is equal to a new manhole in appearance and performance. A channel, approximately two inches larger all around than the connecting pipe, shall be cut into the existing manhole base. The new pipe shall be connected as shown on the Drawings and Standard Details. The rough-cut channel shall be finished to its final smooth and uniform shape with mortar. The existing sewer(s) shall be maintained in service and the fresh concrete and mortar surface shall be protected from the flowing sewage for a minimum of 24 hours.

3.7 Manhole Hydrostatic Testing

A. All manholes will be visually inspected by the Asotin County PUD; there shall be no evidence of leakage of water into any manhole from outside sources or any imperfections which may allow such leakage.

B. The hydrostatic testing of manholes shall consist of plugging all inlets and outlets and filling the manhole with water. The manhole shall be filled to the rim at the start of the test. Leakage in the manhole shall not exceed 0.2 gallons per foot of head above the invert after a one-hour test period. Leakage shall be determined by refilling to the rim using a calibrated known volume container. The manhole may be filled 24 hours prior to the time of testing to permit normal absorption into the walls.

C. If the water table is an adverse factor, the manhole shall be pumped completely dry, all pipes plugged and then be checked for infiltration. The leakage rate shall not exceed 0.2 gallons per day per foot of depth, over a test period of not less than two (2) hours.

D. The CONTRACTOR shall notify the Asotin County PUD three (3) days prior to testing and submit testing data to the Asotin County PUD.

E. The CONTRACTOR shall repair all imperfections and leaks disclosed by either visual inspection or testing. The method of repair shall be subject to the Asotin County PUD's approval.

END OF SECTION

SECTION 220

SANITARY SEWER MAIN CLEANING AND TV INSPECTION

PART 1 GENERAL

1.1 Description

A. This Section includes all labor, materials, equipment and incidentals necessary for cleaning and internal TV inspection of sanitary sewer main lines. Work under this section shall include, but not be limited to: cleaning of mainlines and manholes and TV inspection of designated sanitary sewer main lines, traffic control as shown or required by all local, state, and federal agencies and all other incidental work specified or shown in the project plans and specifications.

B. The CONTRACTOR shall perform all work in accordance with Federal OSHA and State safety requirements, including those for confined space entry.

1.2 Submittals

A. Information on all cleaning and TV inspection equipment proposed for use by the CONTRACTOR, including a listing of size, type and capabilities of each piece of equipment.

B. A traffic control plan that shall include, but not be limited to: staging sites, impacts to traffic patterns, considerations of bus traffic, as well as proposed signs, detours and flaggers.

C. The CONTRACTOR shall provide the following cleaning and CCTV reports:

1. Mainline Cleaning Report
2. TV inspection record
3. Recorded DVD copies of inspection
4. Manhole Inspection Report

1.3 CONTRACTOR'S Record Drawings

A. The CONTRACTOR shall maintain a detailed record, including a neatly marked set of construction drawings if applicable, of the sanitary sewer pipes associated with this work, including but not limited to: any differences in alignment, pipe size and manhole or cleanout location discovered during the progress of the work. Records and Drawings shall be kept current with the

work as it progresses and shall be subject to inspection by the Asotin County PUD at any time.

B. The location, alignment, lengths and sizes of the sanitary sewer lines shown on the Drawings are compiled from available records and/or field surveys. The Asotin County PUD does not guarantee the completeness of such records. All dimensions shall be verified by the CONTRACTOR.

PART 2 PRODUCTS

2.1 Water for Cleaning

The Asotin County PUD will provide water required for cleaning operations from metered hydrants. The Asotin County PUD will provide the meter assembly. The CONTRACTOR shall provide all hoses, adapters and appurtenances required for obtaining water from the designated hydrants. Access to the hydrants shall not be obstructed in case of fire in the area served by the hydrant.

2.2 Cleaning Equipment

A. General

The CONTRACTOR shall furnish and utilize a combination of high velocity hydraulic cleaning equipment and a vacuum unit as specified or required. High velocity cleaning equipment shall be used to clean all sewer mainlines unless otherwise specified or approved by the ENGINEER. Low velocity or mechanical cleaning equipment shall not be used in lieu of high velocity equipment.

B. High Velocity Cleaning Equipment with Vacuum Pickup of Materials

1. High velocity cleaning equipment shall be capable of providing up to 200 gallons per minute at 2,000 pounds per square inch (psi) of working pressure. The CONTRACTOR shall provide a minimum of 500 feet of 1-inch ID high-pressure hose with at least two (2) cleaning nozzles. The nozzles shall be capable of producing a scouring action from 15 to 45 degrees in all size lines designated to be cleaned. The equipment shall also include a high velocity "gun" for cleaning manhole walls and bottoms. The equipment shall be complete, including 1,200 gallon water tanks suitable for holding corrosive or caustic chemicals, pumps, hose, hydraulically driven hose reel, auxiliary engines, controls and all safety features required by law.
2. The cleaning equipment shall have an integral vacuum unit to allow the material cleaned from the pipes to be vacuumed directly from the manhole.

3. The CONTRACTOR shall provide additional cleaning equipment, including root cutters, as required to satisfactorily clean the pipe.

2.3 TV Inspection Equipment

A. A closed circuit color television (CCTV) camera capable of providing still pictures and videos shall be used on all lines. The CCTV equipment shall be specifically designed for sewer inspection operations and shall be operative in 100 percent humidity conditions. Lighting and camera quality shall be suitable to allow a clear focused picture a minimum of six (6) linear feet in front of the camera of the entire inside periphery of the pipe. The camera shall have an adjustable focus distance from six (6) inches to infinity, and the camera lights shall be variable intensity, with light, focus and aperture remotely controlled by the operating technician at the monitoring station.

B. Camera travel speed shall be from 1.8 to 30 feet per minute (fpm) with smooth, uniform motion. Sudden stops and starts will not be acceptable. Camera shall be capable of stopping and reversing direction as necessary to document sewer conditions. Video pictures shall be clear, sharp and free from vibratory or electrical interference when the camera is in operation.

C. A CCTV camera with pan-tilt capabilities shall be used on all lines larger than six (6) inches in diameter. The CCTV camera shall be a tractor-powered camera being able to inspect dead end lines, and shall be remotely controlled by an operating technician.

D. The monitoring station shall be truck-mounted, capable of seating two viewing personnel and one operating technician. The monitoring station shall be fully enclosed within a rigid weatherproof enclosure on the TV truck.

E. A minimum of two (2) color display monitors (minimum 650 lines horizontal resolution) operating simultaneously shall be used in the monitoring station. The monitors shall be of a proper size to allow all viewing personnel in the monitoring station a satisfactory view, and shall continuously display the current date, manhole designation of the mainline being inspected and a continuous forward and reverse read-out of the camera distance from the manhole of reference.

PART 3 EXECUTION

3.1 Temporary Traffic Control

Provide as required to meet County, City and State requirements.

3.2 Maintaining Sewer Flows and Cleaning Precautions

A. All sanitary sewer system components shall remain in service through the cleaning and TV inspection operations unless specific exceptions are approved in writing by the ENGINEER.

B. During cleaning operations, precautions shall be taken by the CONTRACTOR in the use of cleaning equipment. When hydraulically propelled cleaning tools, which retard the flows in the sewer lines are used, precautions shall be taken to insure that the water pressure created does not damage or cause flooding of public or private property being served by the sewer. Precautions shall be taken to protect the sewer lines and manholes from damage that may result from the improper use of cleaning equipment. The CONTRACTOR shall be solely responsible for the repair of any damage to structurally sound lines or damage to properties connected to the sewer which results from the cleaning operations.

C. The methods used to maintain flows shall be at the CONTRACTOR'S option and may include use of flow-through plugs with periodic release of sewage flow or bypass pumping. The bypass system, if used, shall be capable of conveying flows when the sewers are flowing full.

3.3 Cleaning

A. Clean all sewer lines and manholes designated on the Drawings or directed by the Asotin County PUD prior to CCTV inspection, including the manholes at both ends of the section to be inspected. Equipment as specified shall be used for cleaning.

B. All dirt, sand, grease, rocks, roots or other accumulations shall be removed from pipe walls and manholes. Existing lines shall be protected from damage caused by cleaning operations. Hydraulic cleaning operations shall be conducted with care to avoid damage to pipes and manholes, or flooding of adjacent property.

C. All sewers shall be cleaned with high velocity equipment unless the Asotin County PUD allows otherwise. The Asotin County PUD may order the use of other methods or equipment when it appears necessary.

D. All materials removed from the pipes during the cleaning operations shall be collected by a vacuum unit from the manhole downstream of the section being cleaned and removed by the CONTRACTOR. Passing accumulated materials from manhole section to manhole section shall not be permitted.

E. The CONTRACTOR shall be responsible for the proper and legal disposal of all materials removed from the sewers and in a manner acceptable to the Asotin County PUD.

F. Manhole and sewer cleaning reports shall be submitted on forms matching or similar to the format of the cleaning report forms included at the end of this section. All reports shall be completely filled out and provide all essential data, including:

1. Location of mainline segment or manhole being cleaned (street name and manhole designation as shown on the drawings);
2. Diameter of sewers, in inches;
3. Estimated amount and type of material removed from pipe or manhole.

G. Two (2) copies of the typed Mainline Cleaning Report forms shall be furnished to the Asotin County PUD as specified below.

H. Acceptance of the cleaning work will not be made until after the submittal of the cleaning reports and the CCTV inspection reports and tapes. Lines will be considered acceptably clean when sufficient material has been removed to restore the sewer line to 95 percent of its original flow capacity.

3.4 Sewage Flow Controls

A. The methods used to maintain flow shall be at the CONTRACTOR'S option and may include the use of flow-through plugs or bypass pumping.

B. During periods of very high flows when lines flow greater than half full, the CONTRACTOR, with the Asotin County PUD's approval, shall suspend sewer cleaning operations until flows are again less than half full.

C. Depths of flow at the downstream manhole during television inspection shall not exceed those shown below when performing television inspection of the lines.

Pipe Diameter (inches)	Maximum Flow Depth % of Pipe Diameter
6 – 10	20
12 – 24	25
30 - 42	30
48 - 72	35

D. When the sewage depth of flow at the downstream manhole of the mainline section being inspected is above the maximum allowable for television inspection, the CONTRACTOR shall provide flow-through plugs or other

means where necessary to ensure that the flows are reduced to the levels specified above.

3.5 CCTV Inspection

A. Internal CCTV inspection of sanitary sewer mainlines as shown on the drawings shall be performed only after the sewers have been thoroughly cleaned so that service connections, cracks, leaks and structural failures may be located.

B. The CCTV inspection shall be performed on one mainline section at a time and between two manholes. Each mainline section being inspected shall be isolated from the remainder of the line as necessary by the use of line plugs or bypass pumping to insure viewing of the inside periphery of the pipe. The TV inspection shall be performed by moving the television camera through the line along the axis of the pipe. The inspection shall be performed in a forward and/or backward direction, according to line conditions at the time the inspection is made.

C. The pan-tilt camera shall be turned to view directly up the axis of each service lateral encountered.

D. During the CCTV inspections, a record shall be kept which shows clearly the exact location in relation to the centerline of the adjacent manhole of each service connection, crack, leak or structural fault discovered. To ensure accurate measurement, the measurement shall be made at or above ground level by means of a meter device. Marking on a cable or the like which would require interpolation for the depth of the manholes shall not be used. Accuracy of the distance meter shall be checked by use of a walking meter, measuring wheel or other suitable device, and the accuracy shall be satisfactory to the Asotin County PUD.

E. The TV inspection record shall be submitted on forms matching or similar to the format of the report forms included at the end of this section. All reports shall be completely filled out and provide all essential data, including:

1. Location of mainline segment being tested (street name and designation as shown on the drawings);
2. Pipe diameter in inches;
3. Type and condition of the pipe;
4. Length and type of joints;
5. Presence and location of roots or visible leaks;

6. Location and description of any cracks, breaks, misalignments or obstructions;
7. Location and diameter of service laterals, including clock position as viewed from the camera;
8. Condition of the portion of lateral visible from pan-tilt camera;
9. Estimates of flows from service pipes and estimates of whether flow is domestic or I/I.

F. Two (2) copies of the printed Television Inspection Report form shall be furnished to the ENGINEER.

G. All video inspections shall be recorded on digital video disc (DVD) together with voice transmissions of sewer conditions. The video records shall be accurately referenced to the corresponding inspection report and shall be organized and catalogued so that specific faults can easily be located on the DVD-ROM. Two (2) DVDs shall be furnished to the Asotin County PUD.

H. The DVD shall be created in a format compatible with the majority of DVD players sold in the past five years. DVDs and inspection runs shall be numbered sequentially. Each DVD shall have a label which lists the date, the DVD number and all runs (including run number and mainline segment) included on the disk. The DVDs shall become the property of the Asotin County PUD upon payment for the line segments inspected.

3.6 Manhole Inspection Reports

Manholes at each end of any sewer section that is TV inspected shall be inspected. The manhole inspection reports shall be completed and submitted on forms matching or similar to the format of the report forms included at the end of this section. Two (2) copies of the printed Manhole Inspection Report form shall be furnished to the Asotin County PUD.

3.7 Report Submittals

All cleaning and TV inspection and manhole inspection reports shall be typed and organized by manhole numbers and submitted in 3-ring binders along with the DVDs.

MAINLINE CLEANING REPORT

Date:	Client: City:			Basin #:
Technician:	Unit #:	Weather:	Cleaned By:	Report #:

Method of Measurement: ☐ Scaled from map ☐ TV Report ☐ Measured by Tape ☐ Approximated	# TANKS / Hours	FOOTAGE / Diameter (in)	GALLONS REMOVED & TYPE OF DEBRIS / Line Completion Status
1. MH #_____TO MH #_____. Location: . Comments:			
			Line Complete? (Yes / No)
2. MH #_____TO MH #_____. Location: . Comments:			
			Line Complete? (Yes / No)
3. MH #_____TO MH #_____. Location: . Comments:			
			Line Complete? (Yes / No)
4. MH #_____TO MH #_____. Location: . Comments:			
			Line Complete? (Yes / No)

5. MH #_____TO MH #_____. Location: . Comments:			Line Complete? (Yes / No)
6. MH #_____TO MH #_____. Location: . Comments:			
			Line Complete? (Yes / No)
7. MH #_____TO MH #_____. Location: . Comments:			
			Line Complete? (Yes / No)
8. MH #_____TO MH #_____. Location: . Comments:			
			Line Complete? (Yes / No)
Type of Debris: S = Sand; R = Rock; G = Grease; B = Broken Pipe; RT = Roots		**Total Line Footage Complete This Date** SIZE (in)	FOOTAGE
Notes:			

TELEVISION INSPECTION REPORT

Date:	Client: City:					Basin #:	
Technician:	Inspector:		Weather:	Cleaned By:		Report #:	Tape #:
From MH #: Street:	Pipe Dia (in):	Joint Length (ft):	Section Length (ft):	Joint Type:	Pipe Mat'l:	To MH #: Street:	

PIPELINE DATA: Cleanliness: _____ Alignment: _____ Grade: _____ Age: _____ % Leaking Joints ____ (Estimated) Other: _____ _____ _____ _____	Footage	Problem Code	Comments	I/I (gpm)
MANHOLE DATA: (See attached Manhole Inspection Report)				
TURNAROUND: Requested (Date/Time): _____ Authorized (Date/Time): _____				

MANHOLE INSPECTION REPORT

Date:	Client: City:		Basin #:
Technician:	Weather:	Cleaned By:	Report #:
MH #:	MH Location (street and nearest cross-street, or address):		

SURFACE COVER:

Cover: AC ____ Concrete ____ Gravel ____ Dirt ____ Other (specify) _____

Ability to access MH: Satisfactory ____ Poor ____

CONDITION:

Deterioration:
Light _____
Medium _____
Heavy _____

Condition of Rim:
Satisfactory _____
Poor _____

TRAFFIC:

Light _____
Medium _____
Heavy _____

MATERIALS OF CONSTRUCTION:

Number of holes in lid: _____

Manhole Type: Flat-top ___ Cone ___

Cone_____ Precast ___Brick ___

Wall _____ Precast ___Brick ___

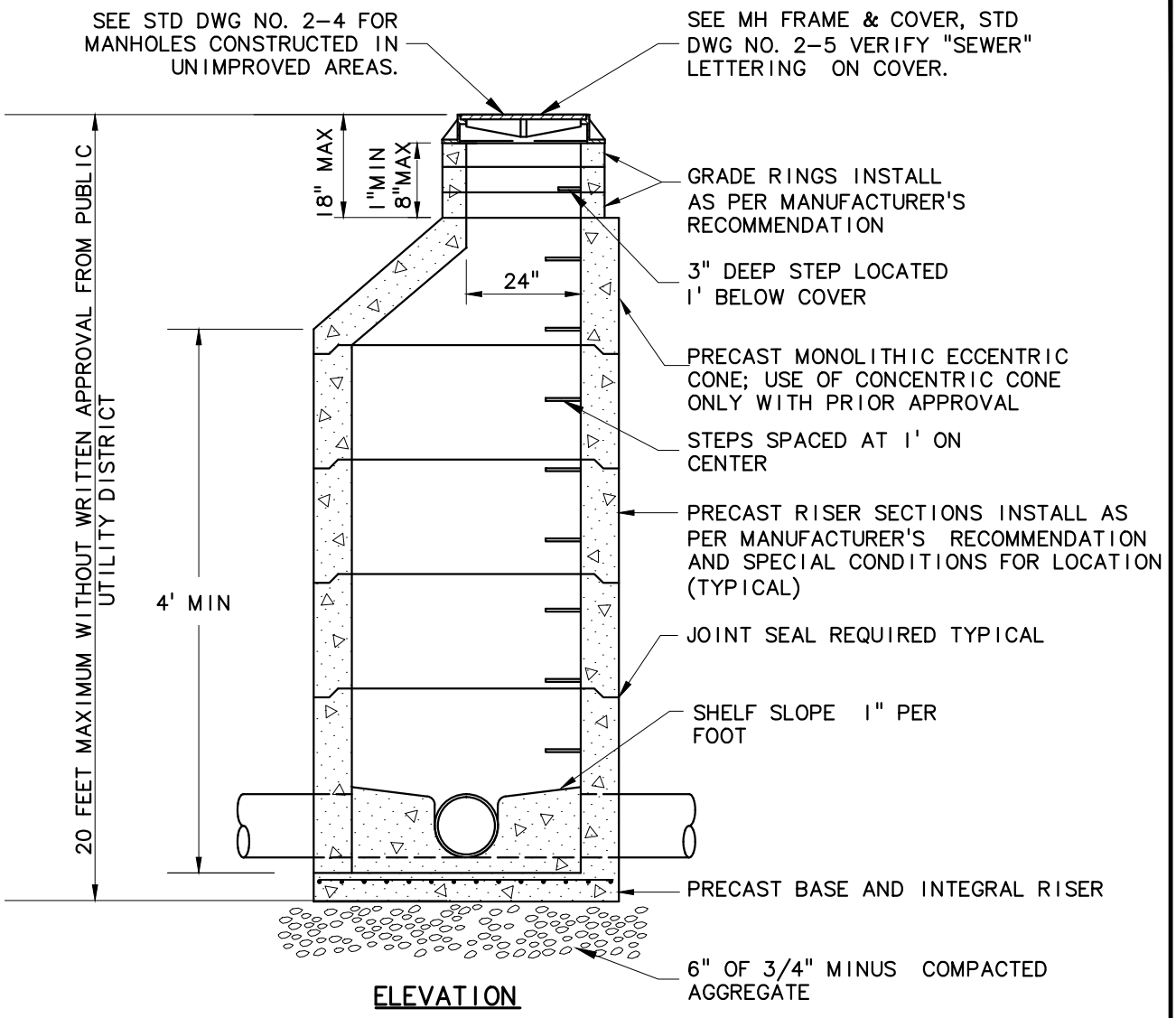
Base _____ Precast ___Brick ___

HYDRAULIC CONDITIONS:

Location	Est'd I/I (gpm)
Cover	_____
Ring	_____
Riser	_____
Cone	_____
Wall	_____
Bench	_____
Pipe Collar	_____

INLETS AND OUTLET:	**FLOW & LEAKS:**	**RIM LOCATION :**
Line Dia Depth from rim Outlet:_____ ft ____ in Inlets: A _____ ft ____ in B _____ ft ____ in C _____ ft ____ in D _____ ft ____ in	Flow Depth (in) _____ Leaks? Yes _____ No _____ Leak locations = X	Rim Height: _____ at grade _____ below grade by _____ inches _____ above grade by _____ inches

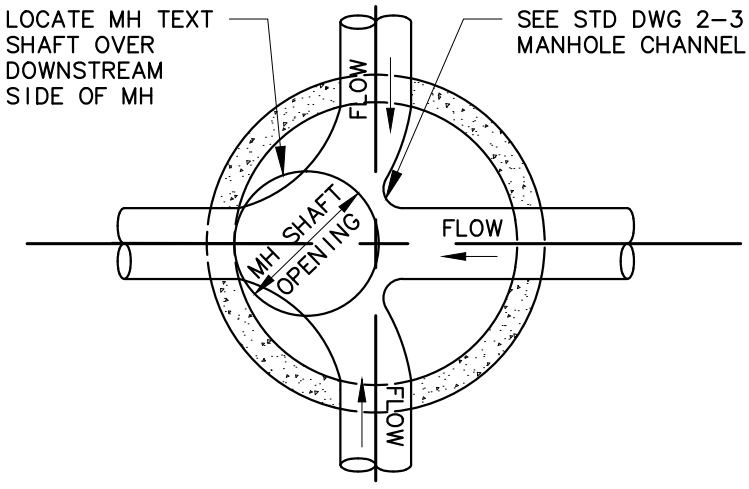
END OF SECTION



ELEVATION

NOTES:

1. INSTALL AS PER MANUFACTURER'S RECOMMENDATION AND SPECIAL CONDITIONS FOR LOCATION.
2. FOR 48-INCH DIA, MANHOLE THE MAXIMUM PIPE SIZE IS 21 INCHES. LARGER DIAMETERS SHALL BE APPROVED BY PUD.



PLAN

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

STANDARD MANHOLE

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	2-1

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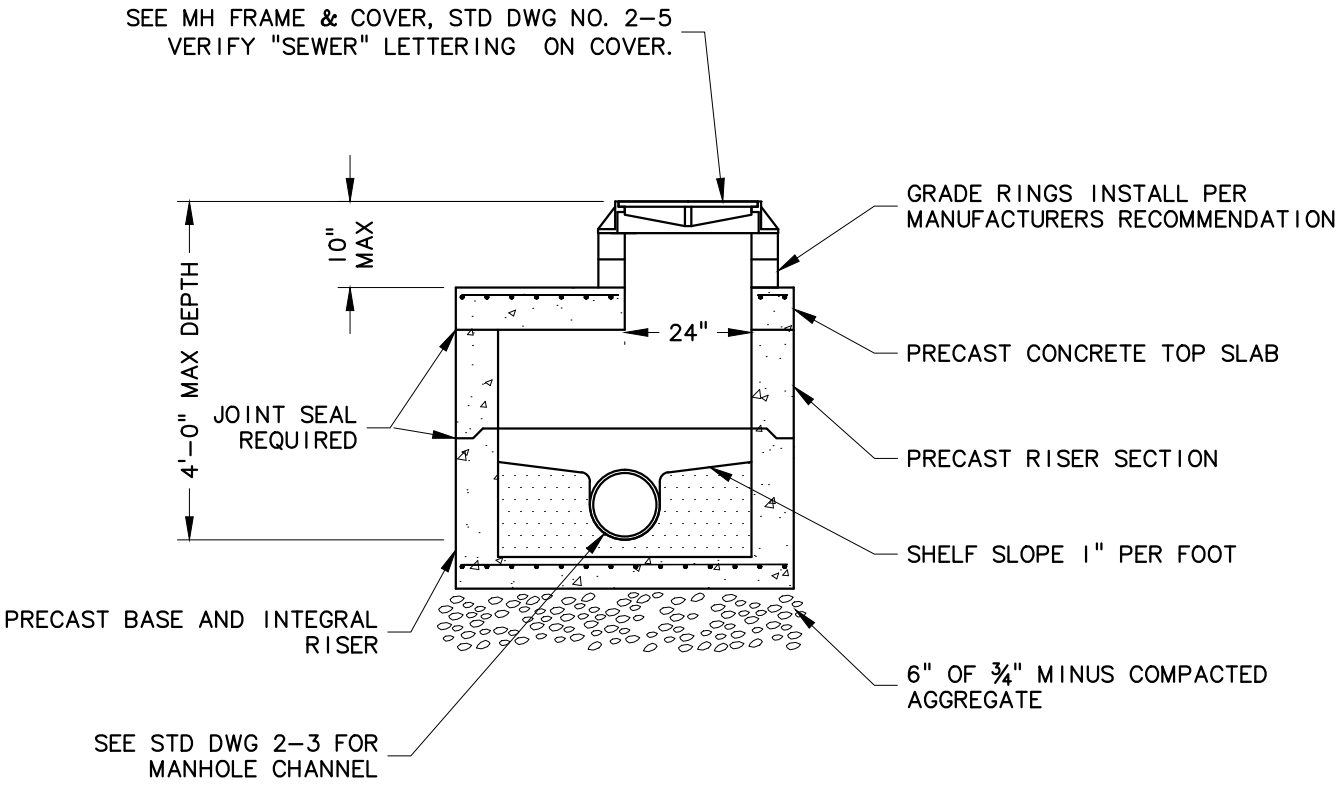

NOTES:
1. INSTALL LADDER RUNGS AS REQUIRED.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

STANDARD SHALLOW MANHOLE

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	2-2

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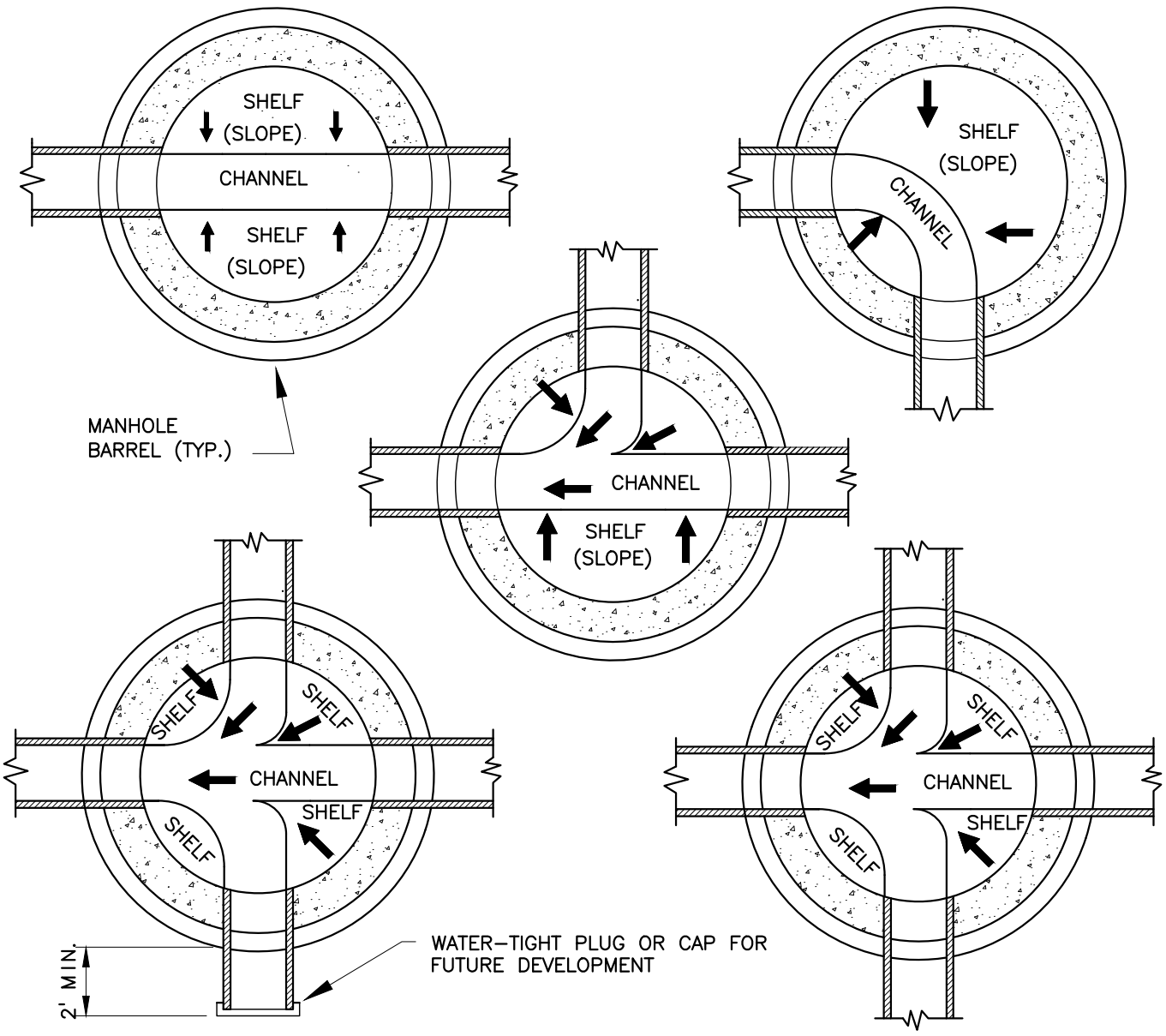

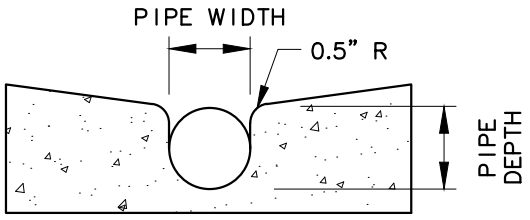

NOTE:
1. SLOPE ALL SHELVES TO CHANNEL AT 1:12.
2. SEE PLAN & PROFILE SHEETS FOR SLOPE OF CHANNEL.
3. FOR PIPES OF DIFFERENT SIZES, THE TOP OF PIPE (CROWN) SHALL BE AT THE SAME ELEVATION.
4. PROVIDE MINIMUM 0.1 FOOT IN–OUT DROP FOR STRAIGHT RUNS AND 0.2 FOOT IN–OUT DROP FOR ALL THE RUNS. PROVIDE 0.1 FOOT IN–OUT DROP FOR STRAIGHT RUNS, 0.2 FOOT IN–OUT DROP FOR 1 SIDE CHANNEL AND 0.3 FOOT IN–OUT DROP FOR 2 SIDE CHANNELS.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

STANDARD MANHOLE CHANNEL

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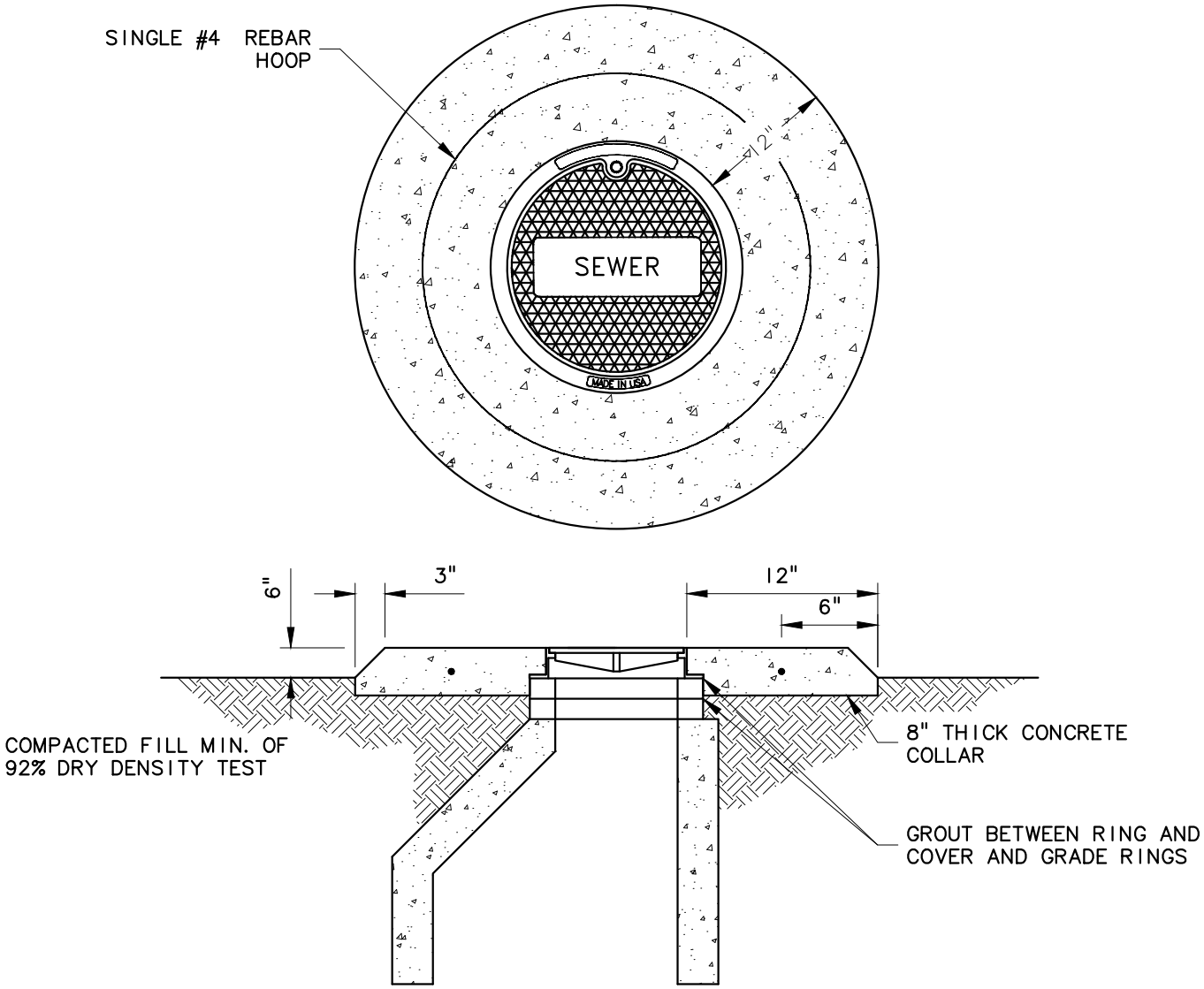

NOTES:

1. A CIRCULAR-SHAPED CONCRETE COLLAR IS REQUIRED ON MANHOLE INSTALLATIONS, IN UNIMPROVED AREAS. INSTALL A 8" THICK CONCRETE COLLAR THAT SHALL BE 6" ABOVE SURROUNDING SURFACE.

2. CONCRETE SHALL BE 3,000 PSI MIN. AT 28 DAYS, WATER/CEMENT RATIO SHALL BE 0.5, 3" MAX. SLUMP AND 3% TO 6% ENTRAINED AIR WITH ONE #4 REBAR HOOP. FIBER-REINFORCED CONCRETE (ADDED PER MANUFACTURER'S RECOMMENDATIONS) MAY BE USED IN LIEU OF #4 REBAR.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

STANDARD MANHOLE UNIMPROVED AREA CONCRETE COLLAR

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	2-4

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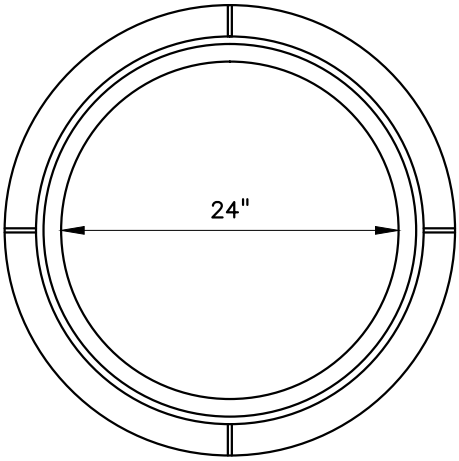

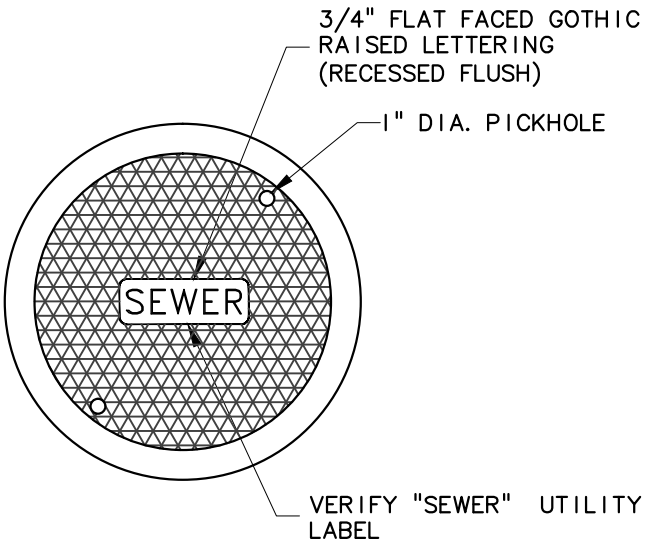

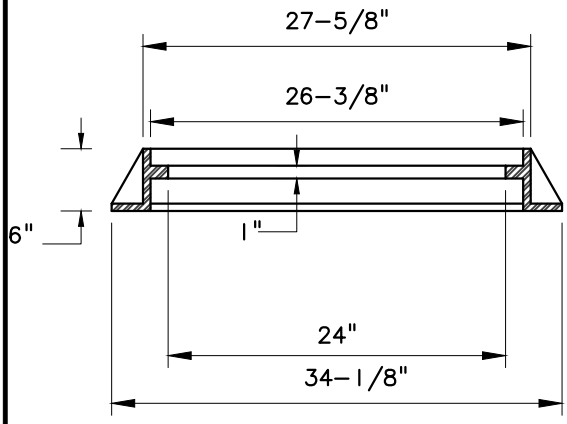

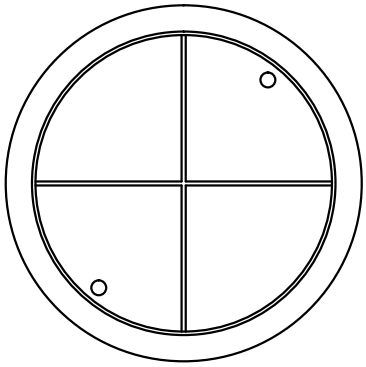

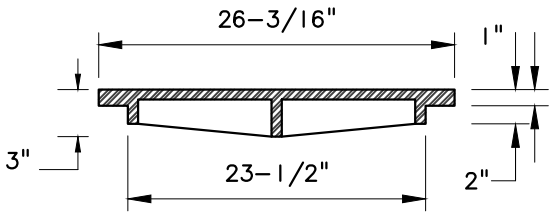

NOTES:
1. MANHOLE FRAME AND COVER D&L FOUNDRY A-2004 OR APPROVED EQUAL VERIFY "SEWER" UTILITY LABEL LETTERING ON COVER.

2. COVER MATERIAL SPECIFICATION GRAY IRON (ASTM A48 CL35B)

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

MANHOLE FRAME AND COVER

REVISION DATE:	STD. DWG. NO.
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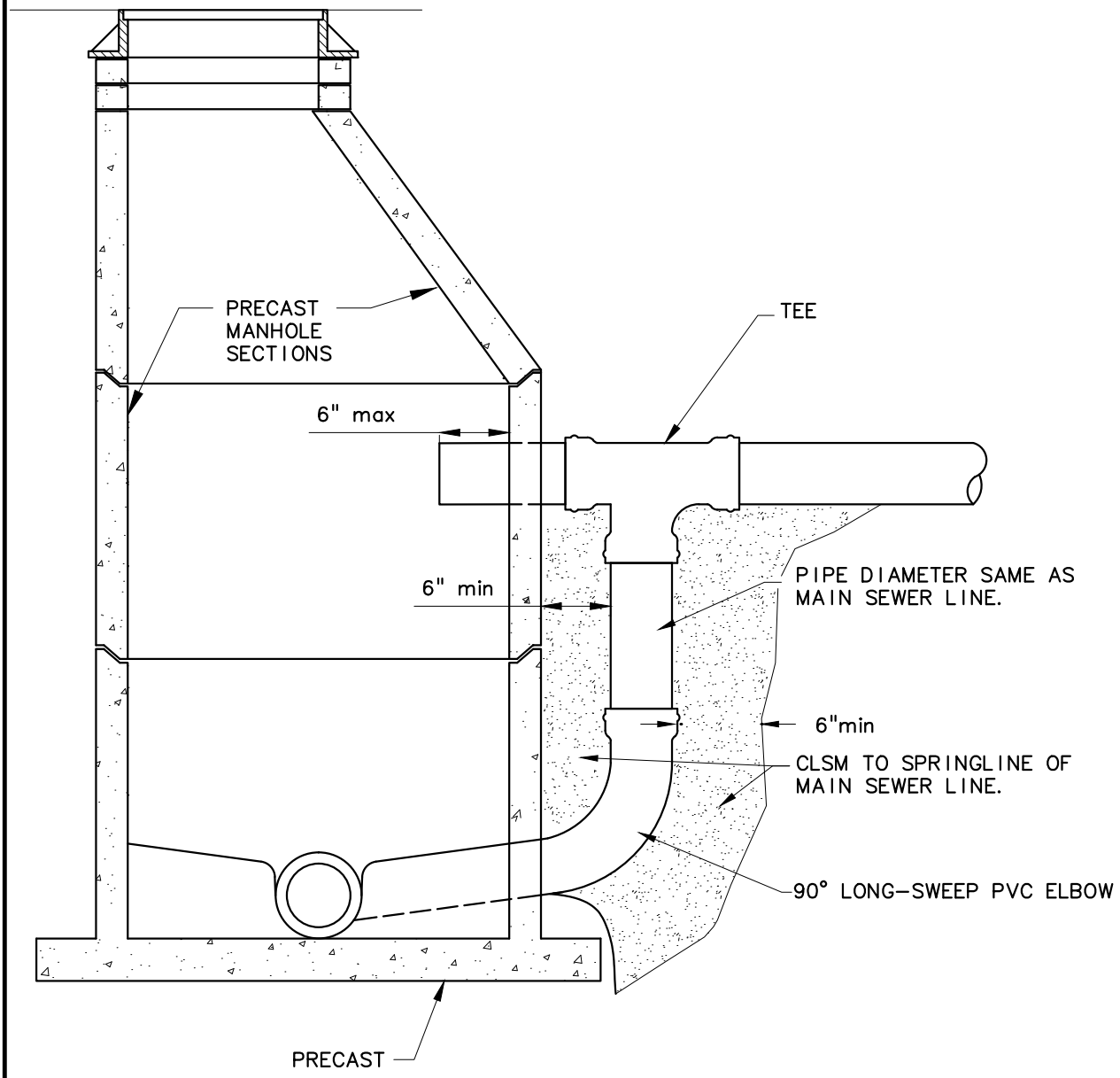

MANHOLE SECTION

NOTES:
1. AN OUTSIDE DROP CONNECTION IS REQUIRED FOR A SEWER ENTERING A MANHOLE AT AN ELEVATION OF 24 INCHES OR MORE ABOVE THE MANHOLE.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

MANHOLE DROP EXTERIOR

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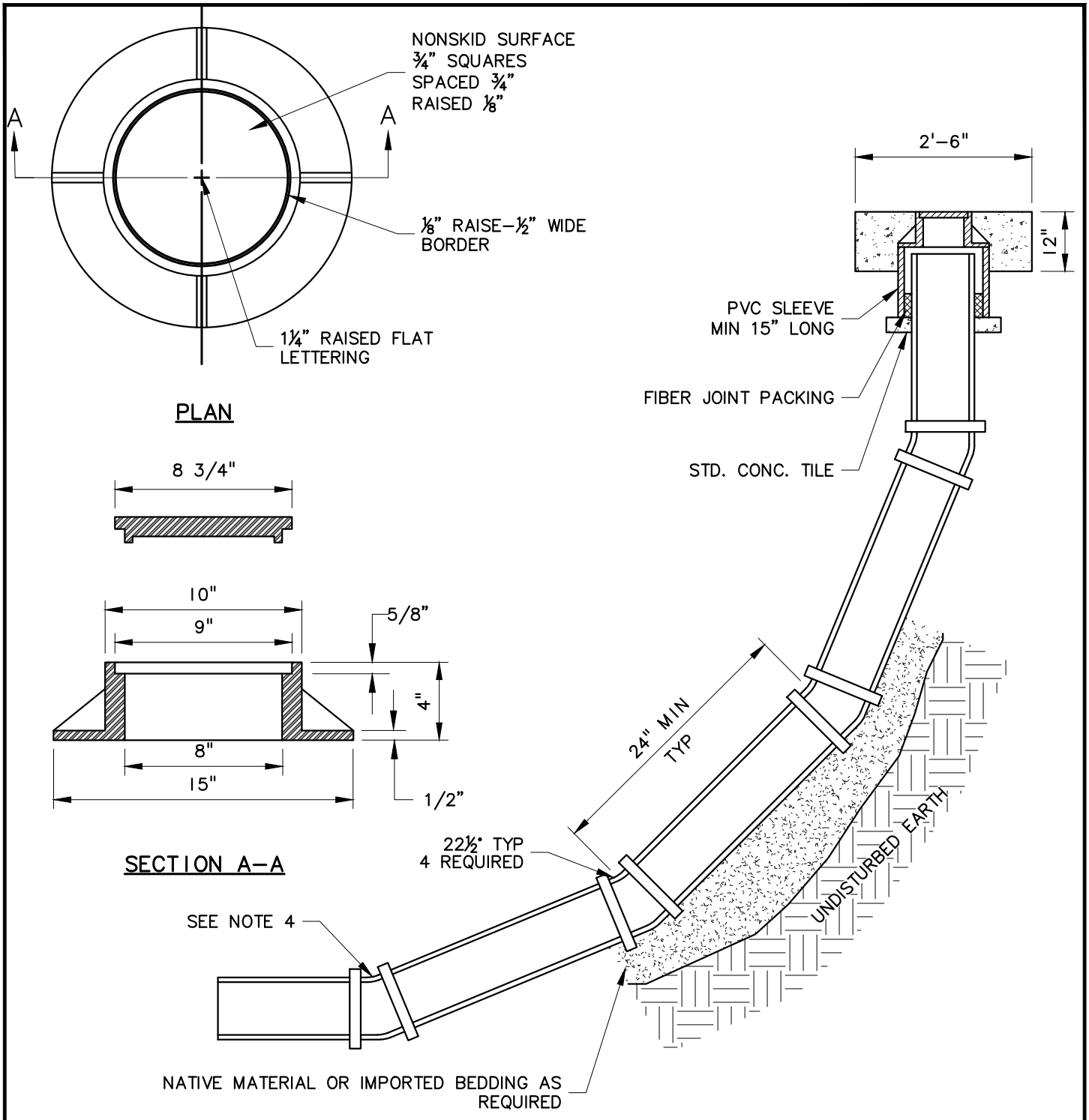

NOTES:

1. BACKFILL ENTIRE ASSEMBLY WITH CRUSHED SURFACING TOP COURSE.
2. CASE AND LID SHALL BE D&L FOUNDRY H–8020 OR APPROVED EQUAL.
3. 6" OR 8" PIPE ONLY. CLEANOUT TO MATCH THE SIZE OF THE MAINLINE.
4. CLEANOUT CAN ALSO CONSIST OF A 45° COMBO WYE WITH END PLUG AND A 45° BEND.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

SANITARY SEWER MAIN CLEANOUT

REVISION DATE:	STD. DWG. NO.
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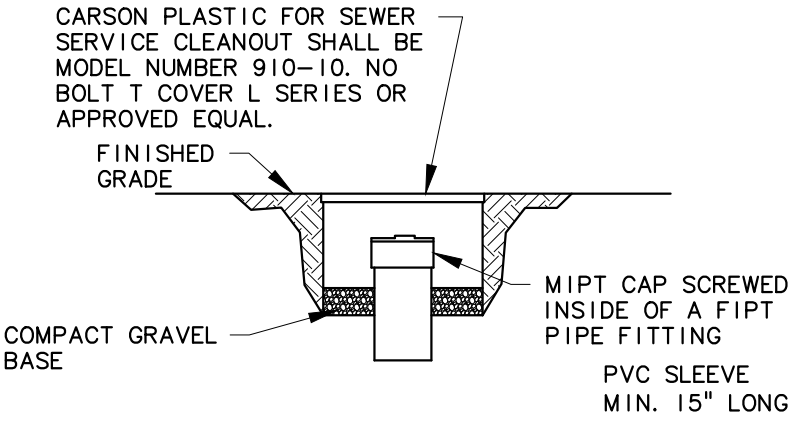
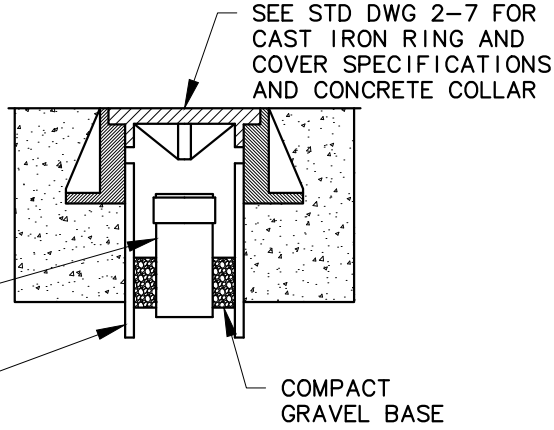
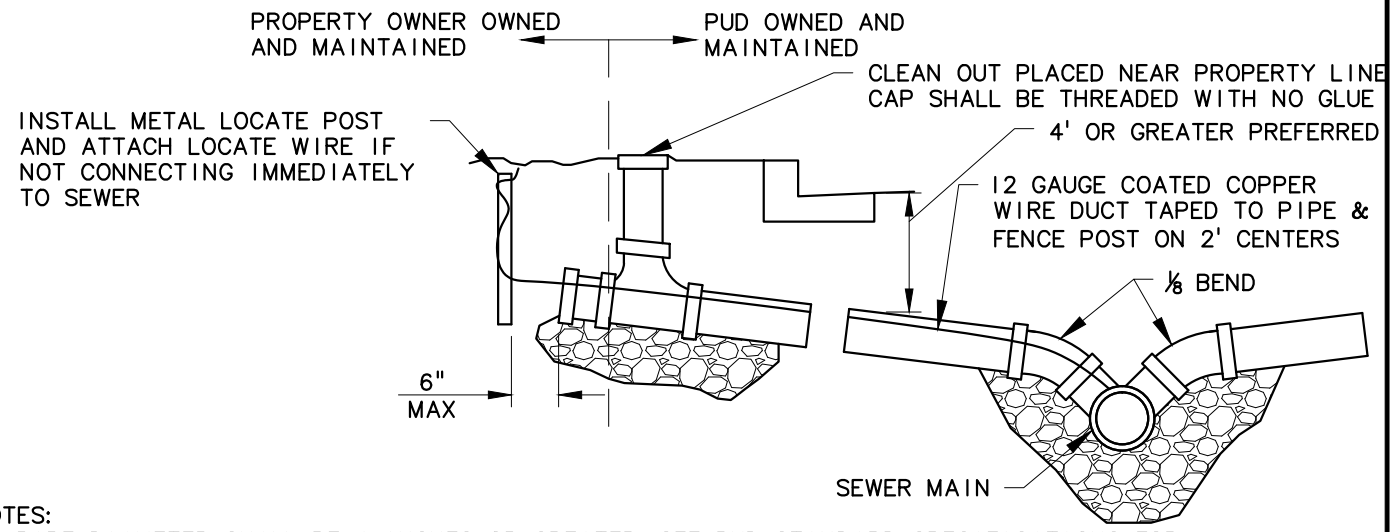


CLEAN OUT DETAIL
FOR LANDSCAPE AREAS



CLEAN OUT DETAIL
FOR HARDSCAPE AREAS



NOTES:

1. PIPE DIAMETER SHALL BE 4 INCHES OR GREATER. SEE PUD STANDARD SPECIFICATIONS FOR ACCEPTABLE MATERIALS.
2. HDPE MAY BE SUBSTITUTED FOR PVC FOR SEWER LATERAL REPAIRS USING PIPE BURSTING OR LONGITUDINAL BORING, UPON APPROVAL BY THE PUD.
3. LATERALS CONNECTING TO NEW SEWER MAINS SHALL BE CONNECTED WITH A GASKETED WYE.
4. LATERALS CONNECTING TO EXISTING SEWER MAINS SHALL BE CONNECTED WITH "ROMAC CB", "INSERTA TEE", OR APPROVED EQUAL.
5. PROVIDE REQUIRED COMPACTION FOR ALL FITTINGS AND JOINTS.
6. MINIMUM SLOPE IS 2 PERCENT, 1 PERCENT ALLOWED FOR SPECIAL CONDITIONS IF APPROVED BY PUD.
7. PIPES STUBBED FOR FUTURE CONNECTIONS SHALL BE PLUGGED WITH A FITTING APPROVED BY MANUFACTURER WITH LOCATE POST.
8. MAXIMUM DISTANCE BETWEEN LATERAL CLEANOUTS SHALL BE 100 FEET. THE MAXIMUM AGGREGATE CHANGE IN DIRECTION BETWEEN LATERAL CLEANOUTS SHALL BE 135 DEGREES. CONSTRUCT ADDITIONAL CLEANOUTS AS NECESSARY.
9. ABANDONED SEWER SERVICES SHALL BE PLUGGED WITHIN 5 FEET OF THE PROPERTY LINE WITH A FITTING APPROVED BY THE MANUFACTURER OR A MINIMUM OF 2-FOOT LONG POURED COMMERCIAL CONCRETE PLUG.
10. LATERAL CONNECTION TO SEWER MAIN IS NOT ALLOWED WITHIN 5' OF MANHOLES OR OTHER LATERAL CONNECTIONS.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

SANITARY SEWER LATERAL

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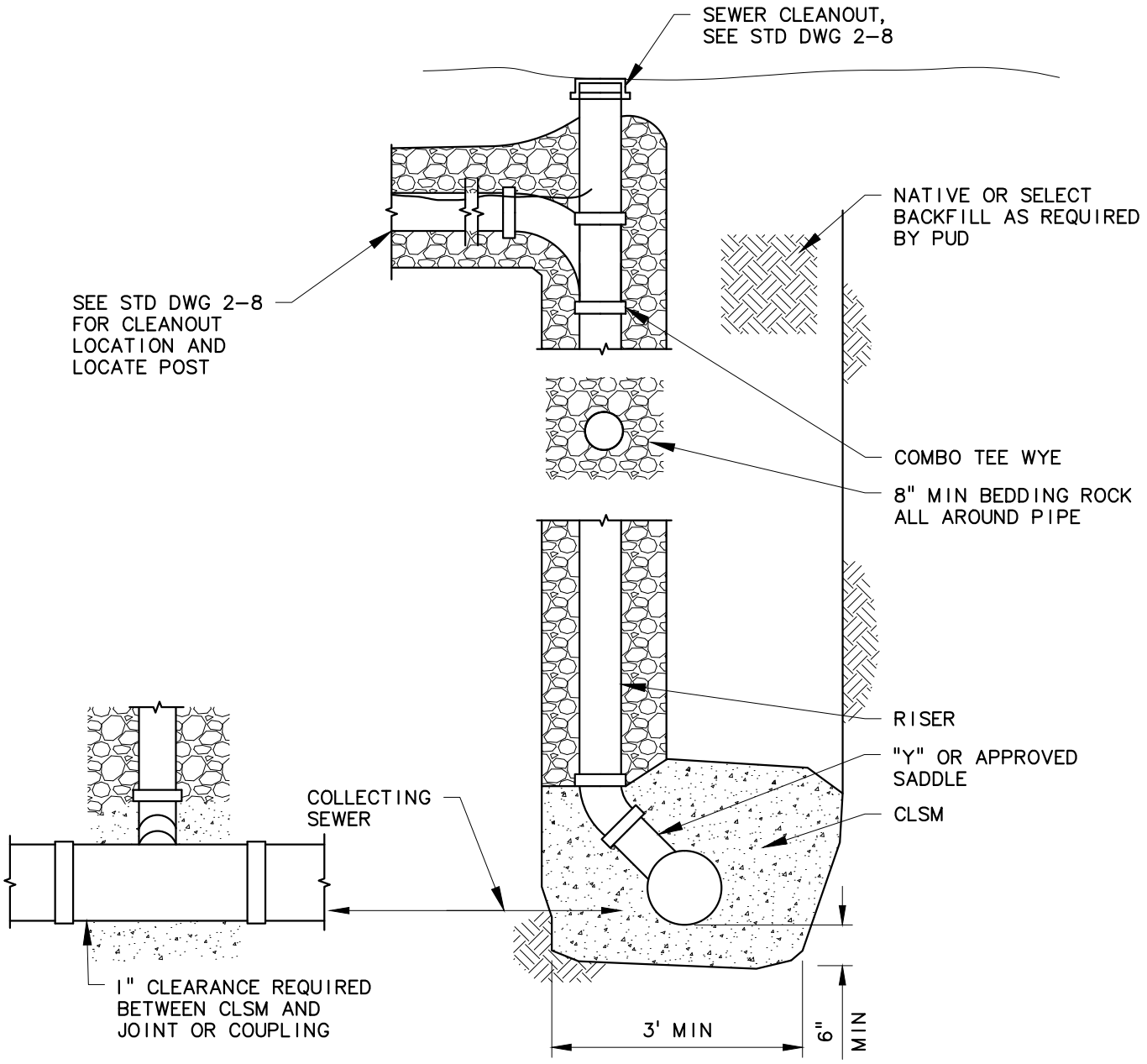

NOTE:
1. SANITARY SEWER LATERAL FOR DEEP SEWER IS ALLOWABLE FOR TRENCHES 15' DEEP OR GREATER WITH PRE-APPRAVOL FROM PUD.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

SANITARY SEWER LATERAL FOR DEEP SEWER

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	2-9

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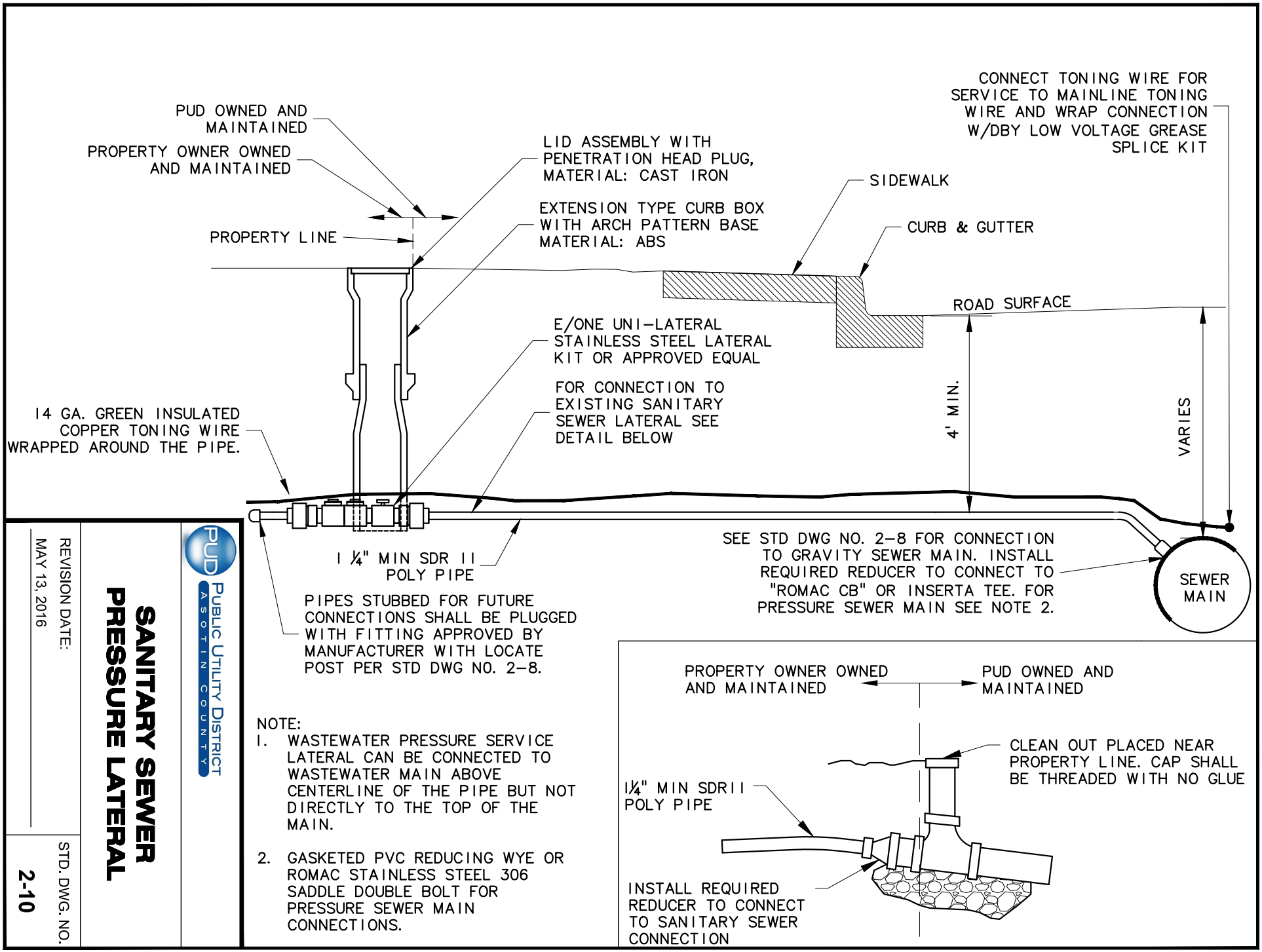

NOTE:

1. WASTEWATER PRESSURE SERVICE LATERAL CAN BE CONNECTED TO WASTEWATER MAIN ABOVE CENTERLINE OF THE PIPE BUT NOT DIRECTLY TO THE TOP OF THE MAIN.
2. GASKETED PVC REDUCING WYE OR ROMAC STAINLESS STEEL 306 SADDLE DOUBLE BOLT FOR PRESSURE SEWER MAIN CONNECTIONS.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

SANITARY SEWER PRESSURE LATERAL

REVISION DATE: MAY 13, 2016

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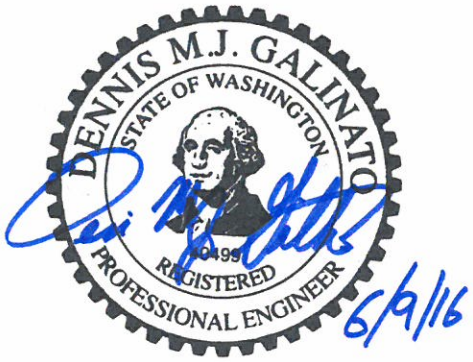
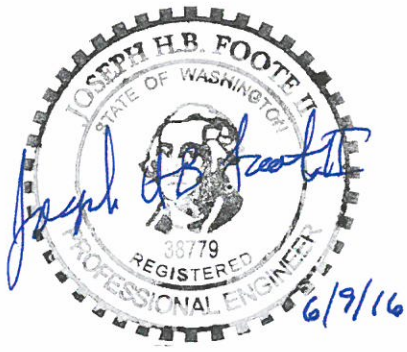
STANDARD WATER SPECIFICATIONS AND DETAILS

FOR

ASOTIN COUNTY PUD

MAY 2016





MURRAY, SMITH & ASSOCIATES, INC.
345 Bobwhite Court, Suite 230
Boise, ID 83706
208.947.9033

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SECTION 300

PIPELINE TESTING AND DISINFECTION

PART 1 GENERAL

1.1 Description

A. This section covers field pressure testing, disinfection and purity testing of potable water systems piping, fittings and valves. All piping shall be flushed and hydrostatically pressure and leak tested. Water flowing in pipeline shall be verified to Asotin County PUD. Defective items revealed by the testing procedures shall be removed and replaced or otherwise corrected as directed by the Asotin County PUD. All costs for labor and materials necessary to conduct the flushing, testing and disinfecting procedures specified herein, and all costs of labor and materials required to remedy defective items shall be borne by the CONTRACTOR.

B. The CONTRACTOR shall provide 72-hour notification to the Asotin County PUD prior to conducting flushing, hydrostatic testing and disinfection. The CONTRACTOR shall provide coordination and scheduling required for the Asotin County PUD to witness and provide necessary labor for operating the Asotin County PUD's existing system during hydrostatic testing and disinfecting procedures. The CONTRACTOR shall not operate any part of the existing water system.

C. The CONTRACTOR shall perform flushing and testing of all pipelines and appurtenant piping for water or sewage and disinfection of all pipelines and appurtenant piping for potable water, complete, including conveyance of test water to point of use and all disposal thereof, all in accordance with the requirements of the Asotin County PUD and the Standard Specifications and Details.

D. Unless otherwise directed by the Asotin County PUD, new water mains and appurtenances must be completely installed, flushed, tested, disinfected, and satisfactory bacteriological sample results received prior to completing permanent connections to existing water system.

1.2 Reference Specifications, Codes and Standards

Codes and Standards: Comply with the provisions of the latest edition of the following codes, standards and specifications, except as otherwise shown and specified:

ANSI/AWWA B300 Hypochlorites

ANSI/AWWA B301	Liquid Chlorine
ANSI/AWWA C651	Disinfecting Water Mains
ANSI/AWWA C600	Installation of Ductile-Iron Water Mains and Their Appurtenances
ANSI/AWWA C605	Underground Installation of PVC Pressure Pipe and Fittings for Water

1.3 Contractor Submittals

A pipeline testing and disinfection plan will be required to be submitted by the CONTRACTOR for review and approval by the Asotin County PUD a minimum of one month before testing is to start. As a minimum, the CONTRACTOR's pipeline testing and disinfection plan shall include the following:

A. Testing schedule

B. Proposed equipment and chemicals

C. Proposed plan for water conveyance including flow rates

D. Proposed plan for water control

E. Proposed plan for water disposal including flow rates

F. Proposed measures to be incorporated in the project to minimize erosion while discharging water from the pipeline

G. Proposed plan for disinfection

H. Proposed plan for dechlorination including discharge points and discharge rates

I. Proposed plan for testing chlorine levels throughout the length of the pipeline including test locations

PART 2 PRODUCTS

2.1 Equipment

A. All test equipment, chemicals for chlorination, temporary valves, bulkheads, or other water control equipment and materials shall be determined and

furnished by the CONTRACTOR subject to the Asotin County PUD's review. No materials shall be used which would be injurious to the construction or its future functions.

B. As a minimum, the CONTRACTOR shall furnish the following equipment and materials for the testing:

Amount	Description
2	Graduated containers
1	Hydraulic pump with hoses, valves and fittings as needed and required for the testing and disinfection of the facilities.
2	Pressure gauges with pressure range at least 120% greater than the required maximum test pressure with graduations in two (2) psi increments. Gauges shall have been calibrated with 90 days of pressure testing.

C. Chlorine for disinfection shall be in the form of liquid chlorine, sodium hypochlorite solution, or calcium hypochlorite granules or tablets.

D. Sodium hypochlorite and calcium hypochlorite shall be in accordance with the requirements of ANSI/AWWA B300. Liquid chlorine shall be in accordance with the requirements of ANSI/AWWA B301.

E. All temporary thrust restraint and equipment and facilities required for hydrostatic testing will be considered incidental.

PART 3 EXECUTION

3.1 Hydrostatic Testing of Water Mains Excluding HDPE Mains

A. All testing shall be observed by the Asotin County PUD and CONTRACTOR shall document and submit results to the Asotin County PUD within 3 days.

B. The CONTRACTOR shall make all necessary provisions for conveying water to the points of use and for the proper disposal of test water.

C. No section of the pipeline shall be hydrostatically tested until all field-placed concrete or mortar has attained full strength. At the CONTRACTOR's option, early strength concrete may be used when the full strength requirements conflict with schedule requirements. All such early applications shall be approved by the Asotin County PUD prior to each installation.

D. All piping shall be tested under a hydrostatic test pressure of 150 psi (+/- 5 psi) at the lowest point along the test section or as shown on the plans. If test

pressure is greater than 150 psi, CONTRACTOR shall verify with ENGINEER appropriate thrust blocks and restraint is provided. Thrust blocks and restraint in these specifications is based on 150 psi. Testing shall be performed by filling the pipe with water, allowing for natural absorption to occur, and applying the specified test pressure by pumping. Once the test pressure has been attained, the pump shall be valved off. The test will be conducted for one 2-hour period with the allowable leakage not to exceed value as per Paragraph E below.

E. During the test, pipe, fittings and valves with welded and/or flanged joints shall be completely watertight. Pipe, fittings and valves with rubber gasketed joints (mechanical joints or push-on joints) shall have a measured loss not to exceed the rate given in the following formula:

$$AL = \frac{LD(P)^{1/2}}{148{,}000}$$

In the above formula:

AL = Allowable leakage, in gallons per hour
L = Length of pipe tested in feet
D = Nominal diameter of pipe in inches
P = Average test pressure during the leakage test in pounds per square inch.

Hydrostatic Test Allowable Leakage

Diameter	**Length**	**Hydrostatic Test Pressure**	**Allowable Leakage**
(inch)	**(feet)**	**(psi)**	**(gallon/hour)**
4	100	150	0.03
6	100	150	0.05
8	100	150	0.07
10	100	150	0.08
12	100	150	0.10
14	100	150	0.12
16	100	150	0.13
18	100	150	0.15
20	100	150	0.17
24	100	150	0.20

F. During the test period, operate the pump as required to maintain pressure in the pipe within 5 psi of the specified test pressure at all times. At the end of test period, operate the pump until the specified test pressure is again obtained. The pump suction shall be in a graduated barrel or similar device or metered

so that the amount of water, measured in gallons, required to restore the test pressure may be accurately measured.

G. If the test reveals any defects, leakage in excess of the allowable, or failure, the CONTRACTOR shall furnish all labor, equipment and materials required to locate and make necessary repairs. The testing of the line (and repairing of defects, excessive leakage, and failures) shall be repeated until a test satisfactory to the Asotin County PUD has been achieved. All costs for locating, repairing, and retesting shall be borne by the CONTRACTOR.

3.2 Hydrostatic Testing of HDPE Water Mains

A. All testing shall be observed by the Asotin County PUD. CONTRACTOR shall document and submit results to the Asotin County PUD within 3 days.

B. All HDPE pipe shall be hydrostatically tested twice. The first test shall be conducted above grade after the pipe is butt fused and ready for installation. The second test shall be conducted after the pipe is in place in the trench or, in the case of installation by the horizontal directional drilling method, the pipe has been pulled into place. Prior to conducting the second test, the pipe shall be flushed.

C. Before commencing each test, the pipeline shall be filled with water to the specified test pressure and allowed to stand without makeup pressure until the pressure reaches equilibrium. Equilibrium will usually occur within 2 to 4 hours. After equilibrium has been reached, the test section shall be returned to the specified test pressure and the test period can begin.

D. Hydrostatic test shall be under a hydrostatic test pressure of 150 psi (+/- 5 psi) at the lowest point along the test section or as shown on the plans. If test pressure is greater than 150 psi, CONTRACTOR shall verify with ENGINEER appropriate thrust blocks and restraint is provided. Thrust blocks and restraint in these specifications is based on 150 psi. Testing shall be performed by applying the specified test pressure by pumping. Once the test pressure has been attained, the pump shall be valved off. The test will be conducted for one two-hour period in accordance with Paragraph 3.1.F above with the allowable leakage not to exceed the value as per Paragraph 3.1.E above.

E. During the above-grade test, the pipe shall be visually inspected for leaks. All leaks shall be repaired before installing the pipe in the trench or pulling the pipeline into the borehole. Leaks at fusion joints shall be repaired by cutting out the leaking fusion joint, re-fusing the joint and conducting a new above-grade test.

F. The second pressure test shall be made after the first pressure test has been successfully completed and approved by the Asotin County PUD and the HDPE pipeline is installed. For HDPE pipe installed by the horizontal directional drilling method, the test section shall be the full length of pipeline that is pulled into place. After the equilibrium period specified in Paragraph 3.2.C above, the pressure test shall proceed as specified in Paragraph 3.2.D above for a period of two (2) hours. Leakage shall not exceed that specified in Paragraph 3.1.E above. If the test fails, the installed pipe section shall be removed and replaced with new HDPE pipe.

G. The CONTRACTOR shall schedule pressure testing such that pressure changes due to thermal expansion or contraction of the pipe during the test period are minimized.

H. If the testing reveals any defects, any leakage, or any failure, the CONTRACTOR shall furnish all labor, equipment and materials required to locate and make necessary repairs. The testing of the line and repairing of defects, excessive leakage, and failures shall be repeated until a test satisfactory to the Asotin County PUD has been achieved. All costs for locating, repairing, and retesting shall be borne by the CONTRACTOR.

3.3 Disinfection of Water Mains

A. After testing and repairing where necessary, all potable water systems shall be thoroughly flushed, cleaned, and disinfected by the CONTRACTOR in accordance with the latest version of AWWA C651. Chlorination by means of tablets (calcium hypochlorite) placed in each length of pipe during installation is specifically prohibited. Chlorination by means of powder (calcium hypochlorite) placed in each length of pipe during installation is acceptable).

B. Before sterilizing, flush all foreign matter from the pipeline. The CONTRACTOR is to provide, at no additional cost to the Asotin County PUD, hoses, temporary pipes, ditches, etc., as required to dispose of flushing water without damage to adjacent properties. Flushing velocities shall be at least 2.5 fps. For large diameter pipe where it is impractical or impossible to flush the pipe at 2.5 fps velocity, clean the pipe in place from the inside by brushing and sweeping, then flush the line at a lower velocity.

C. Potable water piping shall be disinfected with a solution containing a minimum 25 parts per million (ppm) and a maximum 50 ppm of chlorine. The chlorine solution shall remain in the piping system for a period of 24 hours at which time the sterilizing mixture shall have a strength of at least 10 ppm of chlorine. If check samples fail to produce acceptable results, the disinfection procedure shall be repeated at the expense of the CONTRACTOR until satisfactory results are obtained.

D. Disposal of any water containing chlorine shall be performed in accordance with the latest edition of AWWA C651, and any other state or local requirements. Disposal may be made into existing sanitary sewer systems providing approvals are obtained from the City of Clarkston. Chlorinated water may not be discharged to open stream channels or stormwater systems.

E. The CONTRACTOR shall collect samples after the pipeline is flushed in accordance with the latest edition of AWWA C651. The chlorine residual must be below 1.5 mg/L when the sample is taken. Two consecutive sets of acceptable samples, taken at least 24 hours apart, shall be collected from the new main. At least one set of samples shall be collected from every 1,200 feet (366 m) of the new water main, plus one set from the end of the line and at least one set from each branch.

F. Results of the bacteriological testing shall be submitted within 2 days of testing and be satisfactory with the Asotin County PUD and the State Department of Health and/or other appropriate regulatory agencies, or disinfection shall be repeated at the expense of the CONTRACTOR.

3.4 Disinfection of Water Main End Connections and Tie-Ins

Disinfection and pressure testing of potable water piping and appurtenances at end connections which are required to remain in service due to restrictions in allowable shutdown time shall be pressure tested and disinfected as described below:

A. Prior to connecting new potable water piping and appurtenances with existing piping and appurtenances, the interior of all new pipe, fittings, valves and appurtenances shall be swabbed or sprayed with a 1% to 5% calcium hypochlorite solution. Swabbing or spraying connecting piping is acceptable for a maximum of length of 18 feet**.**

B. Following the disinfection procedure described above, connection of the new piping and appurtenances to the existing water system shall be made. During the system startup, the Asotin County PUD and CONTRACTOR shall visually inspect all new fittings, piping, valves and appurtenances for evidence of leakage. Any leakage observed during this period shall be promptly repaired by the CONTRACTOR, at the CONTRACTOR's expense as required by the Asotin County PUD.

3.5 Hydrostatic Testing of Water Service Connections

Service Lines shall be flushed prior to hydrostatic testing service laterals. Water flowing from each service shall be verified to the Asotin County PUD prior to testing.

3.6 Hydrostatic Testing of Fire Service Connections

Service lines serving fire services or sprinkler systems shall not be hydrostatically tested against water system or shut water system valve. CONTRACTOR to provide valve or caps to service line for duration of test. CONTRACTOR to provide any restraint or thrust blocks required for test.

HYDROSTATIC PRESSURE TEST RECORD FORM

Date: Time:	Project: Client: City:	Report #:
Technician:	Inspector:	Weather:
From: Street:		
To: Street:		

PIPELINE DATA:				
Pipe Diameter (in):				
Length (ft):				
Pipe Material				
TEST DATA:				
Pressure Gauge:	Type:	Range:	Calibration Date:	
Required Test Pressure:		Allowable Leakage:		
Test Start Time:		Test End Time:		
Test Duration (ending – starting time):				
Actual Test Pressure:				
Actual Leakage:				
RESULTS:				
Comments:				
Inspection:	Satisfactory ☐	Unsatisfactory☐		
Pressure Test:	Satisfactory ☐	Unsatisfactory☐		
Operator performing work:	Print:	Signature:	Date:	
Inspector witnessing test:	Print:	Signature:	Date:	

END OF SECTION

SECTION 301

DUCTILE IRON PIPE, FITTINGS AND SPECIAL ITEMS

PART 1 GENERAL

1.1 Description

Work under this Section applies to the furnishing and installation of ductile iron pipe, fittings and special items for buried service. The CONTRACTOR shall furnish and install ductile iron pipe, fittings, valves, special items and all appurtenant work, complete in place, all in accordance with the requirements of the Standard Specifications and Drawings.

1.2 Reference Specifications, Codes and Standards

A. Commercial Standards

ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800
ANSI/NSF Standard 61	Drinking Water System Components
ASTM A126	Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ANSI/AWWA C104/A21.4	Cement-Mortar Lining for Ductile-Iron Pipe and Fittings
AWWA C105	Polyethylene Encasement for Ductile-Iron Pipe Systems
ANSI/AWWA C110/21.10	Ductile-Iron and Gray-Iron Fittings
ANSI/AWWA C111/A21.11	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
ANSI/AWWA C115/A21.15	Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
ANSI/AWWA C150/A21.50	Thickness Design of Ductile-Iron Pipe
ANSI/AWWA C151/A21.51	Ductile-Iron Pipe, Centrifugally Cast

ANSI/AWWA C153/A21.53	Ductile-Iron Compact Fittings for Water Service
AWWA C600	Installation of Ductile-Iron Water Mains and Their Appurtenances

1.3 Submittals

A. Product technical data and material data; including all pipe, fittings, restrained joint systems, and appurtenance information.

B. Lining and coating data.

C. Applicable material certifications and testing certificates.

D. Manufacturer's handling delivery storage and installation requirements.

E. Documentation of tracer wire continuity tests

1.4 Quality Assurance

A. Unless otherwise noted, all water works materials provided for the project shall be new, of first class quality and shall be made by reputable manufacturers. All material of a like kind shall be provided from a single manufacturer unless otherwise approved by the Asotin County PUD. All material shall be carefully handled and installed in good working order free from defect in manufacture, storage and handling. Where an item is to be used but does not have its quality specified herein, it shall be equal to that specified in the appropriate American Water Works Association (AWWA) Standard Specification.

B. All references to standards of AWWA or other organizations shall be the latest versions of those standards.

PART 2 PRODUCTS

2.1 General

A. Ductile iron piping materials and specials shall meet the specifications of this Section and of the appropriate AWWA Standard Specifications. In the case of conflict, the more stringent specifications shall apply.

B. Unless otherwise specified herein or shown on the plans, the minimum working pressure rating of all water works material specified herein shall be 1.5 times the operating pressure or 150 psi minimum.

C. All coatings and materials specified herein that come in contact with potable water shall be National Sanitation Foundation (NSF) approved.

2.2 Ductile Iron Pipe

A. Ductile iron pipe shall conform to AWWA Standard C151 and shall be the standard push-on joint type or restrained joint type as identified on the drawings. Push-on joints shall be "TYTON" type or "Fas-Tite" type without exception. Unless otherwise specified herein or shown on the plans, ductile iron pipe shall be thickness Class 52. Polyethylene encasement, where required on the drawings or specified elsewhere, shall conform to AWWA Standard C105.

B. All ductile iron pipe 24 inches in diameter or greater shall be fully gauged for the last 2 feet of each spigot end and shall meet the outside diameter standard dimensions and tolerances required for spigot ends along the last 2 feet of each pipe piece. Pipe shall be externally marked, in manufacturer's color, indicating gauged pipe. Where piping is to be cut, such pipes shall be fully gauged and shall meet the outside diameter standard dimensions and tolerances required for spigot ends long the entire length of pipe. A minimum of 30% of each size of piping greater than 24 inches in diameter provided for the project shall by fully gauged for the entire length of each pipe as described above.

C. Ductile iron pipe shall be cement mortar lined, interior and exterior sealed in accordance with ANSI/AWWA C104.A21.4.

D. Push-on or mechanical type pipe joints shall conform to AWWA Standard C111. Flanged ductile iron pipe shall conform to AWWA Standard C115.

E. Restrained Joint Ductile Iron Pipe

1. Restrained joint ductile iron pipe and fittings shall be provided as identified on the drawings and required for the application. Joint restraint for pipe shall be accomplished with an integral lock mechanism except as may be otherwise specified. Any such system shall be a manufacturer's standard proprietary design, shall be as recommended by the manufacturer for the application, and shall be performance proven.

2. Restraining components for pipe shall be ductile iron in accordance with applicable requirements of ANSI/AWWA C110/A21.10 and/or C153/A21.53 with the exception of the manufacturer's proprietary design dimensions. Push-on joints for such fittings shall be in accordance with ANSI/AWWA C111/A21.11.

   The following is the approved list of restrained joint systems:

a. “Thrust-Lock” Pacific States Cast Iron Pipe Company.

b. “Fast Grip” American Cast Iron Pipe Company.

c. “TR Flex” United States Pipe and Foundry Company.

d. “Snap-Lok” Griffin Pipe Products Company.

e. “Megalug” EBAA Iron, Inc.

f. “Field-Lok” United States Pipe and Foundry Company.

g. “Super Lock” Clow

h. “Restrained Joint” McWane

i. “MJ-TJ” pipe with “Megalugs” Pacific States Cast Iron Pipe Company.

j. “Flex-Ring” American Cast Iron Pipe Company

Where such a system may require "Mega-Lugs" for restraint, "Mega-Lugs" shall be provided in quantities as may be required and shall be considered incidental to the joint restraint system. Restrained piping shall be pressurized following installation and prior to completing piping tie-ins.

3. Restrained joints for pipe shall be designed for a water working pressure as shown on the Drawings.

4. Joint restraint is required at all mechanical joint fittings and where specified on the plans. Joint restraint at mechanical joint fittings shall be accomplished with the following systems or approved equal:

   a. 4- to 12-inch pipe: GripRing Pipe Restrainer, as manufactured by Romac Industries, Inc.

   b. 14-inch pipe and greater: 470 Series Pipe Restraining System, as manufactured by Romac Industries, Inc.

F. Ductile iron pipe may be deflected both horizontally and vertically at the joints after assembly. The maximum pipe deflection shall not exceed one half of the manufacturer’s stated joint deflection allowance.

2.3 Fittings and Specials

A. Fittings

1. Fittings used for joining ductile iron pipe shall be of the type, size and strength designated on the plans, elsewhere in the specifications, or in the proposal and, to the extent therein specified, shall conform to the appropriate specification in this section. Fittings shall have pressure ratings as specified above and as shown on the plans.

2. Fittings shall be mortar lined and seal coated. Mortar lining of fittings shall be factory installed only, unless otherwise directed by Asotin County PUD. All fitting lining interior surfaces shall be smooth finished.

3. Pipe fittings and specials used with ductile iron pipe shall be gray-iron or ductile iron and shall conform to AWWA Standard C110. Ductile iron (compact) fittings conforming to AWWA Standard C153 may be substituted in lieu of AWWA C110 fittings for fitting sizes 3 inches through 24 inches in diameter. Fittings shall be mechanical joint, push-on type, flanged or plain-end as required and shown on the plans. When fitting joints are to be restrained, pipe joint restraint systems as specified herein shall be used.

4. Joint restraint is required at all mechanical joint fittings and where specified on the plans. Joint restraint at mechanical joint fittings shall be accomplished with the following systems or approved equal:

   a. 4- to 12-inch pipe: GripRing Pipe Restrainer, as manufactured by Romac Industries, Inc.

   b. 14-inch pipe and greater: 470 Series Pipe Restraining System, as manufactured by Romac Industries, Inc.

B. Flanges

Threaded flanges shall meet the requirement of AWWA Standard C115 and shall be installed only on pipe with a minimum Class 53 wall thickness. All flanged fittings shall be provided with bolts and gaskets as specified herein. Flanges shall have flat faces and shall be attached with bolt holes straddling the vertical axis of the pipe unless otherwise shown. CONTRACTOR shall coordinate with pipe, valve and fitting suppliers to make certain that pipe, valve and fitting flanges match in bolt pattern.

C. Gaskets

Gaskets for flanged joints shall be as follows:

1. Pipe sizes up to 24-inch in diameter: Gaskets shall be full-face gaskets, premium red rubber, 1/8 inch thickness, Garlock 22, or equal.

2. Pipe sizes 24-inch and greater: Gaskets shall be ring gaskets, premium red rubber, 1/8-inch thickness, Garlock 22, or equal.

D. Bolts and Nuts

Bolts and nuts shall be carbon steel and shall conform to the requirements of ASTM A307 or ASTM A193 grade B7 with ASTM A194 grade 2H heavy hex nuts.

E. Flexible Couplings

1. All flexible couplings shall be cast or ductile iron in accordance with ASTM Standard A536 and high strength alloy bolts and nuts conforming to ANSI/AWWA C111.
2. Insulating flexible couplings shall be of the gasketed sleeve type with insulating boot and shall be Romac Industries, Inc. Style IC501 or approved equal. All coupling materials shall be constructed to diameters that properly fit the pipe.
3. Insulating boot shall be fabricated from nitrile butadiene rubber suitable for water service with electric insulating properties in accordance with ASTM D2000 3 BA 715.
4. CONTRACTOR is responsible for selecting sleeve lengths appropriate to application, recognizing longer sleeves allow larger deflections and may ease installation.

F. Insulating Flanged Joints

Each complete insulating flange kit shall include a full faced gasket, a full-length pyrox insulating sleeve for each flange bolt and two pyrox insulating washers and two steel washers for each bolt. Gaskets shall be Garlock Style 3000 or equal.

G. Flexible Expansion Joints

Flexible expansion joints shall be installed in the locations indicated on the Drawings and shall be manufactured of ductile iron conforming to the material properties of ANSI/AWWA C153/A21.53. Flexible joints shall be provided with end connections as shown on the Plans. All flexible expansion joints shall consist of an expansion joint designed and cast as an integral part of a ball and socket type flexible joint, having a minimum of 15 degree deflection per ball and 4-inch expansion. Actual expansion and deflection requirements will be as shown on the Drawings. Each flexible expansion joint shall be hydrostatically tested to the manufacturer's published pressure rating prior to shipment. All pressure containing parts shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C213 and shall be holiday tested with a 1,500 volt spark test conforming to said specification. All flexible-expansion joints shall be Flex-Tend as manufactured by EBAA Iron, Inc. or approved equal.

H. Tapping Sleeves

Tapping sleeves shall be stainless steel conforming to 18-8 Type 304 stainless steel withstainless steel flanged end with ANSI 150 lb drilling. Bolts and

hardware to be Type 304 stainless steel and the branch outlet shall be heavy stainless steel pipe. The gasket shall be full circumferential gasket. Tapping sleeve shall be Romac SST or approved equal.

Valve for tapping sleeve shall be cast iron body with fusion bonded epoxy coating.

I. Tracer Wire

Tracer wire shall be 12 gauge single strand copper insulated high molecular weight polyethylene (HMWPE) wire. The HMWPE insulated cover shall be blue and shall have a minimum thickness of 45 mils. The wire shall be UL rated for 1400 F.

J. Marking Tape

Marking tape shall consist of inert polyethylene plastic that is impervious to all known alkalis, acids, chemical reagents and solvents likely to be encountered in the soil. The tape shall be a minimum of 6 inches in width. The tape shall be blue and shall be imprinted continuously over its entire length in permanent black ink with the words "Caution Buried Water Line Below"

PART 3 EXECUTION

3.1 General

A. All materials, workmanship and installation shall conform to referenced AWWA Standards and other requirements of these specifications. The methods employed by the CONTRACTOR in the storage, handling, and installation of pipe, fittings, valves, hydrants, equipment and appurtenances shall be such as to insure that the material, after it is placed, tested and permanently covered by backfilling is in as good a condition as when it was shipped from the manufacturer's plant. Should any damage occur to the material, repairs or replacement shall be made to the satisfaction of the Asotin County PUD.

B. Ductile iron pipe shall be installed in accordance with AWWA Standard C600, except as modified elsewhere in these specifications.

C. Sanitary Sewer Separation: The CONTRACTOR shall furnish all labor, equipment and materials required to replace sections of existing sanitary sewers or encase existing sanitary sewers in reinforced concrete as required to comply with Washington State Department of Health requirements for minimum separation of sanitary sewers. See also Section 102 - Excavating, Backfilling, and Compacting for Utilities.

3.2 Product Handling

A. Care shall be taken in handling and transporting to avoid damaging pipes and their coatings. Loading and unloading shall be accomplished with the pipe under control at all times and under no circumstances shall the pipe be dropped. Pipe shall be securely wedged and restrained during transportation and supported on blocks when stored in the shop or field.

3.3 Inspection

A. All pipe sections, specials and jointing materials shall be carefully examined for defects and no piece shall be laid that is known to be defective. Any defective piece installed shall be removed and replaced with a new pipe section in a manner satisfactory to the Asotin County PUD at the CONTRACTOR's expense.

B. Defective material shall be marked and removed from the job site before the end of the day.

3.4 Preparation

A. Excavate trenches, and prepare and maintain subgrade as described in these Specifications and shown on the Plans. Trench base shall be inspected prior to placement of the pipe. Remove large stones or other hard matter which could damage pipe or impede consistent pipe bedding backfilling or compaction.

B. All pipe trenches shall be excavated below the proposed pipe invert as shown on the Plans to accommodate the depths of pipe bedding material as scheduled on the Drawings.

C. Pipe cuts made with proper pipe cutting equipment shall be in accordance with the manufacture's recommendation. When required to re-bevel a pipe end for proper installation, the contractor shall utilize manufacture recommended bevel angle for the intended use.
Prior to assembly of field cut pipe, the reference mark shall be re-established with a pencil or crayon. The location of the reference mark at the proper distance from the bevel end shall be in accordance with the manufacturer's recommendations.

D. Pipe Cleaning

1. Each section of the pipe and each fitting shall be thoroughly cleaned before it is lowered into the trench. Cleaning of each pipe or fitting shall be accomplished by swabbing out, brushing out, blowing out with compressed air, or washing to remove all foreign matter.

2. If clean pipe sections and fittings cannot be placed in the trench without getting dirt into the open ends, the Asotin County PUD may require that a piece of tightly woven canvas be tied over the ends of the pipe and/or fitting until it has been lowered into position in the trench. After the pipe and/or fitting has been lowered into the trench, all foreign matter shall be completely brushed from the bell and spigot ends before assembly.

3.5 Installation

A. Install pipe and accessories in accordance with these specifications and the manufacturer's instructions.

B. Lift or roll pipe into position. Do not drop or drag pipe over prepared bedding.

C. Joints

Pipe jointing surfaces shall be clean and dry when preparing surfaces for joining. Lubricants, primers, adhesives, etc. shall be used as recommended by the pipe or joint manufacturer's specifications. The jointing materials or factory-fabricated joints shall then be placed, fitted, joined and adjusted in such a manner as to obtain a watertight joint. Trenches shall be kept water-free and as dry as possible during bedding, laying and jointing. As soon as possible after the joint is made, sufficient backfill material shall be placed along each side of the pipe to prevent movement of the pipe from any cause.

D. Install pipe and fittings to the line and grade specified on the Drawings, with joints centered, pipe properly supported and restrained against movement, and all valve stems plumb.

E. Lay pipe from the low end toward the high point. Provide a continuous, smooth invert. Bell holes shall be dug where necessary and the pipe shall be placed and supported on bedding material the full length of the barrel.

F. All loose dirt shall be removed from the bottom and the trench backfilled with specified bedding material to pipe laying grade.

G. The open ends of all pipes and special castings shall be plugged or otherwise closed with a watertight plug before leaving the work for the night, and at other times of interruption of the work. All pipe ends which are to be permanently closed shall be plugged or capped and restrained against internal pressure.

H. The weight of cast iron, ductile iron and other metallic fittings shall be supported by a poured-in-place concrete cradle. In-line valves shall be supported and anchored to an in-line thrust block as detailed in the Drawings.

I. Tracer Wire

1. Tracer wire is to be utilized on all pipelines for future locating purposes. Tracer wire shall be installed on the top centerline of the pipe. The wire shall be secured to the top of the pipe at maximum 10-foot intervals using 6-inch strips of 2-inch wide duct tape. The tracer wire shall be routed through all valve boxes (including isolation valves, air release valves, blowoffs and drain valves), meter boxes, fire hydrants and vaults to provide access to terminal ends of the wire. All locations of tracer wire intersections shall be soldered to provide electrical continuity and protected from adverse soil conditions with the use of shrink tubes or other approved waterproof connector devices. The result of the tracer wire installation shall be a continuous wire circuit electrical isolated from ground.
2. Tracer wire shall be installed in conjunction with all service lines. Tracer wire shall be accessible from within the meter box and shall have electrical continuity with any tracer wire laid in conjunction with the waterline to which the service is tapped.
3. Leave slack in mainline tracer wire equivalent to a 12-inch diameter loop at each valve box and at each service tap to facilitate splicing, soldering and waterproofing.
4. Test for continuity and isolation from ground in the wire after all work has been completed on the test section. Perform intermediate testing after backfilling operations and prior to surface restoration work. Test continuity between access locations by use of a temporary wire connecting test points in-line with an ohmmeter. Measure resistance with an approved ohmmeter that has been property calibrated. The continuity of a test section will be accepted if the resistance of the test section does not exceed 5 ohms for each 500 feet of location wire being tested. Measure isolation from ground with an approve 1,000 volt Megger, applied for one minute. The isolation of a test section will be accepted if the isolation resistance of the test section is at least 10 megohms. Locate and repair all breaks or defects in the wire and re-test until specified results are obtained.

J. Marking Tape

Marking tape shall be installed over all pipelines. Marking tape shall be installed approximately 1 foot above the top of the pipe for its full length with the written warning words facing up.

K. Trench excavation and backfill of ductile iron piping system shall conform to the requirements of Section 102 - Excavation, Backfilling and Compacting for Utilities.

L. Thrust Restraint

All tees, plugs, caps, bends, offsets, as well as other appurtenances which are subject to unbalanced thrust, shall be properly braced with concrete thrust blocks unless otherwise specified in the drawings. Concrete thrust blocks shall have a minimum 28-day compressive strength of 3,000 psi. The concrete blocking shall bear against solid undisturbed earth at the side and bottom of the trench excavation and shall be shaped so as not to obstruct access to the joints of the pipe or fittings. Where shown on the plans or specified elsewhere in the Technical Specifications, the CONTRACTOR shall also provide internal or external joint restraint systems at the fittings and on all joints within the specified or shown distance on each side of the fitting or joint.

3.6 Testing and Disinfection of Ductile Iron Pipe Mains

A. Testing and disinfection of PVC pipe mains shall be done in accordance with Section 300 - Pipeline Testing and Disinfection, AWWA Standard C605, and AWWA Standard C651.

B. All chlorinated water used in disinfection of the water main shall either be discharged through an approved connection to a public sanitary sewer system or shall be dechlorinated to limits acceptable by the Washington State Department of Ecology prior to discharge into any storm drainage system or open drainage way. No chlorinated water shall be discharged into a storm drainage system or open drainage way without a dechlorination plan meeting state requirements.

3.7 Survey Line and Grade and Survey Monument Replacement

A. Preserve all stakes, markers, etc. Stakes, markers, etc. that are disturbed by the Contractor will be replaced by the CONTRACTOR at CONTRACTOR'S expense.

B. CONTRACTOR shall develop and make all detailed surveys necessary for layout and construction, including exact component location, working points, lines and elevations. The CONTRACTOR shall have the responsibility to carefully preserve bench marks, reference points and stakes, and in the case of destruction thereof by the CONTRACTOR or resulting from its negligence, the CONTRACTOR shall be charged with the expense and damage resulting therefore and shall be responsible for any mistakes that may be caused by the unnecessary loss or disturbance of such bench marks, reference points and stakes.

END OF SECTION

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SECTION 302

POLYVINYL CHLORIDE (PVC) PRESSURE PIPE, FITTINGS, AND SPECIAL ITEMS

PART 1 GENERAL

1.1 Description

Work under this Section applies to the furnishing and installation of polyvinyl chloride (PVC) pressure pipe fittings and special items for buried service. The Contractor shall furnish and install polyvinyl chloride (PVC) pressure pipe, fittings and all appurtenant work, complete in place, all in accordance with the requirements of the plans and Standard Specifications and Details.

1.2 Reference Specifications, Codes and Standards

A. Commercial Standards

ANSI/AWWA C900	Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4-inch Through 12-inch for Water Transmission and Distribution
ANSI/AWWA C905	Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, Water Transmission Pipe, 14-inch Through 48-inch
ANSI/AWWA 605	Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water
ANSI/ASTM D1784	Standard Specification for Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds
ASTM D1598	Standard Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure
ASTM D2241	Standard Specification of Polyvinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series)

ASTM F477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings
ANSI/NSF Standard 61	Drinking Water System Components
ASTM A126	Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings
ANSI/AWWA C104/A21.4	Cement-Mortar Lining for Ductile-Iron Pipe and Fittings
ANSI/AWWA C110/21.10	Ductile-Iron and Gray-Iron Fittings
ANSI/AWWA C111/A21.11	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
ANSI/AWWA C115/A21.15	Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
ANSI/AWWA C150/A21.50	Thickness Design of Ductile-Iron Pipe
ANSI/AWWA C151/A21.51	Ductile Iron Pipe, Centrifugally Cast
ANSI/AWWA C153/A21.53	Ductile-Iron Compact Fittings for Water Service
AWWA M23	AWWA Manual of Supply Practices - PVC Pipe—Design and Installation, Second Edition

1.3 Submittals

A. Product technical data and material data including all pipe, fittings, restrained joint systems, lining and appurtenance information, marking tape and tracer wire

B. Lining and coating data

C. Applicable material certifications and testing certificates

D. Manufacturer's handling delivery storage and installation requirements

E. Documentation of tracer wire continuity tests

1.4 Quality Assurance

A. Unless otherwise noted, all water works materials provided for the project shall be new, of first class quality and shall be made by reputable manufacturers. All material of a like kind shall be provided from a single manufacturer unless otherwise approved by the Asotin County PUD. All material shall be carefully handled and installed in good working order free from defect in manufacture, storage and handling. Where an item is to be used but does not have its quality specified herein, it shall be equal to that specified in the appropriate American Water Works Association (AWWA) Standard Specification.

B. All references to standards of AWWA or other organizations shall be the latest versions of those standards.

PART 2 PRODUCTS

2.1 General

A. PVC piping materials shall meet the specifications of this Section and of the appropriate AWWA Standard Specifications. In the case of conflict, the more stringent specifications shall apply.

B. Unless otherwise specified herein or shown on the Plans, the minimum pressure rating of all water works materials specified herein shall be 1.5 times the operating pressure or 150 psi minimum.

C. All coatings and materials specified herein that come in contact with potable water shall be National Sanitation Foundation (NSF) approved.

2.2 Polyvinyl Chloride (PVC) Pressure Pipe

A. PVC pressure pipe, 4 inches through 12 inches, shall be manufactured in accordance with AWWA C900 (latest revision), Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings for Water Transmission and Distribution, and shall meet the dimensional requirements of DR 18 pipe (Pressure Class 150) unless shown otherwise on the Drawings or specified elsewhere. PVC pipe greater than 12 inches in diameter shall be manufactured in accordance with AWWA C905 (latest revision), Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14-inch through 48-inch, and shall meet the dimensional requirements of DR18 pipe (Pressure Class 235) unless shown otherwise on the drawings or specified elsewhere.

B. All PVC pipe shall be manufactured with an integral bell design capable of receiving an elastomeric gasket. Gaskets shall conform to ASTM F477.

C. All PVC pressure pipe shall be dimensionally compatible with standard cast/ductile iron fittings produced according to AWWA C110/A21.10 or AWWA C153/A21.53 as applicable (latest revision).

D. PVC pressure pipe may be deflected both horizontally and vertically at the joints after assembly. Deflection by bending of the pipe rather than at the joints is not allowed. The maximum pipe deflection shall not exceed one half of the manufacturer's stated joint deflection allowance.

E. Joint restraint, where required for PVC push-on pipe, will be accomplished with the following bell restraint systems, without exception:

600 Series Pipe Restraining System, as manufactured by Romac Industries, Inc.

470 Series Pipe Restraining System, as manufactured by Romac Industries, Inc.

Joint restraint for fittings are specified in Section 2.3.M

2.3 Fittings and Specials

A. Fittings used for joining PVC pressure pipe shall be of the type, size and strength designated on the plans, elsewhere in the specifications, or in the proposal and, to the extent therein specified, shall conform to the appropriate specification in this Section. Fittings shall have pressure ratings as specified above and as shown on the Plans.

B. Pipe fittings and specials used with PVC pressure pipe shall be gray-iron or ductile iron and shall conform to AWWA Standard C110. Ductile iron (compact) fittings conforming to AWWA Standard C153 may be substituted in lieu of AWWA C110 fittings for fitting sizes 3-inches through 24-inches in diameter. Fittings shall be mechanical joint, push-on type, flanged or plain-end as required and shown on the Plans. All fittings shall be provided with glands, bolts, restraint system and other hardware as required for a complete installation and shall be considered incidental to the fittings and joint restraint systems. Fittings shall be Tyler Union or approved equal.

C. Fittings shall be mortar lined and seal coated. Mortar lining of fittings shall be factory installed only, unless otherwise directed by the Asotin County PUD. All fitting lining interior surfaces shall be smooth finished.

D. Flanges shall conform to either ANSI/AWWA C207 Class D or ANSI B 16.5 150-lb. class for 150 psi pressure rating and either ANSI/AWWA C207 Class E or ANSI B 16.5 150-pound class for pressure ratings between 150 and 275 psi. Flanges shall have flat faces and shall be attached with bolt holes

straddling the vertical axis of the pipe unless otherwise shown. The CONTRACTOR shall coordinate with pipe, valve and fitting suppliers to make certain that pipe, valve and fitting flanges match in bolt pattern. Gaskets for flanged joints shall be full faced. Ring gaskets shall not be permitted.

E. Threaded flanges shall meet the requirement of AWWA Standard C115 and shall be installed only on pipe with a minimum Class 53 wall thickness. All flanged fittings shall be provided with bolts and gaskets as specified herein.

F. Flanged Insulating Joints

Insulating flanged joints shall conform to the following specifications:

1. Flanged joints shall be assembled, lined and coated in shop. The joint assembly shall be delivered to the job site as a complete unit.
2. After assembly, the joint shall be tested for continuity. Electrical resistance between flanges and between each bolt and each flange shall be not less than 100,000 ohms.
3. Each complete insulating flange set shall include a full faced gasket, a full length insulating sleeve for each flange bolt, and two insulating washers and two steel washers for each bolt. Insulating sleeves and washers to be G-10 glass epoxy as manufactured by Accurate Plastics, Inc., or approved equal.
4. Gaskets shall be full face and conform to ANSI B16.21, suitable for the operating and test pressures of the pipe system. Gaskets shall be non-asbestos and non-phenolic compressed sheet packing with nitrile rubber binder. Gaskets shall be Garlock 3000, or equal.
5. Insulating washers shall be 3mm (1/8-inch) thick G-10 epoxy glass. Insulating washers shall fit within the bolt facing on the flange over the outside diameter of the sleeve, grind as necessary. Insulating sleeves shall extend the full width of both flanges, except where one flange hole is threaded where the sleeve shall extend through one flange and the gasket.
6. Washers shall be cadmium plated steel where buried and stainless steel where submerged. Washers shall fit within the bolt facing on the flange, grind as necessary.
7. The complete assembly shall have an ANSI/AWWA pressure rating equal to or greater than that of the flanges between which the assembly is installed.

G. Insulating Union

Where required, insulating unions shall conform to the following specifications:

Insulating unions shall be galvanized malleable iron with a ground joint. Iron pipe threads shall conform to ANSI B2.1. Joint connections to copper alloy pipe and tube shall be copper solder or threaded brass ground joints. Insulations shall be nylon, which is bonded and molded onto the metal body. Union shall be rated for the operating and test pressures of the pipe system.

H. Solid sleeves shall be of the long body design, mechanical joint.

I. Flexible Couplings

All flexible couplings shall be cast or ductile iron in accordance with ASTM Standard A536 and provided with high strength alloy bolts and nuts conforming to ANSI/AWWA C111.

The CONTRACTOR is responsible for selecting sleeve lengths appropriate to the application, recognizing longer sleeves allow larger deflections and may ease installation.

Acceptable Manufacturer's:

ROMAC Style 501 as manufactured by Romac Industries, Inc.

ROMAC MACRO HP as manufactured by Romac Industries, Inc.

Joint restraint, where required for couplings, will be accomplished with the following systems, without exception:

600 Series Pipe Restraining System, as manufactured by Romac Industries, Inc.

470 Series Pipe Restraining System, as manufactured by Romac Industries, Inc.

J. Flexible Expansion Joints

Flexible expansion joints shall be installed in the locations indicated on the drawings and shall be manufactured of ductile iron conforming to the material properties of ANSI/AWWA C153/A21.53. Flexible joints shall be provided with end connections as shown on the Plans. All flexible expansion joints shall consist of an expansion joint designed and cast as an integral part of a ball and socket type flexible joint, having a minimum of 15 degree deflection per ball and 4-inch expansion. Actual expansion and deflection requirements will be as shown on the drawings. Each flexible expansion joint shall be hydrostatically tested to the manufacturer’s published pressure rating prior to shipment. All pressure containing parts shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of

ANSI/AWWA C213 and shall be holiday tested with a 1,500 volt spark test conforming to said specification. All flexible expansion joints shall be Flex-Tend as manufactured by EBAA Iron, Inc. or approved equal.

K. Tapping sleeves shall be stainless steel conforming to 18-8 Type 304 stainless steel, with stainless steel flanged end with ANSI 150 lb drilling. Bolts and hardware to be Type 304 stainless steel and the branch outlet shall be heavy stainless steel pipe. The gasket shall be full circumferential gasket. Tapping sleeve shall be Romac SST or approved equal. Valve for tapping sleeve shall be cast iron body with fusion bonded epoxy coating. Valves shall be as specified in Sections 320, 321, 322 and 323.

L. Joint Restraint

Joint restraint is required at all mechanical joint fittings and where specified on the Plans. Joint restraint shall be accomplished with the following systems or approved equal:

1. 4- to 12-inch pipe: GripRing Pipe Restrainer, as manufactured by Romac Industries, Inc.
2. 14-inch pipe and greater: 470 Series Pipe Restraining System, as manufactured by Romac Industries, Inc.

M. Restrained Flange Coupling Adaptor for PVC Pipe

Where PVC pressure pipe transitions to HDPE pipe, as shown on the Drawings, restrained flange coupling adapters (RFCA) for PVC pipe shall be used. Restrained flange coupling adapters shall be RFCA for PVC Pipe with a RomaGrip for PVC Pipe gland, as manufactured by Romac Industries, Inc., or approved equal.

Flange and gland body shall be ductile iron, meeting or exceeding ASTM A536, grade 65-45-12. Coating for flange and gland body shall be fusion bonded epoxy.

Gaskets shall be made from virgin styrene butadiene rubber (SBR) compounded for water and sewer service in accordance with ASTM D 2000 MBA 710. Flange gasket shall be O-Ring style made from nitrile butadiene rubber (NBR) in accordance with ASTM D 2000. Bolts and nuts shall be Type 304 stainless steel.

N. Tracer Wire

Tracer wire shall be 12 gauge single stranded copper insulated high molecular weight polyethylene (HMWPE) wire. The HMWPE insulated cover shall be blue and shall have a minimum thickness of 45 mils. The wire shall be UL

rated for 1400 F. Tape to fasten tracer wire to pipe shall be 3M Extra Heavy Duty Duct Tape.

O. Marking Tape

Marking tape shall consist of inert polyethylene plastic that is impervious to all known alkalis, acids, chemical reagents and solvents likely to be encountered in the soil. The tape shall be a minimum of 6-inches in width. The tape shall be blue and shall be imprinted continuously over its entire length in permanent black ink with the words "Caution Buried Water Line Below".

PART 3 EXECUTION

3.1 General

A. All materials, workmanship and installation shall conform to referenced AWWA Standards and other requirements of these specifications. The methods employed by the CONTRACTOR in the storage, handling, and installation of pipe, fittings and appurtenances shall be such as to insure that the material, after it is placed, tested and permanently covered by backfilling is in as good a condition as when it was shipped from the manufacturer's plant. Should any damage occur to the material, repairs or replacement shall be made to the satisfaction of the Asotin County PUD.

B. Polyvinyl chloride (PVC) pressure pipe shall be installed in accordance with AWWA Standard C605, except as modified elsewhere in these specifications

C. Sanitary Sewer Separation: the CONTRACTOR shall furnish all labor, equipment and materials required to replace sections of existing sanitary sewers or encase existing sanitary sewers in reinforced concrete, as required to comply with Washington State Department of Health requirements for minimum separation of sanitary sewers. See also Section 102 - Excavating, Backfilling, and Compacting for Utilities.

3.2 Product Handling

A. Care shall be taken in handling and transporting to avoid damaging pipes and their coatings. Loading and unloading shall be accomplished with the pipe under control at all times and under no circumstances shall the pipe be dropped. Pipe shall be securely wedged and restrained during transportation and supported on blocks when stored in the shop or field.

B. Storage: Store all pipe on a flat surface so as to support the barrel evenly. It is not recommended that pipe be stacked higher than four feet. Plastic pipe, if

stored outside, shall be covered with an opaque material to protect it from the sunlight.

3.3 Inspection

A. All pipe sections, specials and jointing materials shall be carefully examined for defects and no piece shall be laid that is known to be defective. Any defective piece installed shall be removed and replaced with a new pipe section in a manner satisfactory to the Asotin County PUD at the CONTRACTOR's expense.

B. Defective material shall be marked and removed from the job site before the end of the day.

3.4 Preparation

A. Excavate trenches and prepare and maintain subgrade as described in these Specifications and shown on the Plans. Trench base shall be inspected prior to placement of the pipe. Remove large stones or other hard matter which could damage pipe or impede consistent pipe bedding backfilling or compaction.

B. All pipe trenches shall be excavated below the proposed pipe invert as shown on the Plans to accommodate the depths of pipe bedding material as scheduled on the Drawings.

C. Pipe cuts made with proper pipe cutting equipment shall be in accordance with the manufacture's recommendation. When required to re-bevel a pipe end for proper installation, the contractor shall utilize manufacture recommended bevel angle for the intended use.

Prior to assembly of field cut pipe, the reference mark shall be re-established with a pencil or crayon. The location of the reference mark at the proper distance from the bevel end shall be in accordance with the manufacturer's recommendations.

D. Pipe Cleaning

1. Each section of the pipe and each fitting shall be thoroughly cleaned before it is lowered into the trench. Cleaning of each pipe or fitting shall be accomplished by swabbing out, brushing out, blowing out with compressed air or washing to remove all foreign matter.
2. If clean pipe sections and fittings cannot be placed in the trench without getting dirt into the open ends, the Asotin County PUD may require that a piece of tightly woven canvas be tied over the ends of the pipe of fitting until it has been lowered into position in the trench. After the pipe of

fitting has been lowered into the trench, all foreign matter shall be completely brushed from the bell and spigot ends before assembly.

3.5 Installation

A. Install pipe and accessories in accordance with these specifications and the manufacturer's instructions.

B. Lift or roll pipe into position. Do not drop or drag pipe over prepared bedding.

C. Joints

Pipe jointing surfaces shall be clean and dry when preparing surfaces for joining. Lubricants, primers, adhesives, etc. shall be used as recommended by the pipe or joint manufacturer's specifications. The jointing materials or factory-fabricated joints shall then be placed, fitted, joined and adjusted in such a manner as to obtain a watertight joint. Trenches shall be kept water-free and as dry as possible during bedding, laying and jointing. As soon as possible after the joint is made, sufficient backfill material shall be placed along each side of the pipe to prevent movement of the pipe from any cause.

D. Install pipe and fittings to the line and grade specified on the Drawings, with joints centered, pipe properly supported and restrained against movement, and all valve stems plumb.

E. Lay pipe from the low end toward the high point. Provide a continuous, smooth invert. Bell holes shall be dug where necessary and the pipe shall be placed and supported on bedding material the full length of the barrel.

F. All loose dirt shall be removed from the bottom and the trench backfilled with specified bedding material to pipe laying grade.

G. The open ends of all pipes and special castings shall be plugged or otherwise closed with a watertight plug before leaving the work for the night, and at other times of interruption of the work. All pipe ends which are to be permanently closed shall be plugged or capped and restrained against internal pressure.

H. The weight of cast iron, ductile iron and other metallic fittings shall be supported by a poured-in-place concrete cradle. In-line valves shall be supported and anchored to an in-line thrust block as detailed in the drawings.

I. Tracer Wire

1. Tracer wire is to be utilized on all PVC pipelines for future locating purposes. Tracer wire shall be installed on the top centerline of the pipe.

The wire shall be secured to the top of the pipe at maximum 6-foot intervals using 6-inch strips of 2-inch wide 3M Extra Heavy Duty Duct Tape. The tracer wire shall be routed through all valve boxes (including isolation valves, air release valves, blowoffs and drain valves), meter boxes, fire hydrants and vaults to provide access to terminal ends of the wire. All locations of tracer wire intersections shall be soldered to provide electrical continuity and protected from adverse soil conditions with the use of shrink tubes or other approved waterproof connector devices. The result of the tracer wire installation shall be a continuous wire circuit electrical isolated from ground.

2. Tracer wire shall be installed in conjunction with all service lines. Tracer wire shall be accessible from within the meter box and shall have electrical continuity with any tracer wire laid in conjunction with the water line to which the service is tapped.

3. Leave slack in mainline tracer wire equivalent to a 12-inch diameter loop at each valve box and at each service tap to facilitate splicing, soldering and waterproofing.

4. Test for continuity and isolation from ground in the wire after all work has been completed on the test section. Perform intermediate testing after backfilling operations and prior to surface restoration work. Test continuity between access locations by use of a temporary wire connecting test points in-line with an ohmmeter. Measure resistance with an approved ohmmeter that has been property calibrated. The continuity of a test section will be accepted if the resistance of the test section does not exceed 5 ohms for each 500 feet of location wire being tested. Measure isolation from ground with an approve 1,000 volt Megger, applied for one minute. The isolation of a test section will be accepted if the isolation resistance of the test section is at least 10 megohms. Locate and repair all breaks or defects in the wire and re-test until specified results are obtained.

J. Marking Tape

Marking tape shall be installed over all PVC pipelines. Marking tape shall be installed approximately 1 foot above the top of the pipe for its full length with the written warning words facing up.

K. Trench excavation and backfill of PVC piping system shall conform to the requirements of Section 102 - Excavation, Backfilling and Compacting for Utilities.

L. Thrust Restraint

All tees, plugs, caps, bends, offsets, as well as other appurtenances which are subject to unbalanced thrust, shall be properly braced with concrete thrust blocks unless otherwise specified in the drawings. Concrete thrust blocks shall

have a minimum 28-day compressive strength of 3,000 psi. The concrete blocking shall bear against solid undisturbed earth at the side and bottom of the trench excavation and shall be shaped so as not to obstruct access to the joints of the pipe or fittings. Where shown on the Plans or specified elsewhere in the Technical Specifications, the CONTRACTOR shall also provide internal or external joint restraint systems at the fittings and on all joints within the specified or shown distance on each side of the fitting or joint.

3.6 Testing and Disinfection of PVC Pipe Mains

A. Testing and disinfection of PVC pipe mains shall be done in accordance with Section 300 - Pipeline Testing and Disinfection, AWWA Standard C605, and AWWA Standard C651.

B. All chlorinated water used in disinfection of the water main shall either be discharged through an approved connection to a public sanitary sewer system or shall be dechlorinated to limits acceptable by the Washington State Department of Ecology prior to discharge into any storm drainage system or open drainage way. No chlorinated water shall be discharged into a storm drainage system or open drainage way without a dechlorination under a plan meeting state requirements.

3.7 Survey Line and Grade and Survey Monument Replacement

A. Preserve all stakes, markers, etc. Stakes, markers, etc. that are disturbed by the Contractor will be replaced by the CONTRACTOR at CONTRACTOR'S expense.

B. CONTRACTOR shall develop and make all detailed surveys necessary for layout and construction, including exact component location, working points, lines and elevations. The CONTRACTOR shall have the responsibility to carefully preserve bench marks, reference points and stakes, and in the case of destruction thereof by the CONTRACTOR or resulting from its negligence, the CONTRACTOR shall be charged with the expense and damage resulting therefore and shall be responsible for any mistakes that may be caused by the unnecessary loss or disturbance of such bench marks, reference points and stakes.

END OF SECTION

SECTION 303

HIGH DENSITY POLYETHYLENE PRESSURE PIPE

PART 1 GENERAL

1.1 Scope

This section covers high density polyethylene (HDPE) pressure pipe. HDPE pipe shall be furnished complete with all fittings, jointing materials and appurtenances.

1.2 Reference Specification

Refer to the latest edition of ANSI/AWWA C906, AWWA Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4-inch through 63-inch, for Water Distribution and Transmission.

1.3 Submittals

A. Complete layout drawings, details and specifications covering all HDPE piping and accessories shall be submitted.

B. Certified copies of physical and chemical test results shall be submitted for the materials to be provided.

C. An affidavit of compliance and certification of special quality assurance testing shall be submitted.

D. Documentation of tracer wire continuity tests.

PART 2 MATERIALS

2.1 General

The nominal diameters of the pipes are as shown on the Drawings.

2.2 Materials

A. Pipe

ANSI/AWWA C906, Standard PE Code Designation - PE 3408, minimum cell classification - PE 334434C (ASTM D3350), iron pipe size (IPS) outside diameter (OD). All HDPE pipe and fittings shall be of the dimension ratio

(DR) 9, minimum 200 psi rating, unless otherwise shown on the Plans. The pipe shall be color striped as follows: potable water (blue).

B. Joints

Pipe shall be joined using thermal butt fusion method only per ASTM D3261.

C. Fittings

HDPE fittings shall be of the same class as the HDPE piping.

D. Connections with Other Pipe Types

Flexible Couplings

All flexible couplings shall be cast or ductile iron in accordance with ASTM Standard A536 and provided with high strength alloy bolts and nuts conforming to ANSI/AWWA C111.

The CONTRACTOR is responsible for selecting sleeve lengths appropriate to the application, recognizing longer sleeves allow larger deflections and may ease installation.

Use pipe stiffener for HDPE as recommended by the manufacturer.

Acceptable Manufacturer's: ROMAC Style 501.

E. Tracer Wire

Open Trench: Tracer wire shall be 12 gauge single stranded copper insulated high molecular weight polyethylene (HMWPE) wire. The HMWPE insulated cover shall be blue and shall have a minimum thickness of 45 mils. The wire shall be UL rated for 1400 F. Tape to fasten tracer wire to pipe shall be 3M Extra Heavy Duty Duct Tape.

Horizontal Directional Drill: Copper clad steel tracer wire shall be direct burial #12 AWG solid (0.0808-inch diameter), steel core hard drawn extra high strength horizontal directional drill tracer wire, 1,150 lb. average tensile break load, 45 mil high molecular weight, high density green polyethylene jacket complying with ASTM-D-1248, 30 volt rating, Copperhead Industries 1245G-EHS-2500 or equal.

PART 3 EXECUTION

3.1 Inspection

Pipe and fittings shall be carefully examined for cracks and other defects immediately before installation. All defective pipe and fittings shall be removed from the site of the work.

3.2 Preparation

A. The interior of all pipe and fittings shall be thoroughly cleared of all foreign matter prior to installation.

B. Precautions shall be taken to prevent foreign material from entering the pipe during installation.

3.3 Handling

Pipe, fittings and accessories shall be handled in a manner that will ensure installation in sound, undamaged condition. Equipment, tools and methods used in handling and installing pipe and fittings shall not damage or change the pipe and fittings. Hooks inserted in ends of pipe shall have broad, well-padded contact surfaces. Pipe shall not be stored uncovered in direct sunlight.

3.4 Joining

A. Sections of polyethylene pipe shall be joined into continuous lengths on the job site above ground per ASTM D3261. The joining method shall be the thermal butt fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations. The butt fusion equipment used in the joining procedures should be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, temperature requirements for 400°F, alignment and 75 psi interfacial fusion pressure.

B. Butt fusion joining shall be 100 percent efficient, providing joint weld strength equal to or greater than the tensile strength of the pipe. Socket fusion will not be allowed. Extrusion welding or hot gas welding of HDPE shall not be used for pressure pipe applications or in fabrications where shear or structural strength is important.

3.5 Tracer Wire

A. Open Trench:

1. Tracer wire is to be utilized on all pipelines for future locating purposes. Tracer wire shall be installed on the top centerline of the pipe. The wire

shall be secured to the top of the pipe at maximum 10-foot intervals using 6-inch strips of 2-inch wide duct tape. The tracer wire shall be routed through all valve boxes (including isolation valves, air release valves, blowoffs and drain valves), meter boxes, fire hydrants and vaults to provide access to terminal ends of the wire. All locations of tracer wire intersections shall be soldered to provide electrical continuity and protected from adverse soil conditions with the use of shrink tubes or other approved waterproof connector devices. The result of the tracer wire installation shall be a continuous wire circuit electrical isolated from ground.

2. Tracer wire shall be installed in conjunction with all service lines. Tracer wire shall be accessible from within the meter box and shall have electrical continuity with any tracer wire laid in conjunction with the waterline to which the service is tapped.

3. Leave slack in mainline tracer wire equivalent to a 12-inch diameter loop at each valve box and at each service tap to facilitate splicing, soldering and waterproofing.

4. Test for continuity and isolation from ground in the wire after all work has been completed on the test section. Perform intermediate testing after backfilling operations and prior to surface restoration work. Test continuity between access locations by use of a temporary wire connecting test points in-line with an ohmmeter. Measure resistance with an approved ohmmeter that has been property calibrated. The continuity of a test section will be accepted if the resistance of the test section does not exceed 5 ohms for each 500 feet of location wire being tested. Measure isolation from ground with an approve 1,000 volt Megger, applied for one minute. The isolation of a test section will be accepted if the isolation resistance of the test section is at least 10 megohms. Locate and repair all breaks or defects in the wire and re-test until specified results are obtained.

B. Horizontal Directional Drill: Attach tracer wire to the outside crown of the pipe at 5 foot intervals with a minimum of three layers of 3M Extra Heavy Duty Duct Tape. For an installation using horizontal directional drilling (HDD) method, extend the tracer wire from the ends of the HDPE pipe to a plastic valve box at each end of the pipeline installation. For other installations, extend the tracer wire to plastic valve boxes along the pipeline route at approximate 1,000 foot intervals or as shown on the Drawings or as otherwise directed by the Asotin County PUD. Provide two (2) feet of slack at the ends of the wire. Demonstrate that the copper conductor is electrically continuous after installation of the pipeline.

3.6 Hydrostatic Pressure Testing and Disinfection

Test and disinfect all sections of HDPE pipe per the requirements of Section 300-Pipeline Testing and Disinfection.

3.7 Connections to HDPE Pipe

If the HDPE pipe is installed using horizontal directional drilling methods, after pullback of the HDPE pipe, the pipe shall remain in the drilled hole at least twenty-four (24) hours before any connections to or cutting of pipe are made.

3.8 Survey Line and Grade and Survey Monument Replacement

A. Preserve all stakes, markers, etc. Stakes, markers, etc. that are disturbed by the Contractor will be replaced by the CONTRACTOR at CONTRACTOR'S expense.

B. CONTRACTOR shall develop and make all detailed surveys necessary for layout and construction, including exact component location, working points, lines and elevations. The CONTRACTOR shall have the responsibility to carefully preserve bench marks, reference points and stakes, and in the case of destruction thereof by the CONTRACTOR or resulting from its negligence, the CONTRACTOR shall be charged with the expense and damage resulting therefore and shall be responsible for any mistakes that may be caused by the unnecessary loss or disturbance of such bench marks, reference points and stakes.

END OF SECTION

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SECTION 310

WATER SERVICE CONNECTIONS

PART 1 GENERAL

1.1 Description

Work includes furnishing and installing service connections two (2) inches in diameter and smaller from the main to the water meter. The water meter shall be furnished and installed by others, unless specified otherwise elsewhere in the plans and Standard Specifications and Details.

1.2 Reference Specifications, Codes, and Standards

A. ANSI/AWWA C800 Underground Service Line Valves and Fittings

B. ANSI/AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe 4 inch through 12 inch for Water Distribution

C. ANSI/AWWA C901 Polyethylene (PE) Pressure Pipe and Tubing, ½ inch through 3 inches for Water Service

D. ANSI/ASME B16.15 Cast Bronze Threaded Fittings, Classes 125 and 250

E. National Sanitation Foundation (NSF) Standard 61

F. Ductile Iron Pipe Research Association (DIPRA) Standards

1.3 Submittals

A. Product material data including all pipe, fittings and appurtenance information.

B. Provide pipe manufacturers, certificates stating that the materials have been sampled and tested in accordance with the provisions of the designated specifications and meet the requirements of the designated specifications. An authorized agent of each manufacturer shall sign the certificate.

C. Documentation of tracer wire continuity tests.

1.4 Quality Assurance

A. Unless otherwise noted, all material of like kind shall be provided from a single manufacturer unless otherwise approved by the Asotin County PUD. All material shall be carefully handled and installed in good working order

free from defect in manufacture, storage and handling. Where an item is to be used, but does not have its quality specified herein, it shall be equal to that specified in the appropriate American Water Works Association (AWWA) Standard Specification.

B. All references to Standards of AWWA or other organizations shall be the latest versions of those Standards.

PART 2 PRODUCTS

2.1 General

Service line materials shall conform to AWWA C800, ANSI/AWWA C900 and AWWA Standard C151 and as follows. Service line materials for normal pressure service applications shall be designed for a working pressure of 200 psig. All materials in contact with potable water shall be NSF Standard 61 approved. All brass and bronze products shall be no-lead.

2.2 Saddles

Saddles for ¾-inch to 2-inch service lines shall have nylon coated saddle and double stainless steel straps. Saddles shall be double strap and shall be female iron pipe thread outlet. Saddles used on PVC shall be formed for PVC pipe and shall have flat, stainless steel straps. Saddles shall be Romac 202NS or approved equal.

2.3 Corporation Stops

A. ¾-inch to 1-inch service lines shall have corporation stops made of lead free bronze alloy. Corporation stops used with 3/4-inch and 1-inch outlet saddles shall have either AWWA tapered thread or male iron pipe thread inlets and outlet connections compatible with either copper or polyethylene tubing. Thread patterns for the saddle outlet and corporation stop inlet shall be the same. Corporation stops shall be manufactured by the Ford Meter Box Company.

B. Corporation stops used with 1 ½-inch and 2-inch outlet saddles shall be lead free and have male iron pipe thread inlets and outlet connections compatible with connecting service pipes. Corporation stops shall be manufactured by the Ford Meter Box Company. At the discretion of the Asotin County PUD 1 ½-inch and 2-inch services lines shall have corporation stops or gate valves consistent with this section.

2.4 Service Pipe

A. ¾-inch to 2-inch: Polyethylene Tubing Service Pipe - Polyethylene tubing service pipe shall meet the requirements of AWWA C901. Tubing shall be SDR 7.

B. 4-inch to 8-inch: Ductile Iron per Section 301 Ductile Iron Pipe, Fittings and Special Items and Polyvinyl Chloride (PVC) Pipe for per Section 302 PVC Pressure Pipe, Fittings and Special Items.

2.5 Service Fittings

A. ¾-inch to 2-inch:

1. Fittings used for service connections shall be made of lead free bronze alloy. All fittings used shall meet or exceed the pressure rating of the pipe to which they are connected and shall meet the requirements of ASME B16.15. All water service fittings shall be manufactured by the Ford Meter Box Company.

2. Fittings used for polyethylene tubing shall have Ford Grip Joints and insert stiffeners.

3. Fittings for plain end iron pipe shall be Ford Pack Joint Coupling.

B. 4-inch to 8-inch:

1. Fittings used for joining pipe shall compatible with connecting service line and be of equal or greater pressure rating to the service line. Service Lines shall be per Section 301 Ductile Iron Pipe, Fittings and Special Items, Section 302 PVC Pressure Pipe, Fittings and Special Items.

2.6 Meter Boxes

A. ¾-inch to 1-inch: Meter box shall be 18-inch x 21-inch manufactured by Riener Concrete. Lid shall be 21" Ford Meter Box Company Lid and Cover A4 for hardscape areas and 21" Ford Meter Lid and Cover X4 for landscape areas.

B. 1 1/2-inch to 2-inch: Meter box shall be 45-inch x 26-inch x 15-inch oval shape manufactured by Riener Concrete. Lid shall be 45-inch x 26-inch x 4" Ford Meter Box Company Lid and Cover A4 for hardscape areas and 21" Ford Meter Lid and Cover X4 for landscape areas.

C. 4-inch: Meter box shall be pre-cast concrete vault manufactured by Wilbert Precast. Meter box shall be H-20 traffic load rated in traffic areas. Lid shall be cast iron frame and cover marked "WATER" and per Section 210 Sanitary Sewer Manhole and Cleanouts. Ladder steps factory installed to provide a continuous ladder of 12-inch center-to-center rung spacing. Steps shall be constructed of injection molded copolymer polypropylene shall meet the requirements of ASTM C478 and AASHTO M 199. The polypropylene shall

conform to ASTM D4101. They shall be Lane Polypropylene Steps or approved equal.

D. 6-inch to 8-inch: Meter box shall be pre-cast concrete vault manufactured by Wilbert Precast. Meter box shall be H-20 traffic load rate in traffic areas. Lid shall be cast iron frame and cover marked "WATER" and per Section 210 Sanitary Sewer Manhole and Cleanouts. Ladder steps factory installed to provide a continuous ladder of 12-inch center-to-center rung spacing. Steps shall be constructed of injection molded copolymer polypropylene shall meet the requirements of ASTM C478 and AASHTO M 199. The polypropylene shall conform to ASTM D4101. They shall be Lane Polypropylene Steps or approved equal.

2.7 Tracer Wire

Tracer wire shall be 12 gauge single stranded copper insulated high molecular weight polyethylene (HMWPE) wire. The HMWPE insulated cover shall be blue and shall have a minimum thickness of 45 mils. The wire shall be UL rated for 1400 F. Tape to fasten tracer wire to pipe shall be 3M Extra Heavy Duty Duct Tape.

2.8 Marking Tape

Marking tape shall consist of inert polyethylene plastic that is impervious to all known alkalis, acids, chemical reagents and solvents likely to be encountered in the soil. The tape shall be a minimum of 6-inches in width. The tape shall be blue and shall be imprinted continuously over its entire length in permanent black ink with the words "Caution Buried Water Line Below"

2.9 Gate Valves

A. 1 ½-inch and 2-inch services lines shall have 2-inch gate valves installed per Section 321 Gate Valves and shall have inlets and outlet connections and fittings compatible with connecting service pipes. At the discretion of the Asotin County PUD 1 ½-inch and 2-inch services lines shall have corporation stops or gate valves consistent with this section.

B. 4-inch to 8-inch service lines shall have gate valves per Section 321 Gate Valves and shall have inlets and outlet connections and fittings compatible with connecting service pipes.

2.10 Tapping Sleeves

Tapping Sleeves on 4-inch to 8-inch service lines shall be stainless steel with full circumferential seal and stainless steel flange. Tapping Sleeves shall be Romac SST or approved equal.

PART 3 EXECUTION

3.1 General

All materials, workmanship and installation shall conform to referenced AWWA Standards and other requirements of these Specifications. The methods employed by the CONTRACTOR in the storage, handling and installation of pipe, fittings, valves and appurtenances shall be such as to insure that the material, after it is placed, tested and permanently covered by backfilling, is in as good a condition as when it was shipped from the manufacturer's plant. Should any damage occur to the material, repairs or replacement shall be made to the satisfaction of the Asotin County PUD at no expense to the Asotin County PUD.

3.2 Installation

Construct the depth of trench for service connection piping to provide a minimum of four (4) feet of cover over the top of the pipe. Excavation, backfill and surface restoration shall be performed in accordance with SECTION 102 - EXCAVATING, BACKFILLING AND COMPACTING FOR UTILITIES and SECTION 110 PAVEMENT AND SURFACE RESOTRATION. All service connections under existing pavement, curbs, sidewalks or other surface improvements may be installed by trenchless construction techniques at the CONTRACTOR's option where ground conditions are favorable and such methods will not disturb foundations under curbs, sidewalks and other structures. The Asotin County PUD must approve all trenchless installation methods. Where trenchless pipe installation is used, payment for the pipe installation will be made for the equivalent trench excavation and backfill as if the open cut method was used. Payment will not be made for surface restoration including pavement, curbs, sidewalks and other surface improvements whose replacement is avoided by the tunneling method. Service 4-inch and larger shall have by-pass within vault.

3.3 Concrete Vault

A. The CONTRACTOR shall safely install all precast items with no damage to the precast item or any other structure, piece of equipment, or appurtenance.

B. Precast structures shall be installed in accordance with the manufacturer's recommendations, unless otherwise required by the Asotin County PUD and the Drawings.

C. Subgrade Preparation: Subgrade shall be compacted to 95 percent of maximum density and covered with a minimum of six (6) inches, or as shown on the plans, of aggregate base, which is also compacted to 95 percent of maximum density. The aggregate base shall be graded to a uniform, level surface to fully support the structure and to an elevation that will assure proper positioning of the top slab or lid and to allow pipe openings to match the

grades for connecting pipes. Vault bases shall be set level so that base gravel fully and uniformly supports them in true alignment with uniform bearing throughout full circumference. Do not level the base sections by wedging gravel under the edges. Provisions shall be made to prevent flotation of the vault in high groundwater areas. Remove and keep all water clear from the excavation during construction and testing operations.

E. All vault joints shall be watertight and use rubber gaskets. Rubber gasketed joints installed in accordance with manufacturer's instructions. All joints shall then be filled with non-shrink grout inside and out so as to produce smooth interior and exterior surfaces. All manhole penetrations shall be watertight. Complete manholes shall be rigid.

F. Excavation, backfill and compaction as specified in SECTION 102 - EXCAVATING, BACKFILLING AND COMPACTING FOR UTILITIES.

3.4 Water Main Tap

Make all service connections using saddles and tapping sleeves as specified and of the size and type suitable for use with the pipe being tapped.

3.5 Piping

Install polyethylene tubing service as shown on the Plans or as specified elsewhere in this document. Cut service pipes using tools specifically designed to leave a smooth, even, and square end on the material being cut. Ream cut ends to the full inside diameter of the pipe. Clean pipe ends to a sound, smooth finish prior to using couplings which seal to the outside surface of the pipe. Adjust meter box to finished grade after the service piping has been installed and surface has been restored to the satisfaction of the Asotin County PUD.

3.6 Reconnecting Existing Services

Where shown on the Plans, reconnect existing service connections to the new water main in accordance with the applicable provisions of this Specification. Coordinate with the Asotin County PUD and notify affected customers of the service interruption at least 48 hours prior to service interruption.

3.7 Tracer Wire

A. Tracer wire is to be utilized on all water service lines for future locating purposes. Tracer wire shall be installed on the top centerline of the pipe. The wire shall be secured to the top of the pipe at maximum 6 foot intervals using 6-inch strips of 2-inch wide 3M Extra Heavy Duty Duct Tape. The tracer wire shall be routed through meter boxes to provide access to terminal ends of the wire. All locations of tracer wire intersections shall be soldered to provide

electrical continuity and protected from adverse soil conditions with the use of shrink tubes or other approved waterproof connector devices. The result of the tracer wire installation shall be a continuous wire circuit electrical isolated from ground.

B. Tracer wire shall be installed in conjunction with all service lines. Tracer wire shall be accessible from within the meter box and shall have electrical continuity with any tracer wire laid in conjunction with the waterline to which the service is tapped.

C. Leave slack in mainline tracer wire equivalent to a 12-inch diameter loop at each valve box and at each service tap to facilitate splicing, soldering and waterproofing.

D. Test for continuity and isolation from ground in the wire after all work has been completed on the test section. Perform intermediate testing after backfilling operations and prior to surface restoration work. Test continuity between access locations by use of a temporary wire connecting test points in-line with an ohmmeter. Measure resistance with an approved ohmmeter that has been properly calibrated. The continuity of a test section will be accepted if the resistance of the test section does not exceed 5 ohms for each 500 feet of location wire being tested. Measure isolation from ground with an approved 1,000 volt Megger, applied for one minute. The isolation of a test section will be accepted if the isolation resistance of the test section is at least ten (10) megohms. Locate and repair all breaks or defects in the wire and re-test until specified results are obtained.

3.8 Marking Tape

Marking tape shall be installed over all water service lines. Marking tape shall be installed approximately one (1) foot above the top of the pipe for its full length with the written warning words facing up.

3.9 Flushing, Testing and Disinfection

Flush, test and disinfect all service connections and appurtenances in accordance with Section 300-Pipeline Testing and Disinfection. All service lines shall be flushed prior to hydrostatic testing with water flowing verified to Asotin County PUD.

END OF SECTION

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SECTION 320

VALVES, GENERAL

PART 1 GENERAL

1.1 Description

A. The CONTRACTOR shall provide all tools, supplies, materials, equipment and labor necessary for furnishing, installing, adjusting and testing of all valves and appurtenant work, complete and operable, in accordance with the requirements of the plans and Standard Specifications and Details. Where buried valves are shown, the CONTRACTOR shall install valve boxes to grade, with covers and extensions.

B. The provisions of this Section shall apply to all valves and valve operators specified in Sections 321, 322 and 323 of these Specifications except where otherwise specified by the Asotin County PUD. Valves and operators in particular locations may require a combination of units, sensors, limit switches and controls specified in other Sections of these Specifications.

1.2 Reference Specifications, Codes and Standards

A. Commercial Standards

ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800
ANSI B16.5	Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and other Special Alloys
ANSI/ASME B1.20.1	General Purpose Pipe Threads (Inch)
ASTM A 36	Specification for Structural Steel
ASTM A 48	Specification for Gray Iron Castings
ASTM A 126	Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A 536	Specification for Ductile Iron Castings
ASTM B 61	Specification for Steam or Valve Bronze Castings

ASTM B 62	Specification for Composition Bronze or Ounce Metal Castings
ASTM B 148	Specification for Aluminum Bronze Castings
ASTM B 584	Specification for Copper Alloy Sand Castings for General Applications
ANSI/AWWA C500	Gate Valves for Water and Sewerage Systems
ANSI/AWWA C502	Dry-Barrel Fire Hydrants
ANSI/AWWA C503	Wet-Barrel Fire Hydrants
ANSI/AWWA C504	Rubber-Seated Butterfly Valves
ANSI/AWWA C507	Ball Valves 6 Inches Through 48 Inches
AWWA C508	Swing-Check Valves for Waterworks Service, 2 Inches Through 24 Inches NPS
ANSI/AWWA C509	Resilient-Seated Gate Valves for Water and Sewerage Systems
ANSI/AWWA C511	Reduced-Pressure Principle Backflow-Prevention Assembly
AWWA C550	Protective Interior Coatings for Valves and Hydrants
SSPC-SP1	Solvent Cleaning
SSPC-SP3	Power Tool Cleaning
SSPC-SP6	Commercial Blast Cleaning

1.3 Submittals

A. Shop Drawings -- Shop drawings of all valves and operators including associated wiring diagrams and electrical data, shall be furnished as specified in the Standard Specifications and Details and if specified in the individual valve sections.

B. Lining and coating data.

C. Manufacturer’s handling, delivery, storage and installation requirements.

D. Applicable material certifications and testing certifications and testing certificates.

1.4 Quality Assurance

A. Valve Testing -- Unless otherwise specified, each valve body shall be tested under a test pressure equal to twice its design water-working pressure.

B. Bronze Parts -- Unless otherwise specified, all interior bronze parts of valves shall conform to the requirements of ASTM B 62, or, where not subject to dezincification, to ASTM B 584.

C. Certification -- Prior to shipment, the CONTRACTOR shall submit for all valves over 12 inches in size, certified, notarized copies of the hydrostatic factory tests, showing compliance with the applicable standards of AWWA, ANSI, ASTM, etc.

D. Unless otherwise noted, all water works materials provided for the project shall be new, of first class quality and shall be made by reputable manufacturers. All material of a like kind shall be provided from a single manufacturer unless otherwise approved by the Asotin County PUD. All material shall be carefully handled and installed in good working order free from defect in manufacture, storage and handling. Where an item is to be used but does not have its quality specified herein, it shall be equal to that specified in the appropriate American Water Works Association (AWWA) Standard Specification.

1.5 Material Delivery, Storage and Protection

All valves and accessories shall be delivered in a clean and undamaged condition and stored off the ground, to provide protection against oxidation caused by ground contact. All defective or damaged materials shall be replaced with new materials at no cost to the Asotin County PUD.

PART 2 PRODUCTS

2.1 General

A. Valve Flanges -- The flanges of valves shall be in accordance ANSI B16.1, ANSI B16.5 and ANSI/AWWA C115/A21.15 as required. The CONTRACTOR shall coordinate with pipe, valve and fitting suppliers to make certain that pipe, valve and fitting flanges match in bolt pattern.

B. Valve boxes, except those of special design as required by the plans, shall be of cast iron of the two-piece extension type with a cast iron cover. Valve

boxes shall have walls not less than 3/16 inch thick at any point, and the internal diameter shall be not less than 5 inches. Valve box covers shall have the word "WATER" cast into them as appropriate to their place of use. Valve box covers shall be of design and construction which prevents dislodging and rotation from traffic and shall be of the type which allows a hand held pry bar to be applied for easy removal. Valve boxes shall be constructed of high quality castings and shall be the product of Tyler or any other manufacturer approved by the Asotin County PUD.

C. Protective Coating -- The valve manufacturer shall certify in writing that the required coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with these Specifications. Flange faces of valves shall not receive protective coatings.

D. Valve Operators -- Valve operators shall be as shown or as specified for a valve type. Provide operator extensions to 12 inches below grade where depth to valve exceeds five (5) feet.

E. Valve Labeling -- If required by the drawings and/or these specifications, a label shall be provided on all exposed (not buried) shut-off valves exclusive of hose bibbs. The label shall be of 1/16-inch plastic or stainless steel, minimum two (2) inches by four (4) inches in size, and shall be permanently attached to the valve or on the wall adjacent to the valve as directed by the Asotin County PUD.

F. Bolts, Gaskets, Glands and Nuts -- Bolts, gaskets, glands, retainer glands, nuts and miscellaneous accessories required to install all valves shall be furnished and installed. Bolts and nuts for flanged connections shall be as specified elsewhere with American Standard regular unfinished square or hex heads. Gaskets for flanged connections shall be as specified elsewhere. Jointing materials for mechanical joints shall conform to AWWA C111.

G. Actuators -- Unless otherwise indicated, all valves and gates shall be furnished with manual actuators. Valves in sizes up to and including four (4) inches shall have direct acting lever or handwheel actuators of the manufacturer's best standard design. Larger valves and gates shall have gear-assisted manual actuators, with an operating pull of maximum 60 pounds on the rim of the handwheel. Actuators shall be sized for the valve design pressure in accordance with AWWA C504. All gear-assisted valves that are buried, submerged or located in below grade vaults and all gates shall have the actuators hermetically-sealed and grease-packed. All valves six (6) inches to 30 inches in diameter may have traveling-nut actuators, worm-gear actuators, and spur- or bevel-gear actuators, as appropriate for each valve. All buried valves shall be provided with two (2)inch square operating nuts.

PART 3 EXECUTION

3.1 Valve Installation

A. General -- All valves, gates, operating units, stem extensions, valve boxes and accessories shall be installed in accordance with the manufacturer's written instructions and as shown and specified. All gates shall be adequately braced to prevent warpage and bending under the intended use. Valves shall be firmly supported to avoid undue stresses on the pipe. Stem extensions shall be braced at no greater than 10 feet intervals and be provided with double universal joints to allow for misalignment.

B. Access -- All valves shall be installed to provide easy access for operation, removal and maintenance and to avoid conflicts between valve operators and structural members or handrails.

C. Valve Accessories -- Where combinations of valves, sensors, switches and controls are specified, it shall be the responsibility of the CONTRACTOR to properly assemble and install these various items so that all systems are compatible and operating properly. The relationship between interrelated items shall be clearly noted on shop Drawing submittals.

D. Valve Boxes -- All buried valves shall be furnished with valve boxes. Valves shall be set in a concrete pad at finished grade as shown on the Plans.

E. Testing and Disinfection -- Valves to be tested concurrent with adjacent sections of pipe per 300 Pipeline Testing and Disinfection.

END OF SECTION

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SECTION 321

GATE VALVES

PART 1 GENERAL

1.1 Description

The CONTRACTOR shall furnish and install gate valves, complete and operable, as shown and specified herein, including coatings and linings, appurtenances, operators, and accessories, in accordance with the requirements of the plans and Standard Specifications and Details.

1.2 Submittals

As required by Section 320.

PART 2 PRODUCTS

2.1 General

Gate valves shall be furnished and installed as shown and as specified herein.

2.2 Materials & Manufacturers

A. Gate Valves, two (2) inches

Unless specified or shown otherwise, gate valves shall be two (2) inch resilient-seat type, with an iron body, non-rising stem, bolted bonnet, left opening and shall conform to AWWA Standard C509. Coatings and/or linings shall conform to AWWA Standard C550 and shall be suitable for potable water service. Valve ends shall be threaded. The CONTRACTOR, as specified in Section 320, shall furnish a valve box and cover with all buried service valves installed. Gate valve stem extensions shall be furnished and installed on deep buried valves as shown on the Plans and specified in Section 320. Acceptable manufacturers are as follows:

1. AMERICAN-Series 2500 Resilient

B. Gate Valves, three (3) inches to twelve (12) inches

Gate valves for buried service shall be the resilient-seat type, with an iron body, non-rising stem, bolted bonnet, left opening and shall conform to AWWA Standard C509. Coatings and/or linings shall conform to AWWA

Standard C550 and shall be suitable for potable water service. Valve ends shall be as shown on the Plans. The CONTRACTOR, as specified in Section 320, shall furnish a valve box and cover with all buried service valves installed.

Gate valve stem extensions shall be furnished and installed on deep buried valves as shown on the Plans and specified in Section 320.
Acceptable manufacturers are as follows:

1. AMERICAN-Series 2500 Resilient

PART 3 EXECUTION

3.1 General

Valve installation shall be in accordance with Section 320 and manufacturer's requirements.

END OF SECTION

SECTION 322

BUTTERFLY VALVES

PART 1 GENERAL

1.1 Description

The CONTRACTOR shall furnish and install butterfly valves, complete, as shown and specified herein, including coatings and linings, appurtenances, operators and accessories in accordance with the requirements of the Asotin County PUD and the Standard Specifications and Details.

1.2 Submittals

As required by Section 320.

PART 2 PRODUCTS

2.1 General

A. Butterfly valves furnished under this section shall be of the rubber seated, tight-closing type. Metal to metal seating surfaces shall not be used. Butterfly valves shall be bubble-tight at the rated pressure with flow in either direction, and shall be satisfactory for operation following long periods of inactivity. Valve discs shall rotate a full 90 degrees from the open position to closed position.

Butterfly valves shall be Class 150 unless otherwise called out on the plans. Class 150 valves shall meet the full requirements of AWWA Standard C504 for Class 150B. Class 250 valves shall conform to the requirements of AWWA Standard C504 subject to the requirements herein.

B. Valve shafts shall consist of the one-piece type or "stub-shaft" type. "Stub-shaft" type valve shafts shall be inserted a minimum of one and one-half (1-1/2) shaft diameters into the valve disk hub. Valve shafts shall have a minimum diameter extending through the valve bearings and into the valve disc, as specified in AWWA Standard C504. Valve shafts shall be full size for that portion of the shaft extending through the valve bearings, valve disc and shaft seal. Any portion of the shaft turned down for any reason shall have fillets with radii equal to the offset to minimize stress concentrations at the junction of the different shaft diameters. The turned down portion of the shaft shall be capable of transmitting the maximum operator torque without exceeding a torsional steel stress of 11,500 pounds per square inch (psi).

Valve shafts shall be constructed of wrought stainless steel, model or carbon-steel, with stainless steel journals. When carbon-steel shafts and stainless steel journals are used, static seals shall be provided to isolate the interior of the disc and the shaft from water.

C. Valve discs shall be of cast design with no external ribs transverse to the flow. The design shall be such to sustain full differential pressure across the closed valve disc without exceeding a working stress to one fifth of the tensile strength of the disc material. Valve discs shall be constructed from cast iron, alloy cast iron or ductile iron.

D. Rubber seats applied to either the body or the disc, shall be constructed from new, natural or synthetic rubber, secured to the valve body or disc, and designed to provide tight shut-off and facilitate removal and replacement at the site. Rubber seats shall mate with the following acceptable surfaces: stainless steel, monel, bronze Grade A, D or E, or alloy cast iron. Rubber seats that are applied to the valve body and are penetrated by the valve shaft shall be adequately reinforced and clamped, mechanically secured, bonded or vulcanized to the valve body to prevent the seat from being inflated by pressure behind the valve seat. Rubber seats shall be resistant to microbiological attack, copper poisoning and ozone attack. All clamps and retaining rings for rubber seats shall be corrosion resistant.

E. Valve bearings shall be of the sleeve type contained in the hubs of the valve body. Sleeve bearings fitted into the valve body shall be of self-lubricating materials approved for use with potable water.

F. Valve shaft seals shall be designed for the use of standard split-v type packing, standard "O" ring seals or for pull down packing. "O" rings used for shaft seals shall be contained in a removable corrosion-resistant recess. Shaft seals shall be designed to allow seal replacement without removal of the valve shaft.

G. Manual operators for buried service valves and valves in below grade vaults shall be of the traveling nut, self- locking type and shall be designed to hold the valve in any intermediate position between full open and fully closed without creeping or fluttering. For buried services, operators shall be equipped with a 2-inch square-operating nut (left opening) and shall be fully gasketed and grease-packed. For valves in below grade vaults, operators shall be equipped with a handwheel and shall be fully gasketed and grease-packed. A valve position indicator, if specified or shown, shall be furnished for all valves for installation in a valve box. The valve indicator shall be hermetically sealed for installation inside a cast iron valve box and shall show valve-disc position, direction of rotation and number of turns from full open to full close. The valve manufacturer shall provide the indicator.

H. All surfaces of the valve shall be clean, dry and free from grease before painting. For buried service valves and valves in below grade vaults, the interior and exterior valve surfaces shall be epoxy coated in accordance with AWWA Standard C550.

I. Acceptable Butterfly Valve manufacturers are as follows:

Pratt

2.2 Class 150 Butterfly Valves

A. Valve bodies shall be constructed of cast iron conforming to ASTM A-126 Class B (with integrally cast flanged or mechanical joint ends). Flange drilling shall be in accordance with ANSI/B16.1 standard for cast iron flanges. Two trunnions for shaft bearings shall be integral with each valve body. Body thickness shall be in strict accordance with AWWA C504.

B. Valve shafts shall be turned, ground and polished. Valve shafts shall be constructed of 18-8 Type 304 or Type 316 stainless steel. Shaft diameters must meet minimum requirements established by AWWA C504 for Class 150B.

2.3 Class 250 Butterfly Valves

A. Valve bodies shall be constructed of cast iron conforming to ASTM A-126 Class B (with integrally cast flanged or mechanical joint ends). Unless otherwise shown, Class 250 butterfly valve flanges shall have the same drilling as ANSI B16.1, Class 125 cast iron flanges and mechanical joint ends shall conform to ANSI 21.11. Two trunnions for shaft bearings shall be integral with each valve body.

B. Valve shafts shall be turned, ground and polished. Valve shafts shall be constructed of stainless steel, ASTM A-564, Type 630 or 18-18 Type 304.

PART 3 EXECUTION

3.1 General

Valve installation shall be in accordance with Section 320 - Valves, General and manufacturer's requirements. All valves 24-inches in diameter or larger shall be pressure and leakage tested at the project site and shall pass the field testing prior to installation.

END OF SECTION

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SECTION 323

MISCELLANEOUS VALVES

PART 1 GENERAL

1.1 Description

A. The CONTRACTOR shall furnish and install miscellaneous valves complete, as shown on the Drawings and/or specified herein, including coating and lining, appurtenances, operators and accessories.

B. Miscellaneous valves include non-freeze wall hydrant, combination air and vacuum valves, strainers and small swing check valves.

1.2 Submittals

As required by Section 320.

PART 2 PRODUCTS

2.1 Materials and Manufacturers

A. Combination Air/Vacuum Valves

Air and vacuum valves shall be of the Combination Air Valve (CAV) type consisting of a kinetic air and vacuum valve and an air release valve contained in a single body housing. The valve shall be designed to exhaust large volumes of air when filling the pipeline, to release small quantities of air during operation and to admit large volumes or air upon impending vacuum during draining.

Body and cover materials shall be cast iron ASTM A126, Class B. Orifice floats and orifices shall be ASTM A240 stainless steel. Valve seats shall be Buna-N. Kinetic Compact Combination air valves shall be as manufactured by Val-Matic Series 100, APCO standard single body Series 140.

PART 3 EXECUTION

3.1 General

A. Valve installation shall be in accordance with Section 320 and manufacturer's requirements.

END OF SECTION

SECTION 330

FIRE HYDRANTS

PART 1 GENERAL

1.1 Description

The CONTRACTOR shall furnish and install fire hydrants, complete and operable, as shown and specified herein, including coatings and linings, appurtenances, operators and accessories, in accordance with the requirements of the plans and Standard Specifications and Details.

1.2 Submittals

A. Shop Drawings

B. Lining and coating data

C. Manufacturer's handling, delivery, storage and installation requirements.

D. Applicable material certifications, testing certifications and testing certificates.

PART 2 PRODUCTS

2.1 General

Fire hydrants shall be furnished and installed as shown on the Plans and as specified herein. All hydrants of like kind shall be provided from a single manufacturer for this project.

2.2 Materials

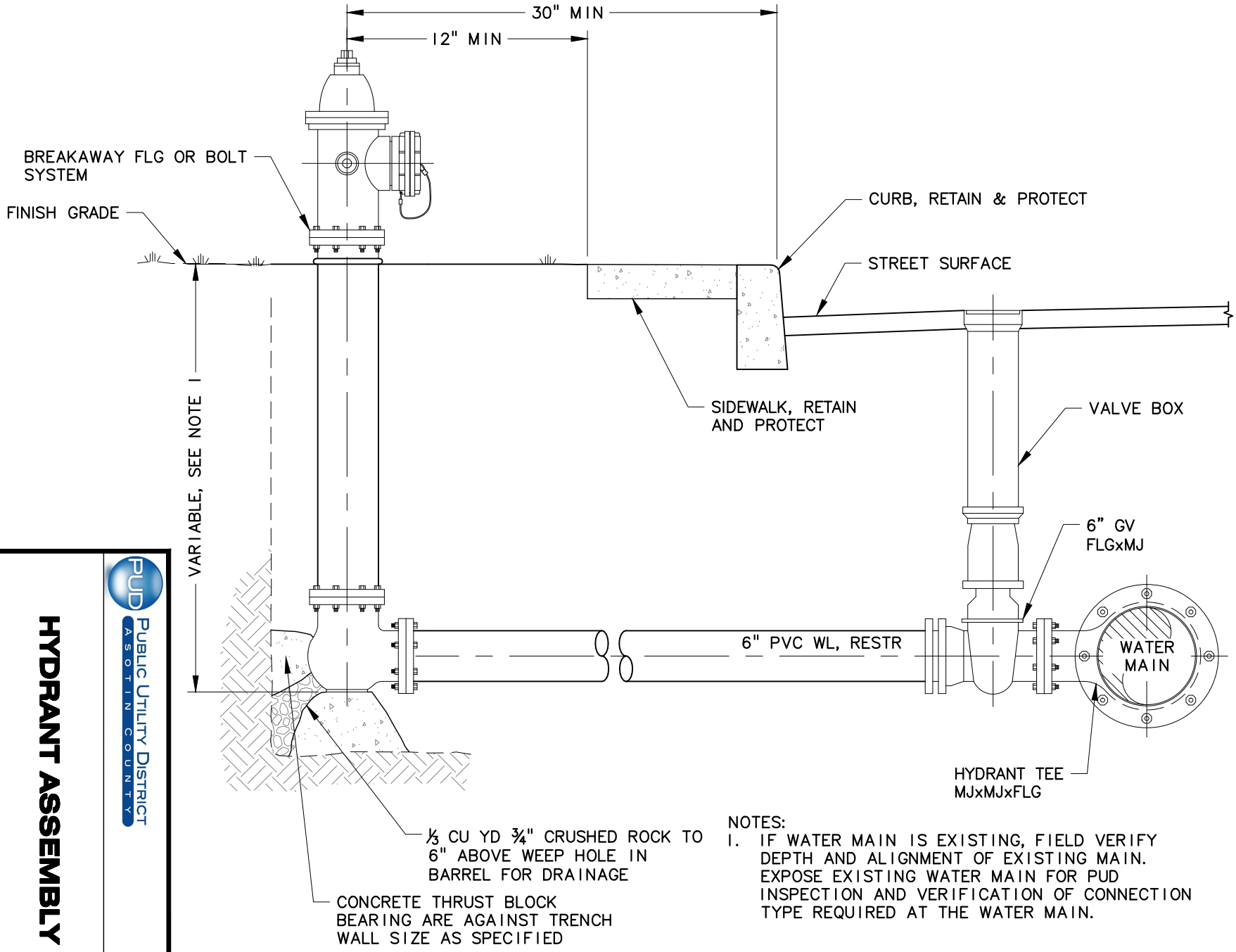
A. Fire hydrants shall meet or exceed the requirements of AWWA Standard C502 and shall be equipped with a 5 ¼ - inch valve, three port nozzles, two of which are 2 ½ -inch hose nozzles and one 5- inch pumper nozzle. Hydrant shall be Waterous Pacer with Storz Nozzle.

PART 3 EXECUTION

3.1 General

Hydrant assembly installation shall be in accordance with AWWA C600, manufacturer's requirements and as shown on the Plans.

END OF SECTION



NOTES:

1. IF WATER MAIN IS EXISTING, FIELD VERIFY DEPTH AND ALIGNMENT OF EXISTING MAIN. EXPOSE EXISTING WATER MAIN FOR PUD INSPECTION AND VERIFICATION OF CONNECTION TYPE REQUIRED AT THE WATER MAIN.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

HYDRANT ASSEMBLY

REVISION DATE: MAY 13, 2016

STD. DWG. NO. 3-1

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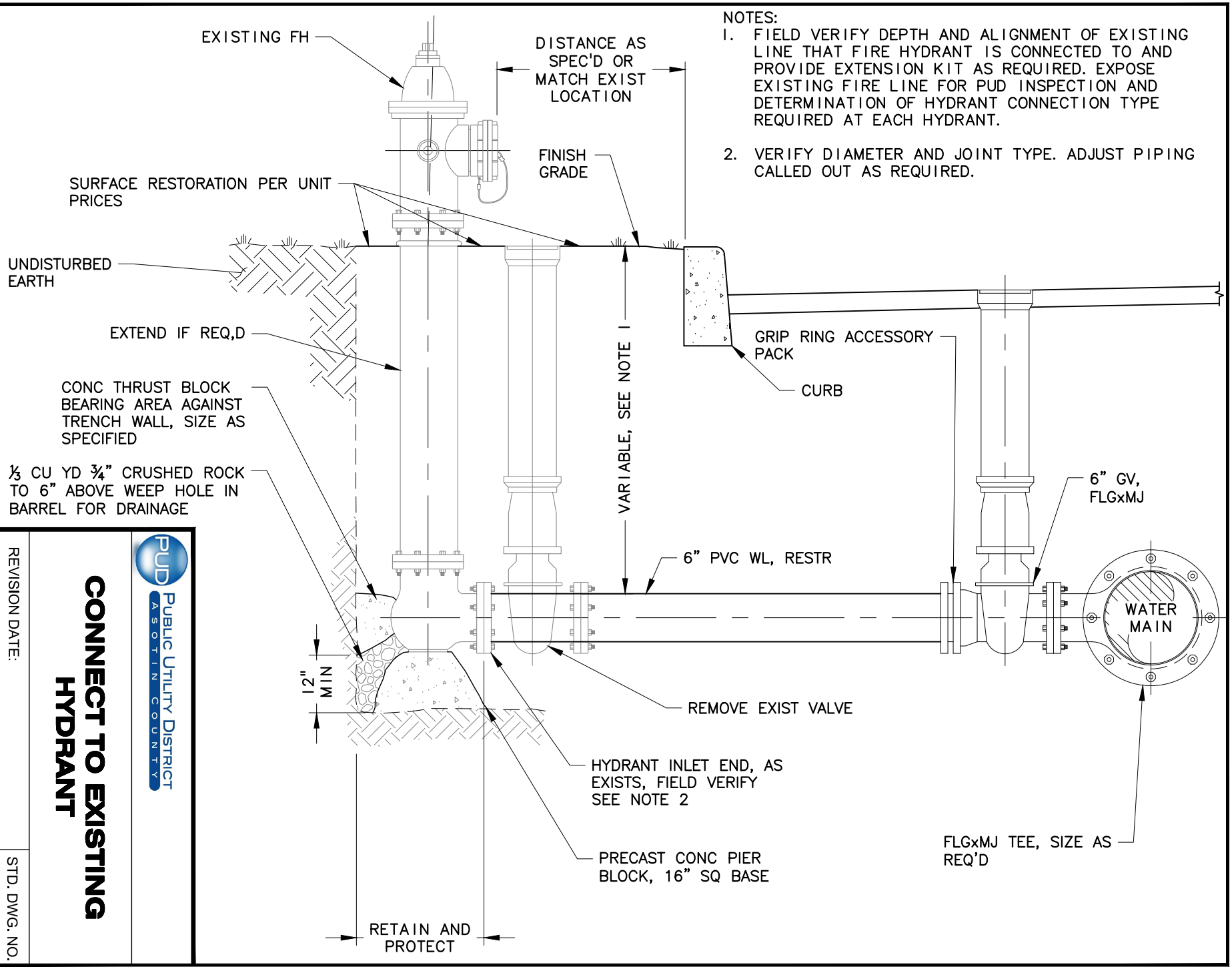

NOTES:

1. FIELD VERIFY DEPTH AND ALIGNMENT OF EXISTING LINE THAT FIRE HYDRANT IS CONNECTED TO AND PROVIDE EXTENSION KIT AS REQUIRED. EXPOSE EXISTING FIRE LINE FOR PUD INSPECTION AND DETERMINATION OF HYDRANT CONNECTION TYPE REQUIRED AT EACH HYDRANT.
2. VERIFY DIAMETER AND JOINT TYPE. ADJUST PIPING CALLED OUT AS REQUIRED.

CONNECT TO EXISTING HYDRANT

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

REVISION DATE: MAY 13, 2016

STD. DWG. NO. 3-2

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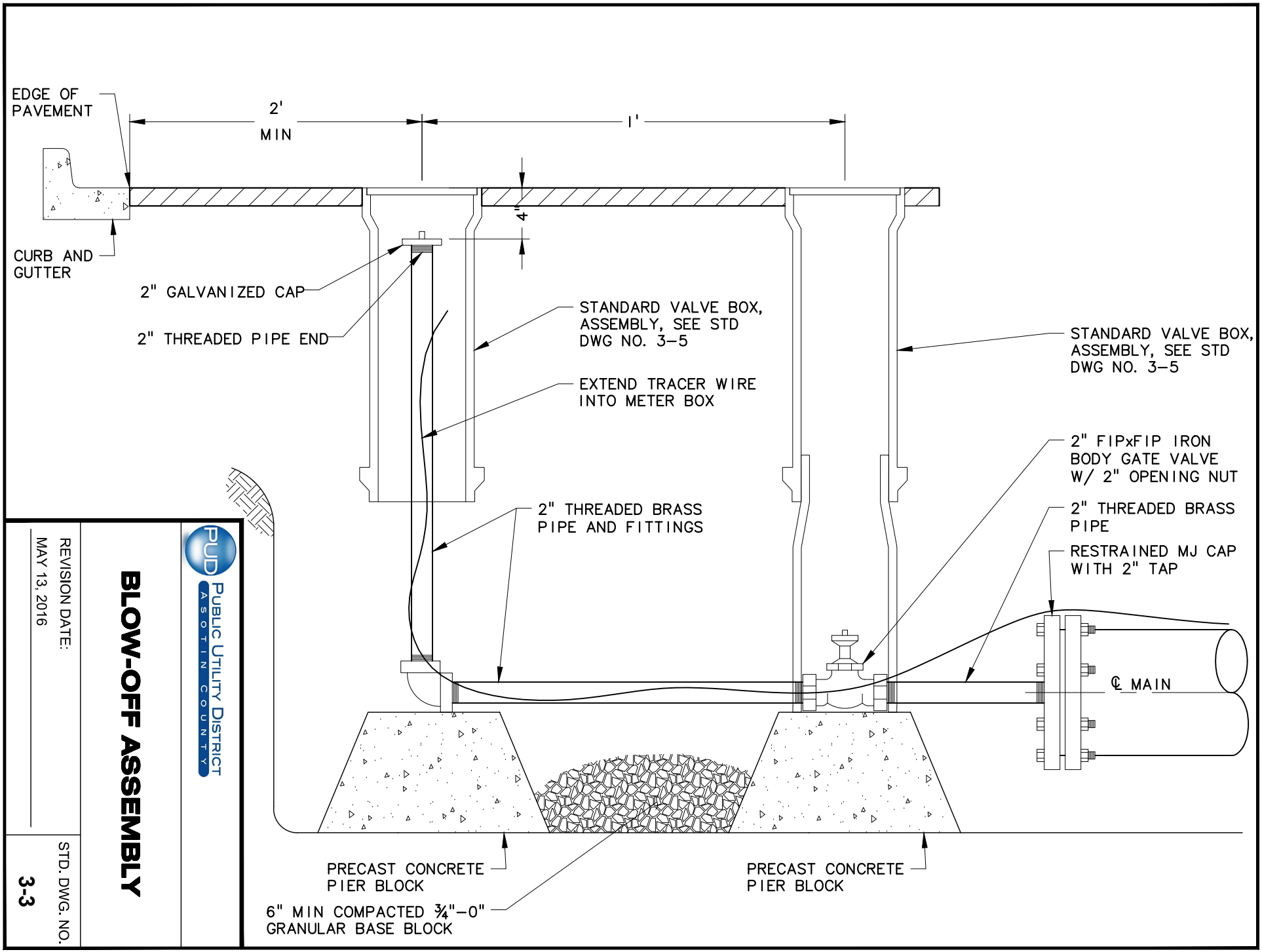

PUD Public Utility District Asotin County

BLOW-OFF ASSEMBLY

REVISION DATE: MAY 13, 2016

STD. DWG. NO. 3-3

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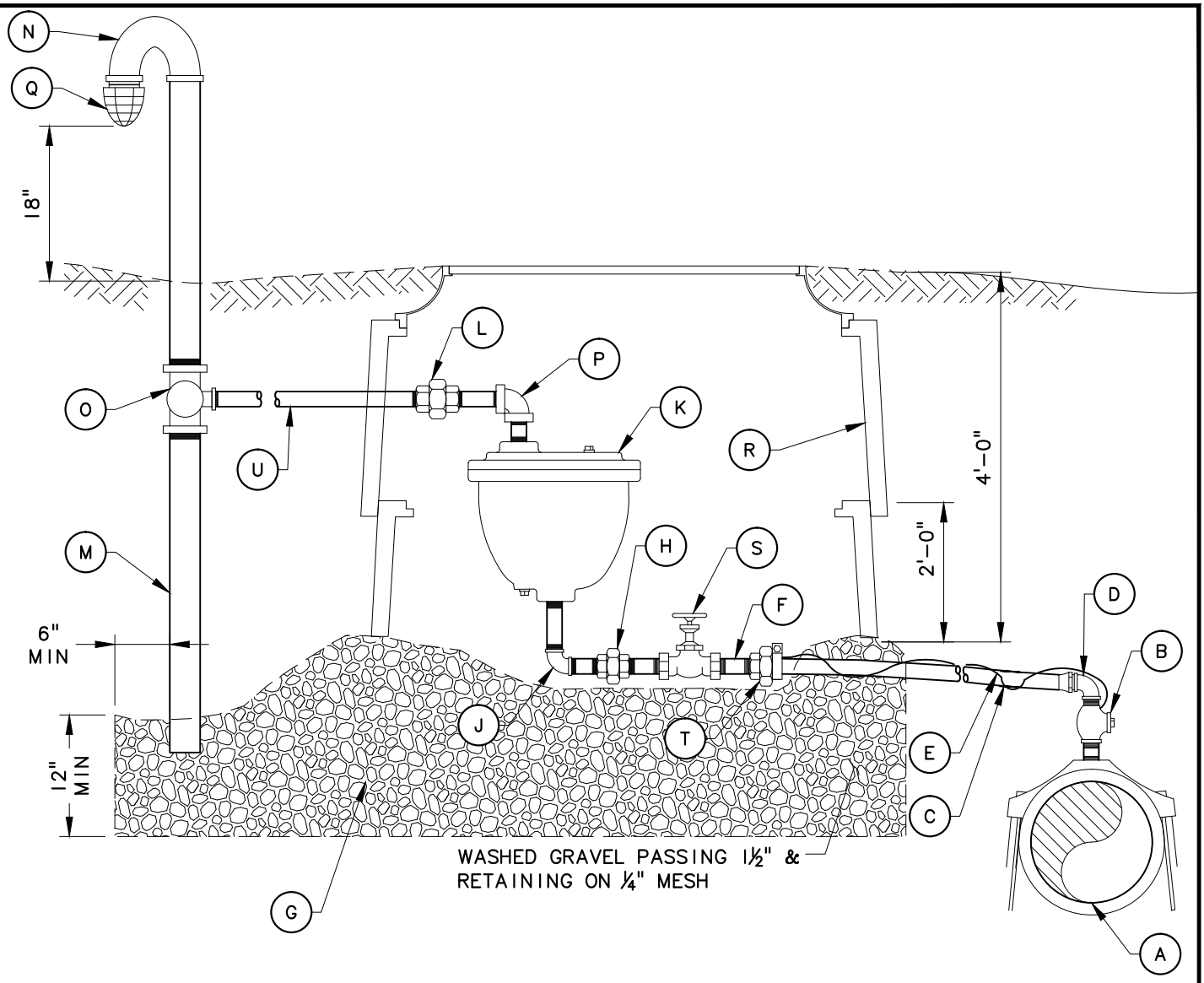

KEY NOTES:

- (A) WATER MAIN
- (B) 1" FORD 600 SERIES CORP
- (C) 1" POLYETHYLENE SERVICE PIPE
- (D) 1" FORD 602-44 ANGLE COUPLING
- (E) TRACER WIRE
- (F) 1" BRASS NIPPLE
- (G) WASHED GRAVEL PASSING 1½" & RETAINING ON ¼" MESH
- (H) 1" BRASS UNION
- (J) 1" BRASS 90° ELL
- (K) 1" COMBINATION AIR AND VACUUM RELIEF VALVE
- (L) 1" BRASS UNION
- (M) 2" BRASS PIPE
- (N) 2" STREET ELL (HORIZ)
- (O) 2"X1" BRASS TEE (VERT)
- (P) 1" BRASS 90° BEND
- (Q) 2" BEEHIVE STRAINER
- (R) METER BOX, 21"x18" ID, 2 REQ'D
- (S) GATE VALVE (FIPXFIP)
- (T) STRAIGHT CPLG (FIPXPE)
- (U) GALV PIPE

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

AIR AND VACUUM RELEASE STATION

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	3-4

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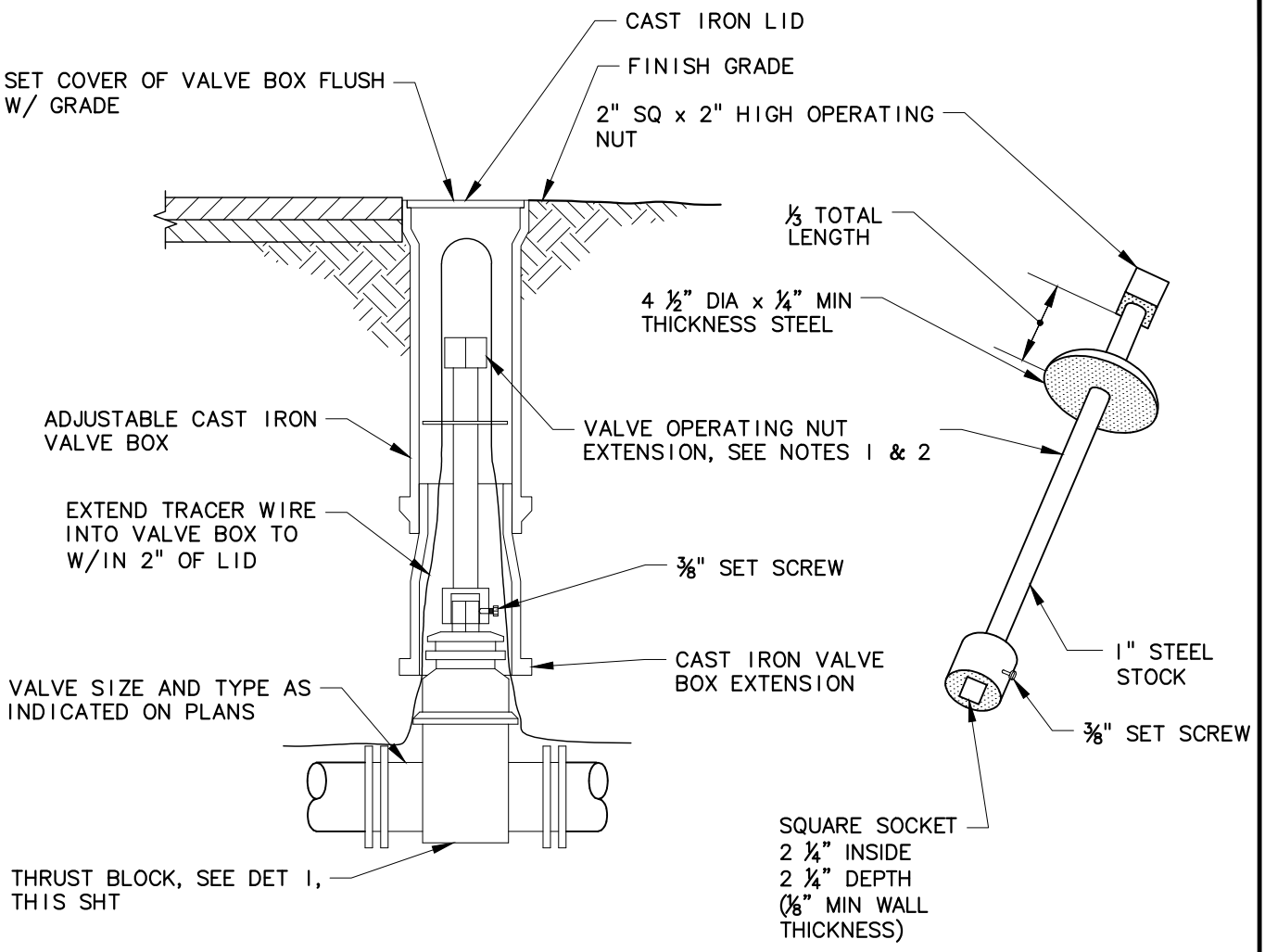

VALVE BOX
AND EXTENSION

VALVE OPERATING
NUT EXTENSION

NOTES:

1. VALVE OPERATING NUT EXTENSIONS ARE REQUIRED WHEN THE VALVE NUT IS MORE THAN FIVE (5) FEET BELOW FINISHED GRADE.

2. ALL VALVE OPERATING NUT EXTENSIONS ARE TO BE MADE OF STEEL, SIZED AS NOTED, AND PAINTED WITH TWO (2) COATS OF METAL PAINT.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

BURIED VALVE AND BOX

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	3-5

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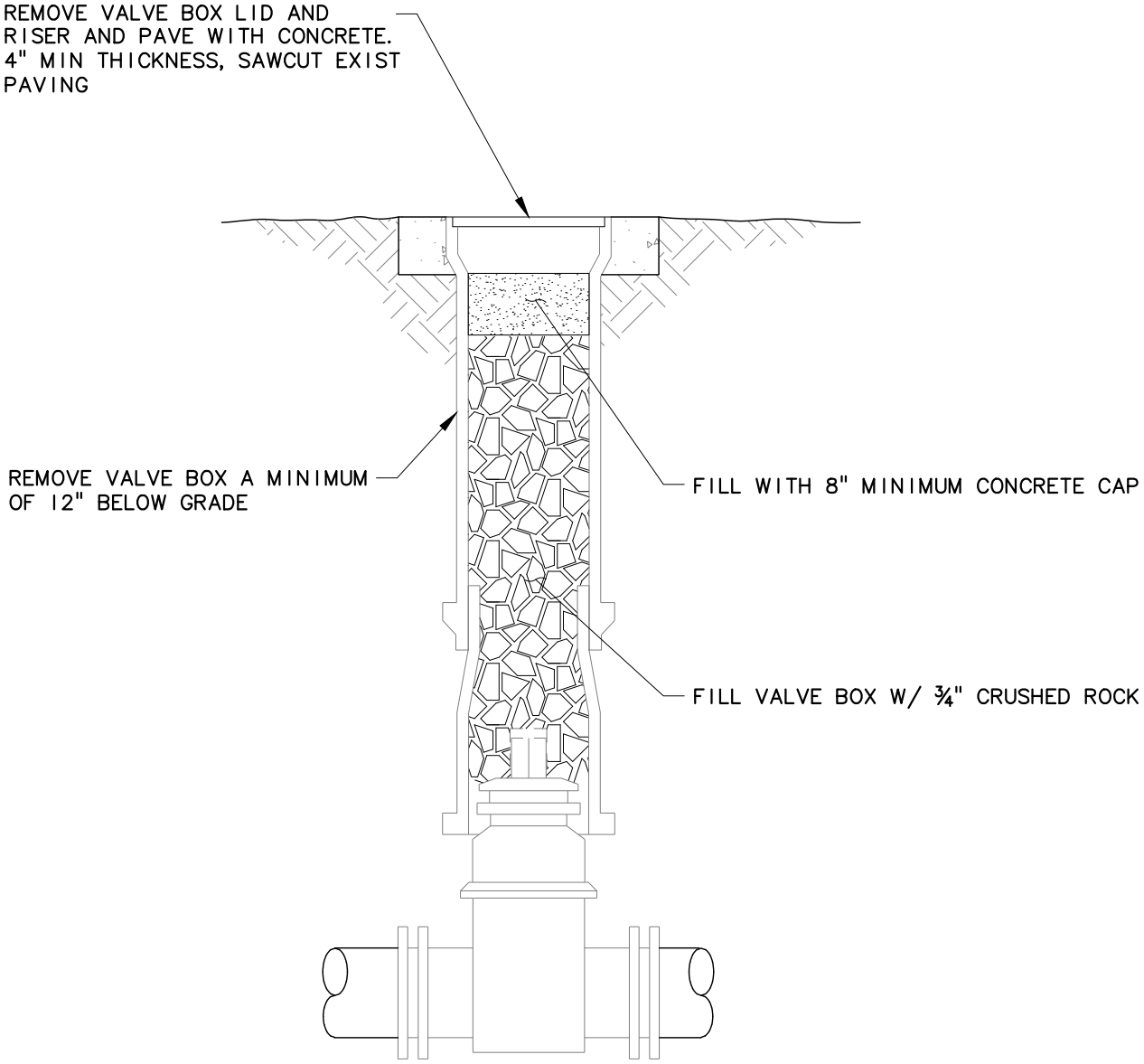

PUBLIC UTILITY DISTRICT
ASOTIN COUNTY

VALVE ABANDONMENT

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	3-6

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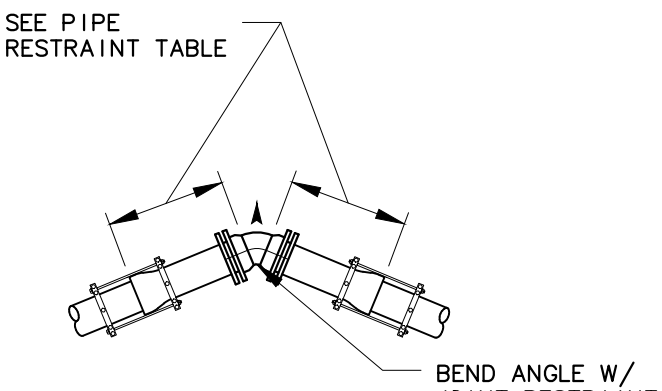
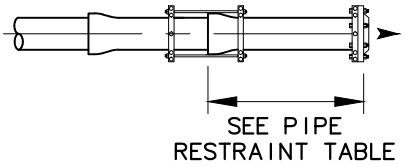
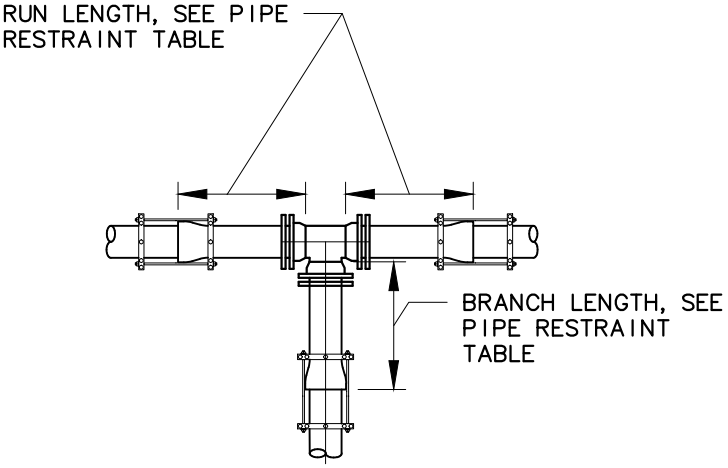


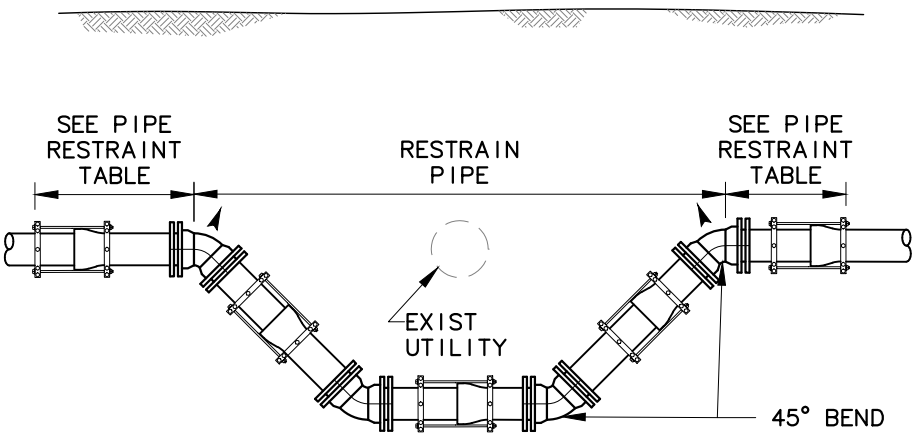
HORIZONTAL BENDS



DEAD END



TEE



VERTICAL OFFSET

NOTES
1. SEE PUD STD DWG NO. 3-7B, FOR PIPE RESTRAINT TABLE

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

PIPE RESTRAINT DETAILS

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	3-7A

PIPE RESTRAINT TABLE

PIPE SIZE (IN)	MINIMUM RESTRAINED PIPE LENGTH (FT)							
	HORIZONTAL BENDS				TEE		DEAD END	VERTICAL OFFSET (45° VERT BENDS)
	11¼°	22½°	45°	90°	RUN	BRANCH		
4	2	3	6	14	4	8	40	17
6	2	4	8	19	6	7	56	23
8	3	5	10	24	8	8	73	31
10	3	6	12	29	9	14	88	37
12	4	7	14	34	11	12	104	43
14	4	8	16	39	12	18	119	50
16	5	9	18	43	14	16	135	56

1. USE RESTRAINED JOINTS WHEN SHOWN ON PLANS. SEE PUD STANDARD SPECIFICATION SECTION 02640 POLYVINYL CHLORIDE (PVC) PRESSURE PIPE, FITTINGS AND SPECIAL ITEMS FOR ACCEPTABLE TYPES OF JOINT RESTRAINT.

2. THE RESTRAINED JOINT TABLE SHOWS THE MINIMUM LENGTH OF PIPE THAT MUST BE RESTRAINED. ALL PIPE JOINTS WITHIN THIS LENGTH SHALL BE RESTRAINED.

3. REQUIRED LENGTHS OF PIPE USING RESTRAINED JOINTS WERE CALCULATED USING THE ASSUMPTIONS LISTED BELOW. REQUIRED LENGTHS SHALL BE REVISED BY A REGISTERED PROFESSIONAL ENGINEER IF THE CONDITIONS IN THE FIELD VARY FROM THE ASSUMPTIONS LISTED BELOW:
   A. MINIMUM COVER = 4 FT
   B. MAXIMUM TEST PRESSURE = 150 PSI
   C. BEDDING SOIL TYPE = GM–SILTY GRAVEL OR GRAVEL SAND SILT MIXTURE.
   D. TRENCH TYPE = GRANULAR BEDDING PER DETAIL 2, SHT D–2
   E. SAFETY FACTOR = 2.0

4. IN–LINE VALVES REQUIRING RESTRAINED JOINTS SHALL HAVE RESTRAINED JOINTS FOR A LENGTH REQUIRED FOR DEAD END LINES ON BOTH SIDES OF THE VALVE.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

PIPE RESTRAINT TABLE AND NOTES

REVISION DATE: MAY 13, 2016

STD. DWG. NO. 3-7B

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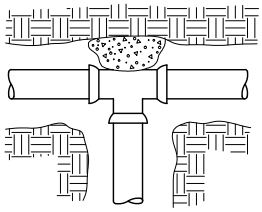
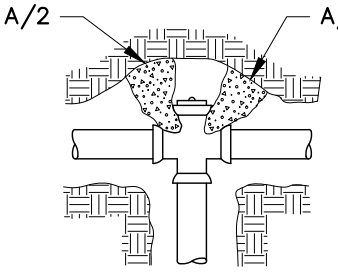
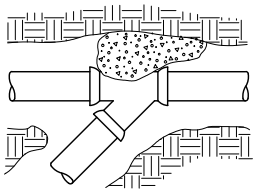


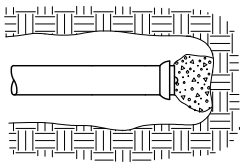
TEE



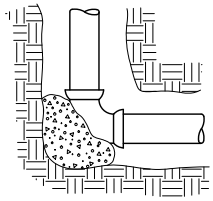
PLUGGED CROSS



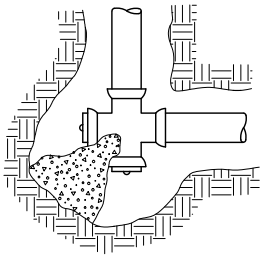
WYE



PLUG OR CAP



BEND



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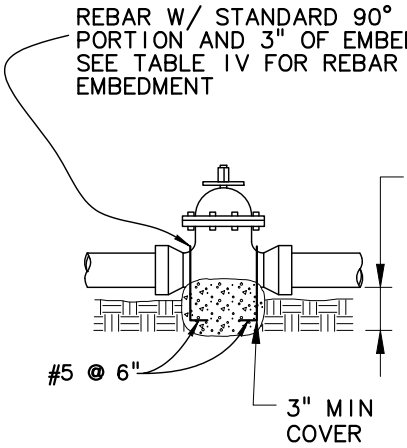
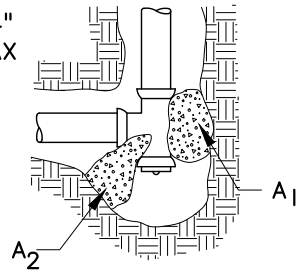
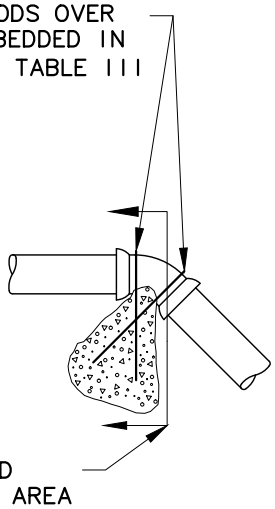


VALVE



PLUGGED TEE

PLAN



PROFILE

NOTES
1. SEE PUD STD DWG NO. 3-8B, 3-8C FOR THRUST BLOCK TABLES AND NOTES.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

THRUST BLOCK DETAILS

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	3-8A

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TABLE I

MINIMUM SQUARE FEET OF THRUST AREA ONTO UNDISTURBED EARTH				
PIPE SIZE	TEE, PLUG OR VALVE	90° BEND	45° BEND	22 ½°, 11 ¼° BENDS OR REDUCER
3	1.0	1.1	1.0	1.0
4	1.4	2.0	1.1	1.0
6	3.2	4.5	2.4	1.2
8	5.7	8.0	4.3	2.2
10	8.8	12.5	6.8	3.4
12	12.7	18.0	9.7	5.0
14	17.3	24.5	13.3	6.8

*BEARING AREAS BASED UPON TEST PRESSURE OF 150 P.S.I. AND AN ALLOWABLE SOIL BEARING STRESS OF 2000 POUNDS PER SQUARE FOOT. TO COMPUTE BEARING AREAS FOR DIFFERENT TEST PRESSURES AND SOIL BEARING STRESSES, USE THE FOLLOWING EQUATION: BEARING AREA=(TEST PRESSURE/150) X (2000/SOIL BEARING STRESS) X (TABLE VALUE).

TABLE II

FITTING SIZE	BEND ANGLE					
	45°		22½°		11¼°	
	VOL(CY)	AREA(SF)	VOL(CY)	AREA(SF)	VOL(CY)	AREA(SF)
3	0.3	1.0	0.2	1.0	0.1	1.0
4	0.5	1.0	0.3	1.0	0.1	1.0
6	1.0	1.0	0.6	1.0	0.3	1.0
8	*	*	1.0	1.0	0.5	1.0
10	*	*	*	*	0.9	1.0
12	*	*	*	*	*	*
14	*	*	*	*	*	*

* THRUST BLOCK WITH VOLUME OVER 1 CY NOT ALLOWED FOR VERTICAL DOWNWARD BEND. USE RESTRAINED PIPE, SEE PUD STD DWG NO. 3-7A AND 3-7B.

TABLE III

FITTING SIZE	ROD SIZE	EMBEDMENT
12" AND LESS	#6	30"
14"-16"	#8	36"

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

THRUST BLOCK TABLES

REVISION DATE: MAY 13, 2016

STD. DWG. NO. 3-8B

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TABLE IV THRUST BLOCK FOR VALVES

VALVE SIZE	BEARING AREA PLACED AGAINST UNDISTURBED EARTH IN SQ FT.	REBAR SIZE	MINIMUM EMBEDMENT OF REBAR
4"	1.3	#6	16"
6"	2.8	#8	16"
8"	5.1	#10	20"
12"	11.3	#10	20"

NOTES:

1. KEEP CONCRETE CLEAR OF JOINT AND JOINT ACCESSORIES.
2. CONCRETE THRUST BLOCKING SHALL BE POURED AGAINST UNDISTURBED EARTH.
3. REQUIRED VOLUMES OR BEARING AREAS IN TABLE I OR TABLE II AT FITTINGS SHALL BE AS INDICATED BELOW, ADJUSTED, IF NECESSARY, TO CONFORM TO ACTUAL TEST PRESSURE(S) AND ALLOWABLE SOIL BEARING STRESS(ES).
4. THRUST BLOCK VOLUMES FOR VERTICAL BENDS HAVING UPWARD RESULT AND THRUSTS ARE BASED ON TEST PRESSURE OF 150 PSIG AND THE WEIGHT OF CONCRETE =4050 LBS/CU YD. TO COMPUTE VOLUMES FOR DIFFERENT TEST PRESSURES, USE THE FOLLOWING EQUATION: VOLUME =(TEST PRESS/150) X (TABLE VALUE).
5. THRUST BLOCKS FOR VERTICAL BENDS HAVING DOWNWARD RESULTANT THRUSTS SHOULD BE THE SAME AS FOR HORIZONTAL BENDS.
6. BEARING AREAS, VOLUMES, AND SPECIAL BLOCKING DETAILS SHOWN ON PLANS TAKE PRECEDENCE OVER THIS STANDARD
7. BEARING AREA OF THRUST BLOCK SHALL NOT BE LESS THAN 1.0 SQ FT.
8. SEE PLANS AND PUD STANDARD SPECIFICATION 300, PIPELINE TESTING AND DISINFECTION FOR TEST PRESSURES.
9. CONSULT SOIL ENGINEER FOR ACTUAL SOIL BEARING PRESSURE.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

THRUST BLOCK TABLES AND NOTES

REVISION DATE: MAY 13, 2016

STD. DWG. NO. 3-8C

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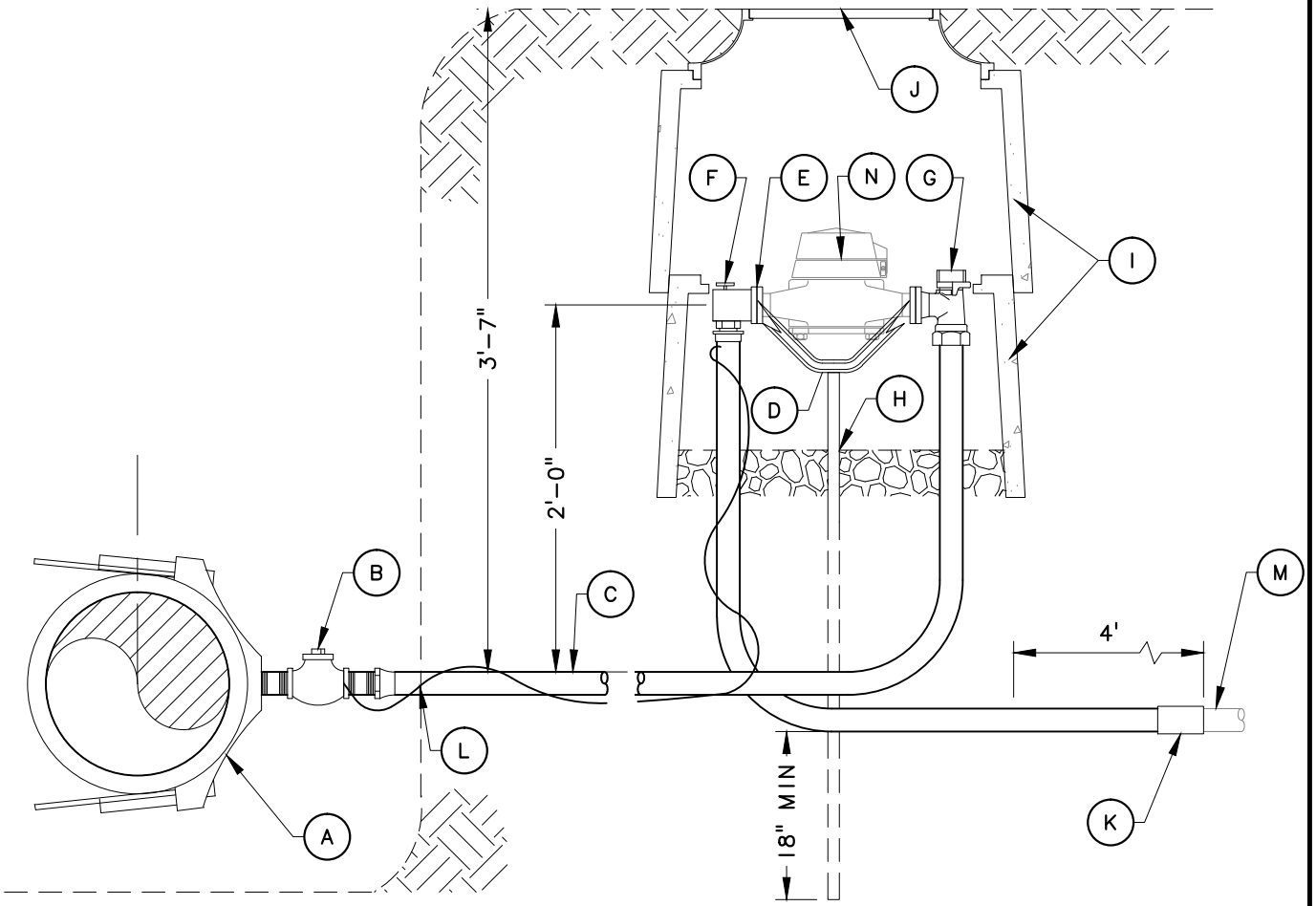
NOTES:

1. REPLACE EXISTING METER BOX. SALVAGE EXISTING METER BOX AND COVER FOR PUD USE AND TRANSPORT TO PUD DESIGNATED STORAGE AREA.
2. VERIFY EXISTING LINE SIZE AND MATERIAL FOR COUPLING. PROVIDE GRIP JOINT END WITH INSERT STIFFENER FOR NEW AND EXISTING SERVICE LINES.
3. EXTEND TRACER WIRE INTO EXISTING METER BOX.
4. EXISTING SERVICE LINE SHALL BE ABANDONED. EXCAVATE EXISTING CORPORATION STOP AND TURN OFF PRIOR TO SWITCHING TO NEW WATER SERVICE.



KEY NOTES:

- (A) ROMAC DOUBLE STRAP NYLON SADDLE
- (B) FORD CORPORATION STOP FB1101-4-G-NL
- (C) POLYETHYLENE SERVICE PIPE
- (D) FORD METER YOKE WITH PRONG Y504-P
- (E) FORD METER YOKE EXPANSION CONNECTION EC-4-NL
- (F) FORD ANGLE CHECK VALVE HA91-444-NL AND FORD MIPxPE GJ COUPLING C86-44-G-NL
- (G) FORD BALL YOKE VALVE BA96-444W-G-NL
- (H) GALV PIPE TO SUPPORT YOKE
- (I) REINER CONCRETE BOXES - 18"x21" (2 REQ'D)
- (J) 21" FORD METER BOX LID AND COVER A4 FOR HARDSCAPE AREAS AND X4 FOR LANDSCAPE AREAS
- (K) FORD GRIP COUPLING PExPE, SEE NOTE 2
- (L) TRACER WIRE, NEW, SEE NOTE 3
- (M) EXIST SERVICE LINE - RETAIN AND PROTECT
- (N) METER - RETAIN AND PROTECT, RELOCATE METER WHEN SHOWN ON PLANS. LONG SPUDS A24 OR SHORT SPUDS A34 ARE REQUIRED TO ADAPT ¾" METER. VERIFY FITTINGS REQUIRED PRIOR TO INSTALLATION
- (O) FORD LONG SPUDS (A24) OR SHORT SPUDS (A34) ARE REQUIRED TO ADAPT TO ¾" METER. VERIFY FITTINGS REQUIRED PRIOR TO INSTALLATION

NEW ¾" AND 1" SERVICE LINE WITH METER

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

REVISION DATE: MAY 13, 2016

STD. DWG. NO. 3-9

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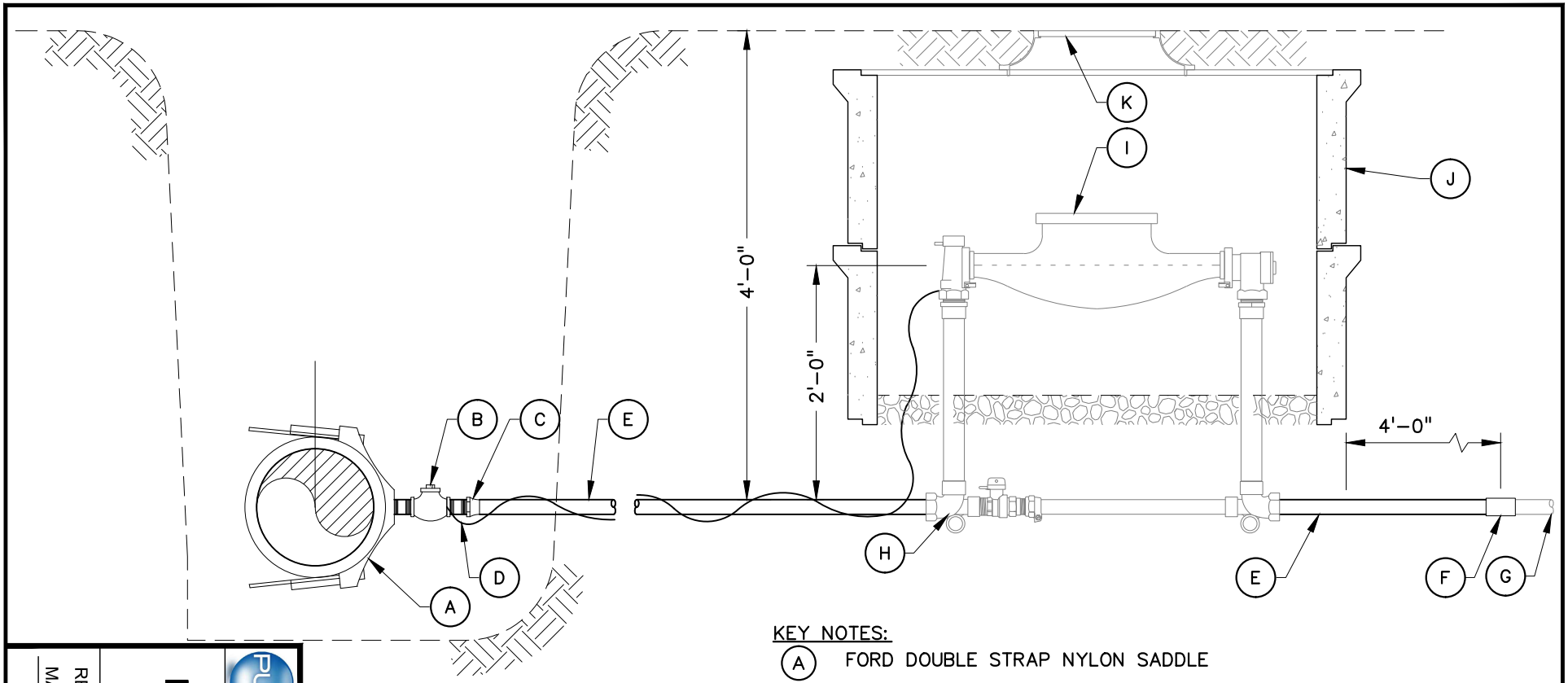

NEW 1 ½" AND 2" SERVICE LINE

PUBLIC UTILITY DISTRICT
ASOTIN COUNTY

REVISION DATE:
MAY 13, 2016

STD. DWG. NO.
3-10

NOTES:

1. VERIFY EXISTING LINE SIZE AND MATERIAL FOR COUPLING. PROVIDE GRIP JOINT END WITH INSERT STIFFENER FOR NEW AND EXISTING SERVICE LINES.
2. EXTEND TRACER WIRE INTO EXISTING METER BOX.
3. EXISTING SERVICE LINE SHALL BE ABANDONED. EXCAVATE EXISTING CORPORATION STOP AND TURN OFF PRIOR TO SWITCHING TO NEW WATER SERVICE.

KEY NOTES:

- (A) FORD DOUBLE STRAP NYLON SADDLE
- (B) DETERMINED BY ASOTIN COUNTY PUD: FORD CORP STOP OR 2" AMERICAN GV FIPxFIP AND STANDARD VALVE BOX, SEE DWG NO. 3-5
- (C) FORD GRIP COUPLINGxIPT
- (D) TRACER WIRE – NEW, SEE NOTE 2
- (E) POLYETHYLENE SERVICE PIPE
- (F) FORD GRIP COUPLING PExPE, SEE NOTE 1
- (G) EXIST SERVICE, RETAIN & PROTECT
- (H) 18" FORD COPPER SETTER FIPxFIP – 1.5" VH76-18B-11-55-NL AND 2" VH77-18B-11-77-NL. FORD 1.5" OR 2" MIPxPEPJ AT FIRST CONNECT INTO SETTER.
- (I) EXIST METER
- (J) 45"x26"x15" RIENER CONCRETE METER BOX (OVAL SHAPE)
- (K) 45"x26"x4" PUMICE OVAL LID W/ FORD METER BOX LID AND COVER A4 FOR HARDSCAPE AREAS AND X4 FOR LANDSCAPE AREAS

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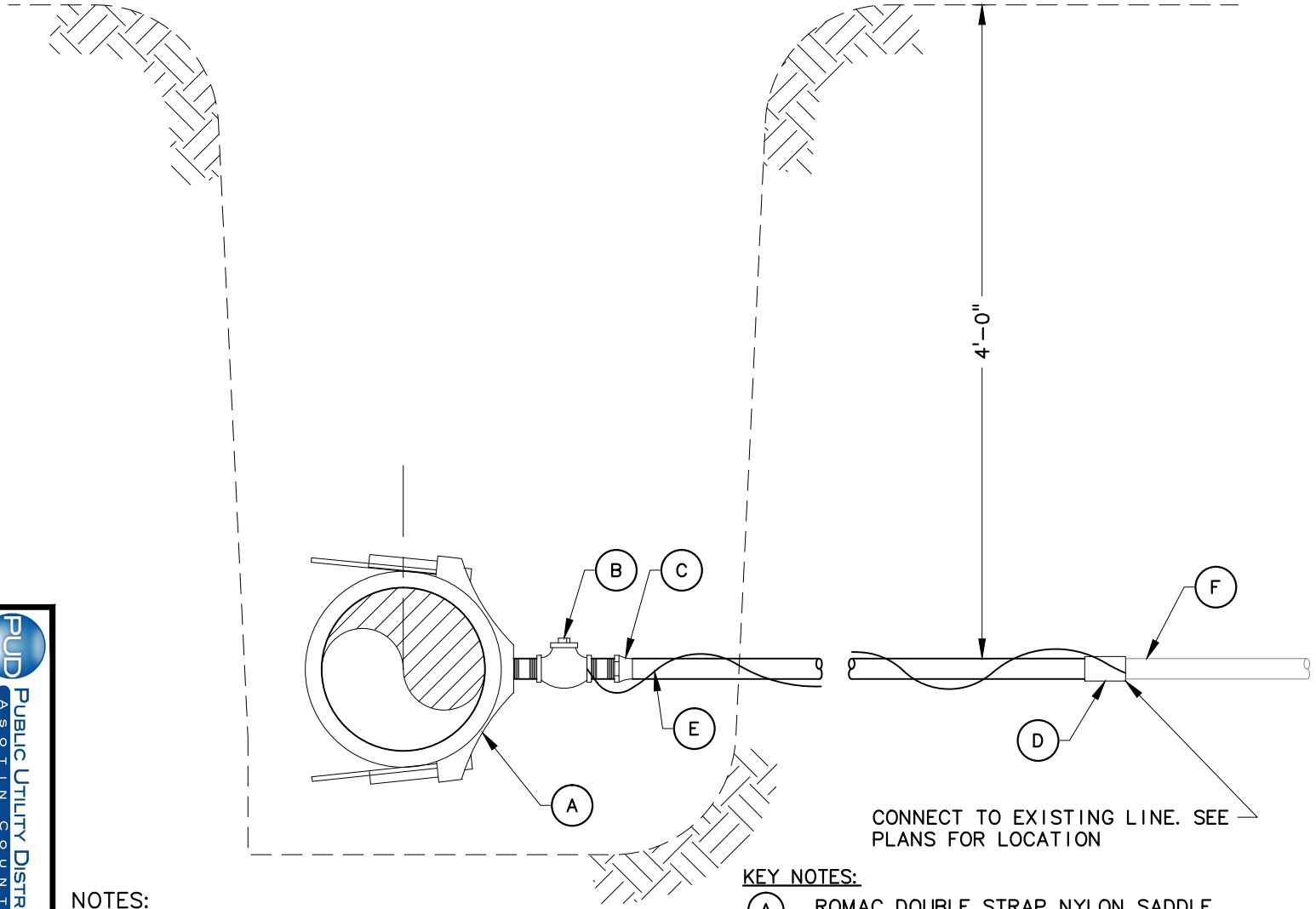

NOTES:

1. PROVIDE GRIP JOINT END WITH INSERT STIFFENER FOR NEW AND EXISTING SERVICE LINES.
2. CONNECT TO EXISTING TRACER WIRE.
3. EXISTING SERVICE LINE SHALL BE ABANDONED. EXCAVATE EXISTING CORPORATION STOP AND TURN OFF PRIOR TO SWITCHING TO NEW WATER SERVICE.

KEY NOTES:

- (A) ROMAC DOUBLE STRAP NYLON SADDLE
- (B) FORD CORPORATION STOP FB1101-4-G-NL WITH GRIP JOINT AND INSERT STIFFENERS
- (C) POLYETHYLENE SERVICE PIPE
- (D) FORD GRIP COUPLING – SEE NOTE 1
- (E) TRACER WIRE, NEW, SEE NOTE 2
- (F) EXIST SERVICE LINE – RETAIN AND PROTECT

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

NEW 3/4" AND 1" SERVICE LINE, CONNECT TO EXISTING WATER SERVICE

REVISION DATE: MAY 13, 2016

STD. DWG. NO. 3-11

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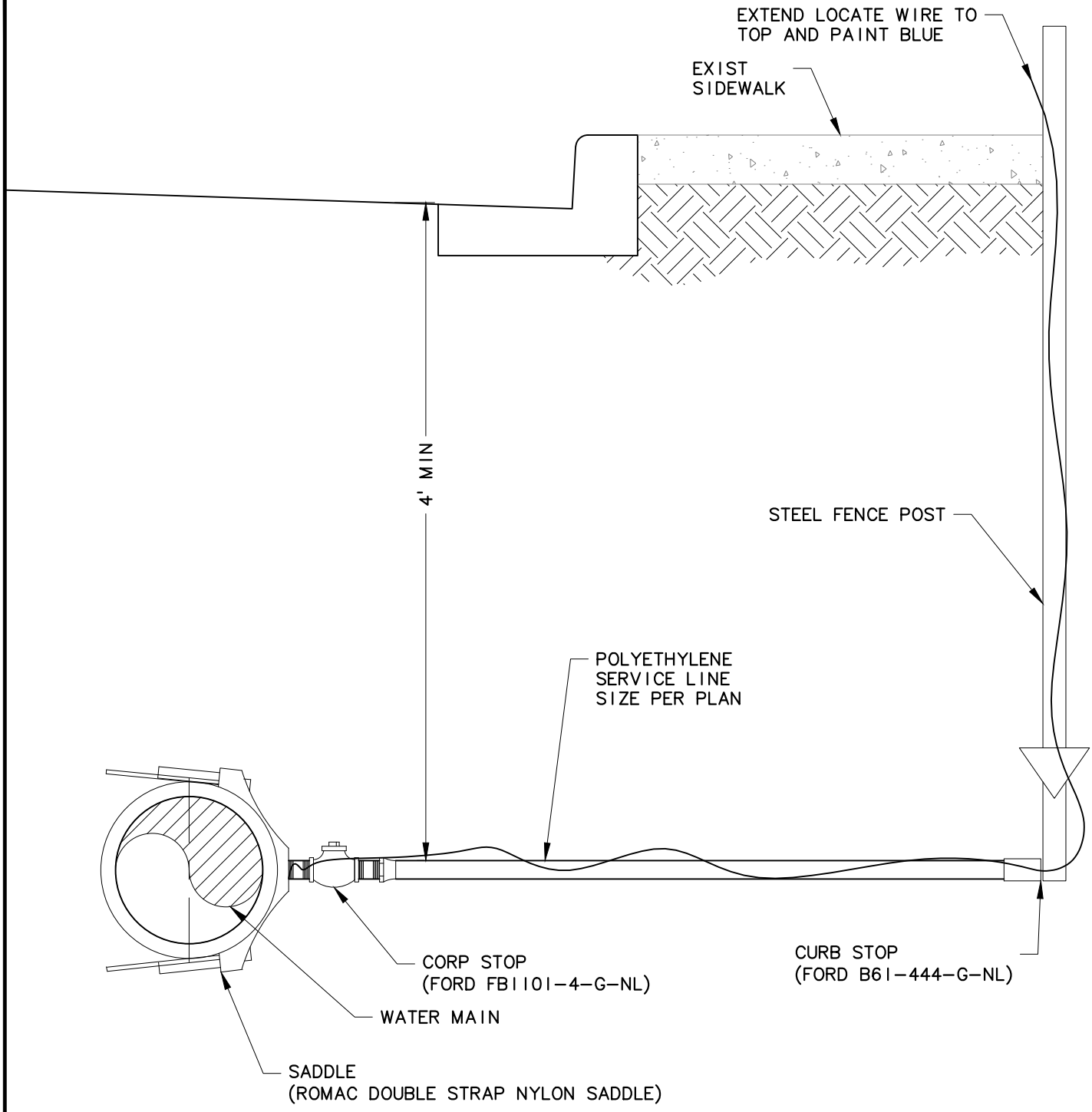

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

WATER SERVICE STUB OUT

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	3-12

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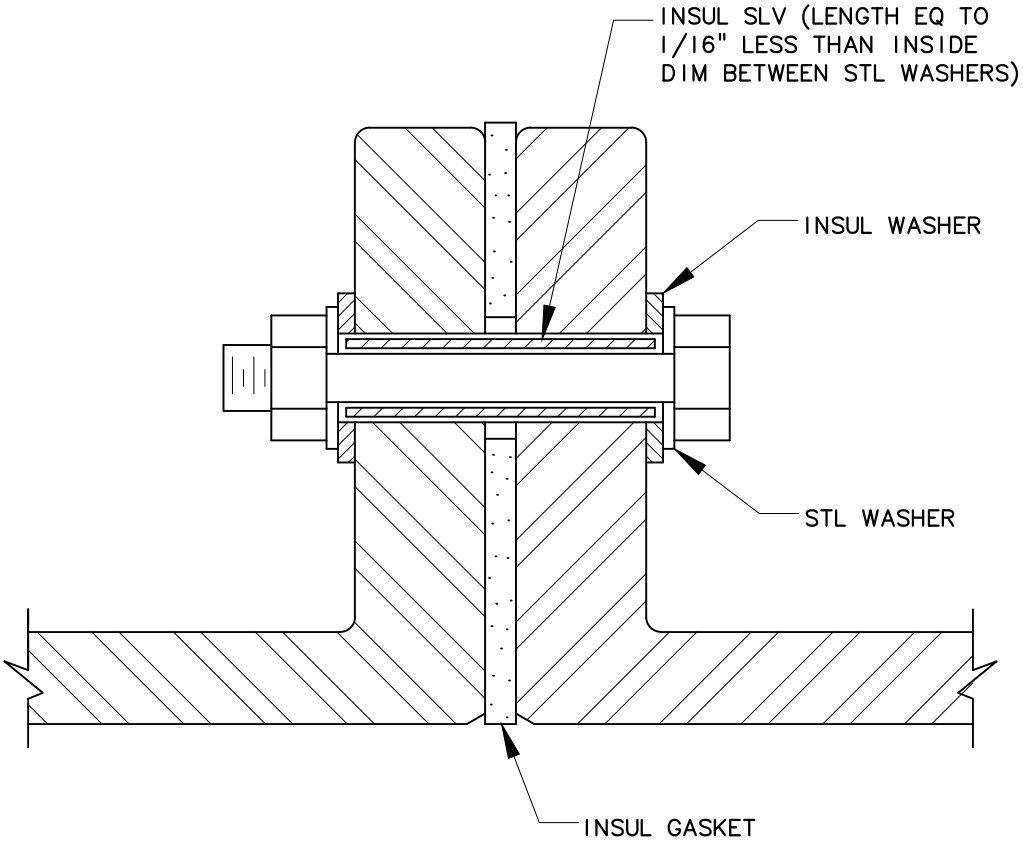

NOTE:
1. SEE PUD STANDARD SPECIFICATION, 301 DUCTILE IRON PIPES, FITTINGS AND SPECIAL ITEMS FOR INSULATING MATERIAL TYPES.

PUBLIC UTILITY DISTRICT
ASOTIN COUNTY

INSULATING FLANGE JOINT

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	3-13

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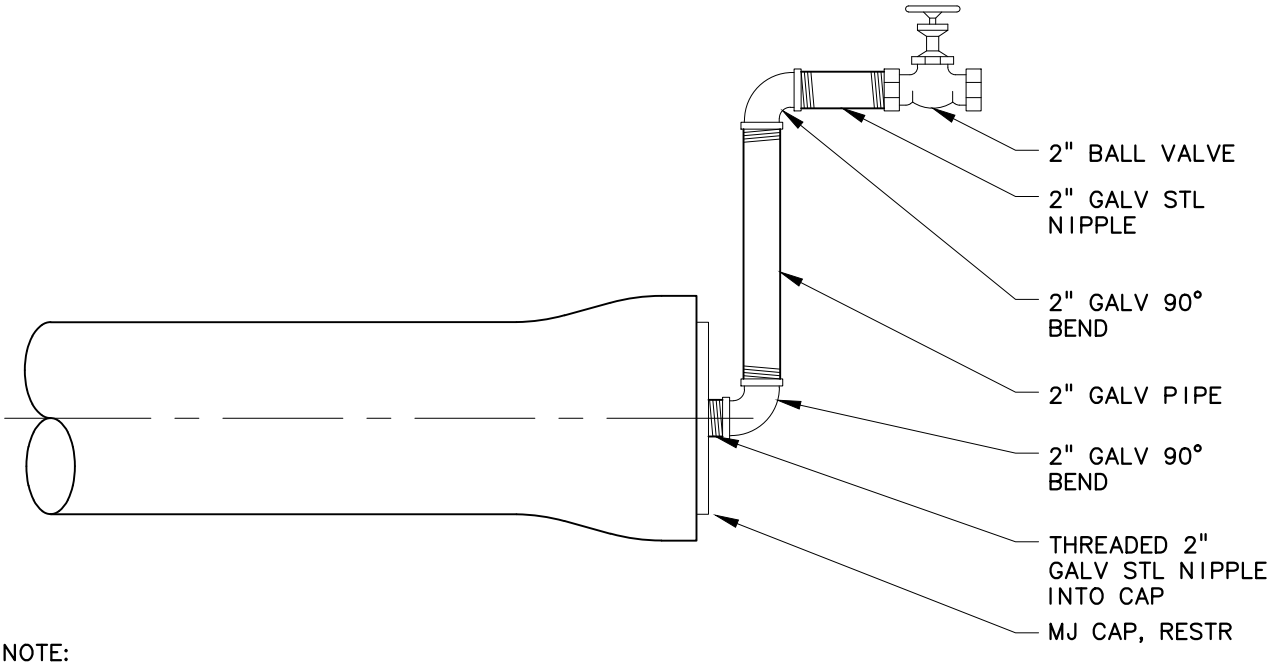

NOTE:

1. USE FOR AIR VENTING, PRESSURE TESTING, DISINFECTION APPLICATION, FLUSHING ETC..
2. RESTRAIN PIPE PER PUD STD DWG NO. 3-7A AND 3-7B.
3. PROVIDE MH COVER OR STEEL PLATE OVER THE TOP OF HOLE.

PUBLIC UTILITY DISTRICT
ASOTIN COUNTY

TEMPORARY END PLUG ANCHOR AND PRESSURE TEST POINT

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	3-14

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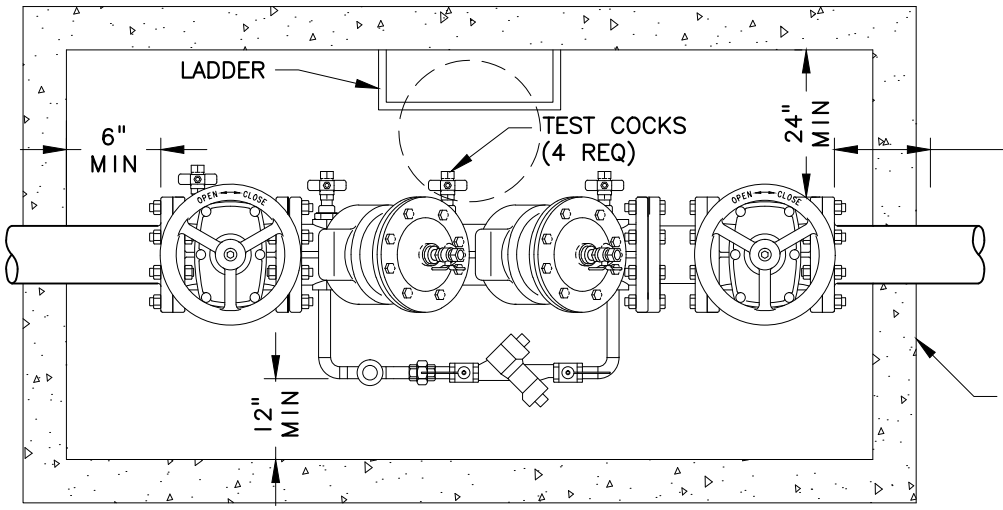
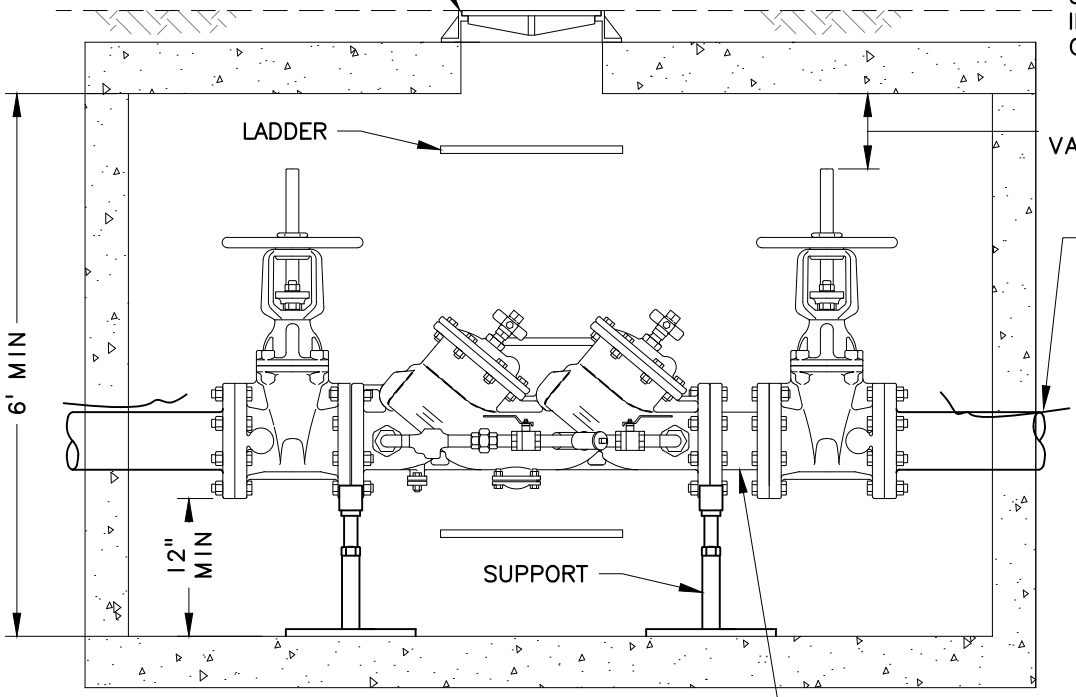


PLAN

30" ACCESS OPENING WITH A H20 TRAFFIC RATED 24" MANHOLE COVER AND FRAME STAMPED WITH "WATER"

H20 TRAFFIC RATED PRECAST VALVE VAULT, WILBERT PRECAST VALVE PIT OR APPROVED EQUAL. INSTALL PER MANUFACTURER'S RECOMMENDATION AND PER SECTION 310 PART 3.3 FOR INSTALLATION OF CONCRETE VAULT.



PROFILE

NOTES:

1. DOUBLE CHECK DETECTOR ASSEMBLY, WATTS SERIES 774DCDA OR APPROVED EQUAL.

2. APPROVED BACKFLOW-PREVENTION DEVICES ARE REQUIRED ON ALL PRIVATE FIRE LINES. THE DEVICE SHALL BE A DOUBLE-CHECK DETECTOR BACKFLOW PREVENTION ASSEMBLY INSTALLED ON THE BUILDING SIDE OF THE PROPERTY LINE. THE DEVICE SHALL BE SO PLACED AS TO ALLOW ACCESS FOR THE PUD TO READ THE METER AND TEST THE DEVICE UPON REQUEST.

3. THE CITY OF CLARKSTON AND ASOTIN COUNTY ARE THE JURISDICTIONAL ENTITY REGARDING PRIVATE FIRE HYDRANT REQUIREMENTS. THE SPECIFIC PLACEMENT AND SIZING SHALL BE DETERMINED BY THE FIRE MARSHAL.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

STANDARD DOUBLE CHECK DETECTOR ASSEMBLY

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	3-15

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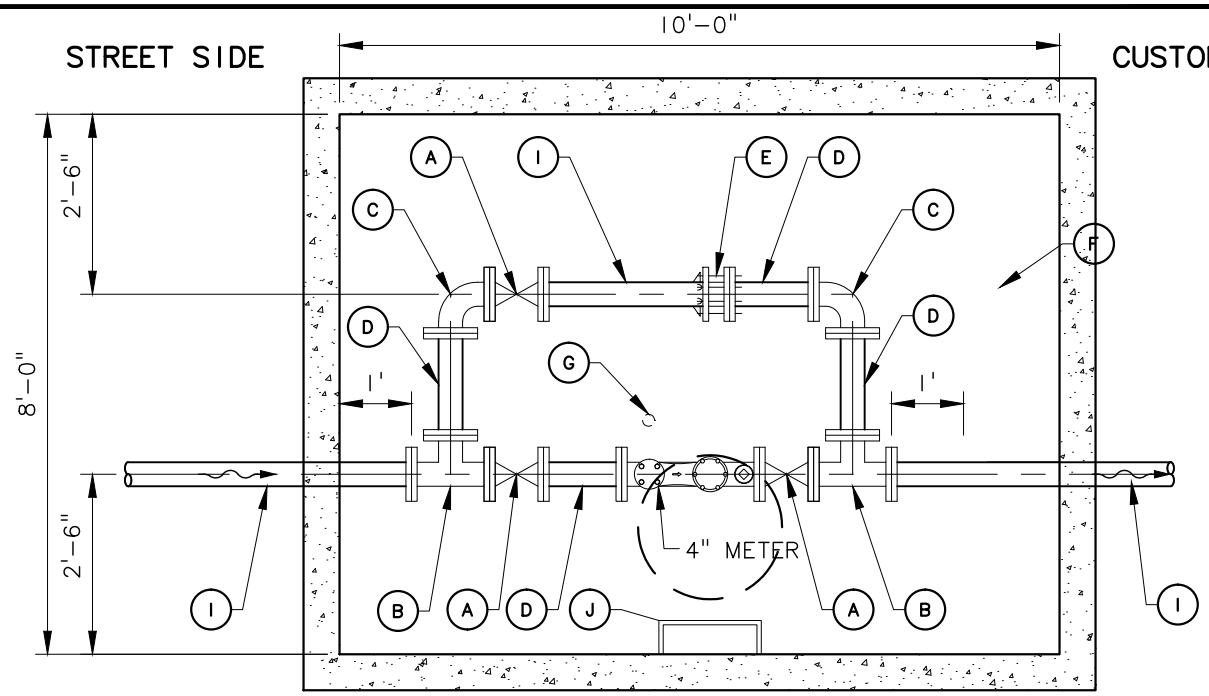
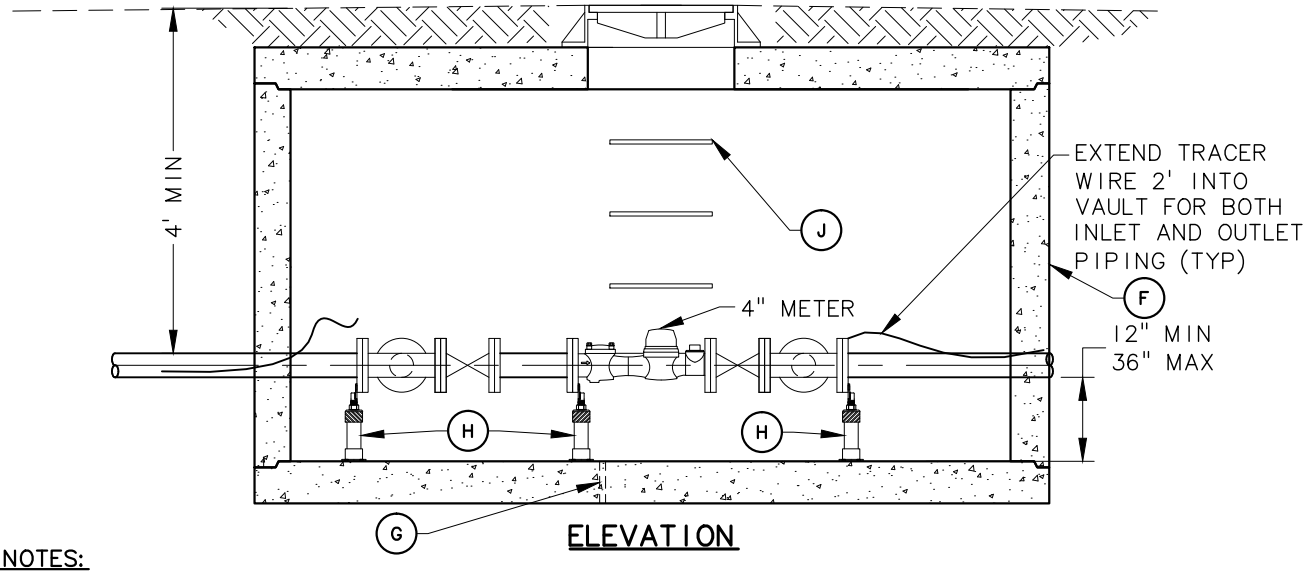


PLAN



ELEVATION

KEY NOTES:

- (A) 4" GATE VALVE, FLGxFLG W/ HANDWHEEL OPERATOR
- (B) 4" TEE, FLGxFLG
- (C) 4" DI 90° BEND, FLGxFLG
- (D) 4" DI PIPE, FLGxFLG LENGTH TO FIT, 6" MIN
- (E) 4" RESTRAINED FLANGE COUPLING ADAPTOR
- (F) WILBERT PRECAST UTILITY VAULT (6" MIN WALL AND 8" TOP THICKNESS) W/ OSHA APPROVED LADDER AND 24" MANHOLE COVER AND FRAME STAMPED WITH "WATER" OVER METER
- (G) WEEP HOLE
- (H) PIPE SUPPORT, SUPPORTING TEE, METER AND BYPASS
- (I) 4" DI PIPE, FLGxPE
- (J) LADDER

NOTES:

1. SEAL ALL OPENINGS IN VAULT WITH NON-SHRINK GROUT.
2. RESTRAIN PIPE OUTSIDE VUALT PER STD DWG 3-7A.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

WATER METER - 4"

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	3-16

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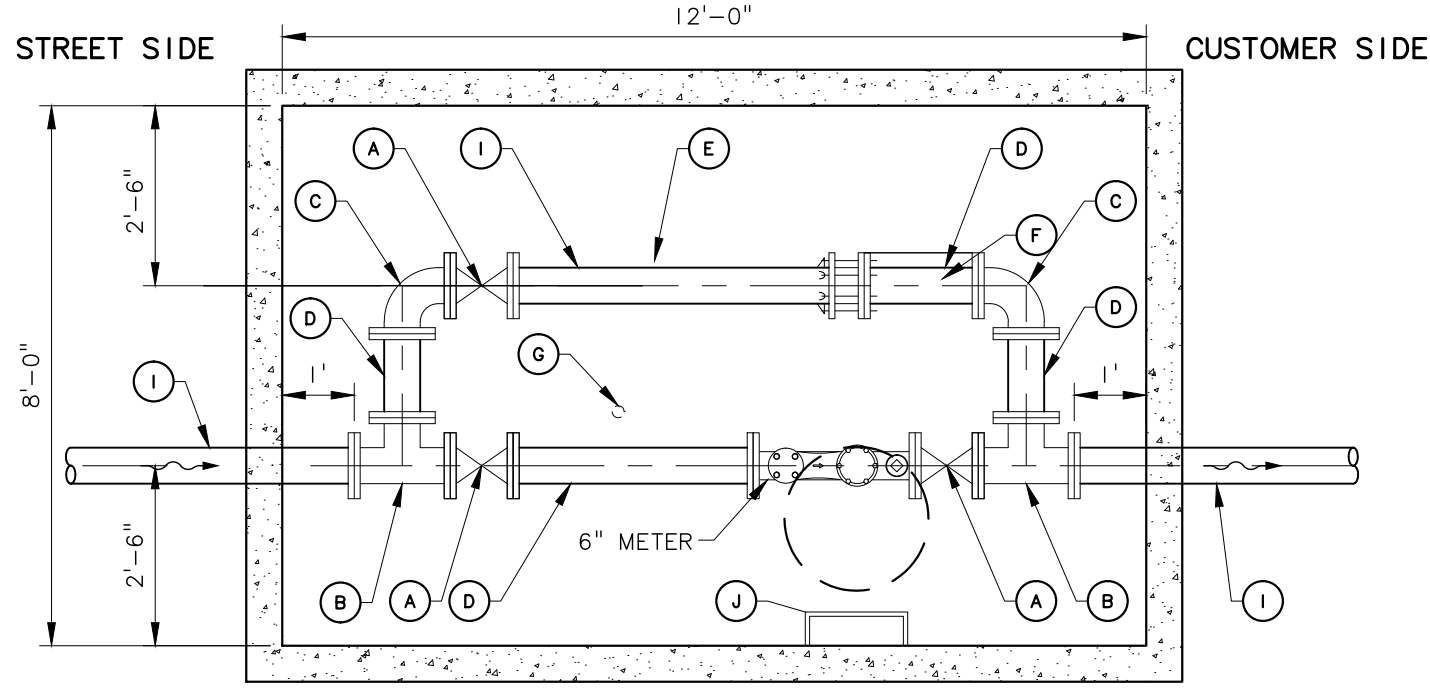
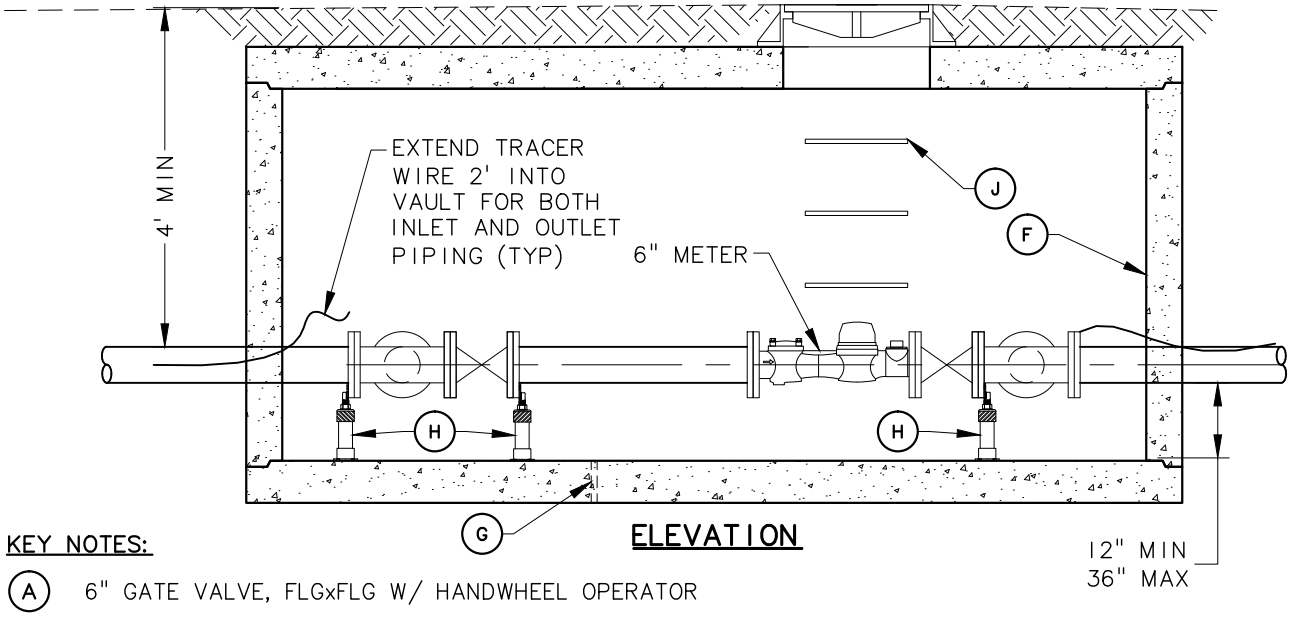


PLAN



ELEVATION

KEY NOTES:

- (A) 6" GATE VALVE, FLGxFLG W/ HANDWHEEL OPERATOR
- (B) 6" TEE, FLGxFLG
- (C) 6" DI 90° BEND, FLGxFLG
- (D) 6" DI PIPE, FLGxFLG, LENGTH TO FIT, 6" MIN
- (E) 6" RESTRAINED FLANGE COUPLING ADAPTOR
- (F) WILBERT PRECAST UTILITY VAULT (6" MIN WALL AND 8" TOP THICKNESS) W/ OSHA APPROVED LADDER AND 24" MANHOLE COVER AND FRAME STAMPED WITH "WATER" OVER METER
- (G) WEEP HOLE
- (H) PIPE SUPPORT, SUPPORTING TEE, METER AND BYPASS
- (I) 6" DI PIPE, FLGxPE
- (J) LADDER

NOTES:

1. SEAL ALL OPENINGS IN VAULT WITH NON-SHRINK GROUT.
2. RESTRAIN PIPE OUTSIDE VUALT PER STD DWG 3-7A.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

WATER METER - 6"

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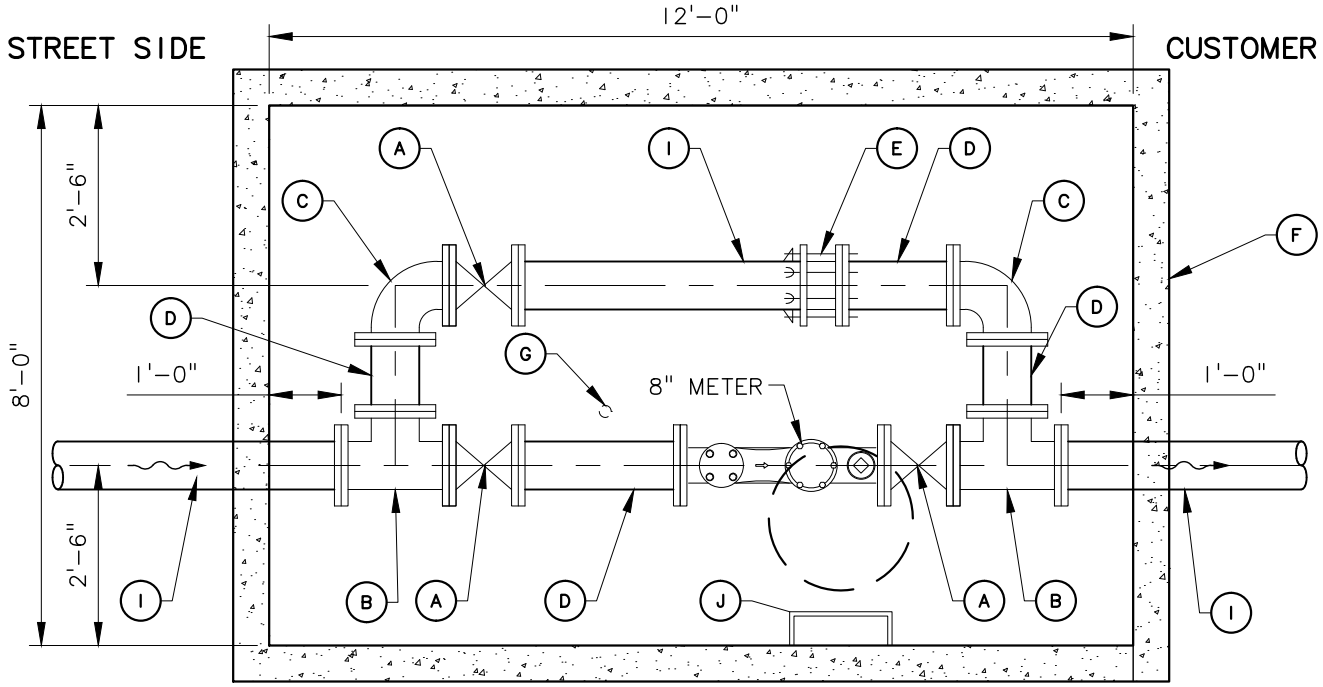

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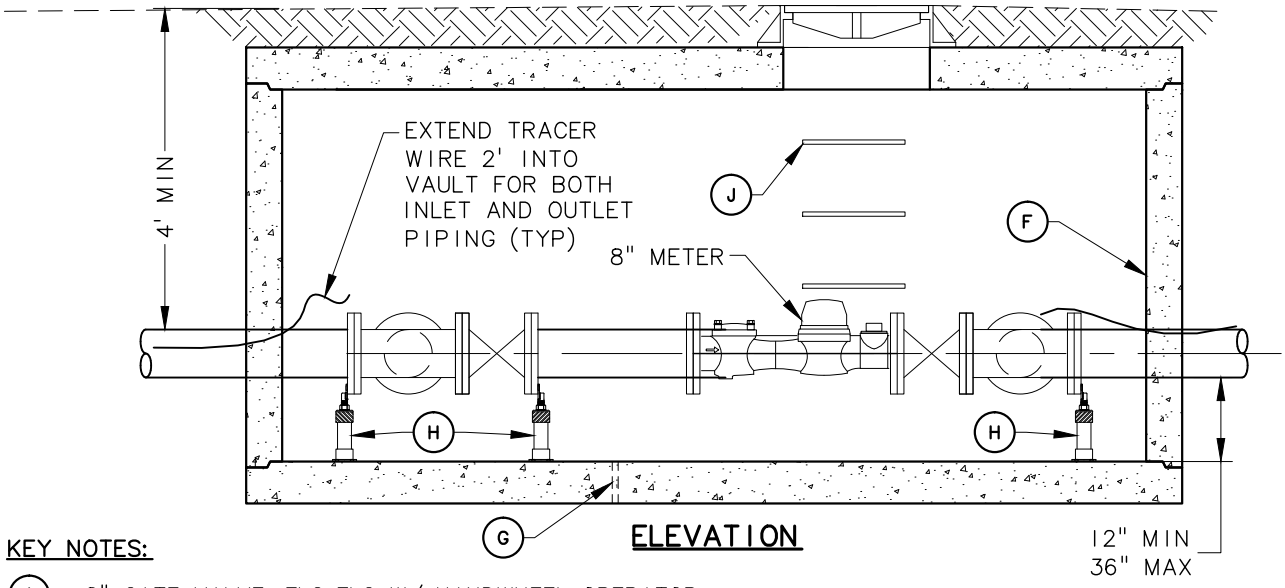

ELEVATION

KEY NOTES:

- (A) 8" GATE VALVE, FLGxFLG W/ HANDWHEEL OPERATOR
- (B) 8" TEE, FLGxFLG
- (C) 8" DI 90° BEND, FLGxFLG
- (D) 8" DI PIPE, FLGxFLG, LENGTH TO FIT, 6" MIN
- (E) 8" RESTRAINED FLANGE COUPLING ADAPTOR
- (F) WILBERT PRECAST UTILITY VAULT (6" MIN WALL AND 8" TOP THICKNESS) W/ OSHA APPROVED LADDER AND 24" MANHOLE COVER AND FRAME STAMPED WITH "WATER" OVER METER
- (G) WEEP HOLE
- (H) PIPE SUPPORT, SUPPORTING TEE, METER AND BYPASS
- (I) 8" DI PIPE, FLGxPE
- (J) LADDER

NOTES:

1. SEAL ALL OPENINGS IN VAULT WITH NON-SHRINK GROUT.
2. RESTRAIN PIPE OUTSIDE VUALT PER STD DWG 3-7A.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

WATER METER - 8"

REVISION DATE:	STD. DWG. NO.
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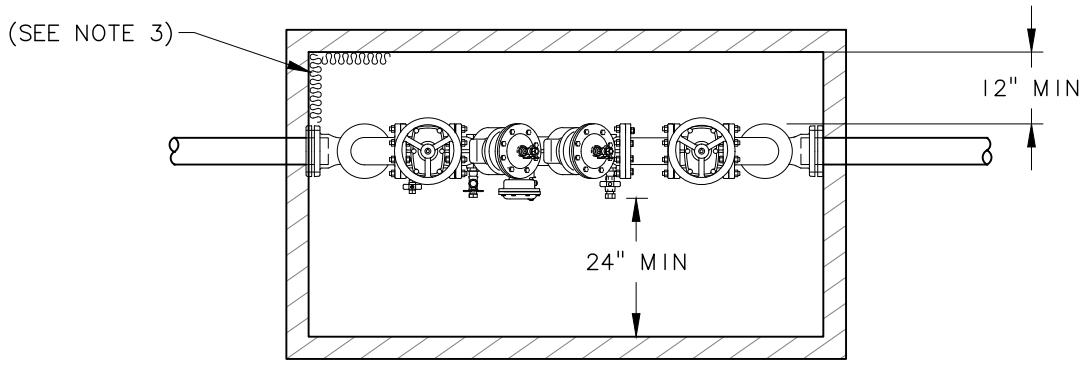

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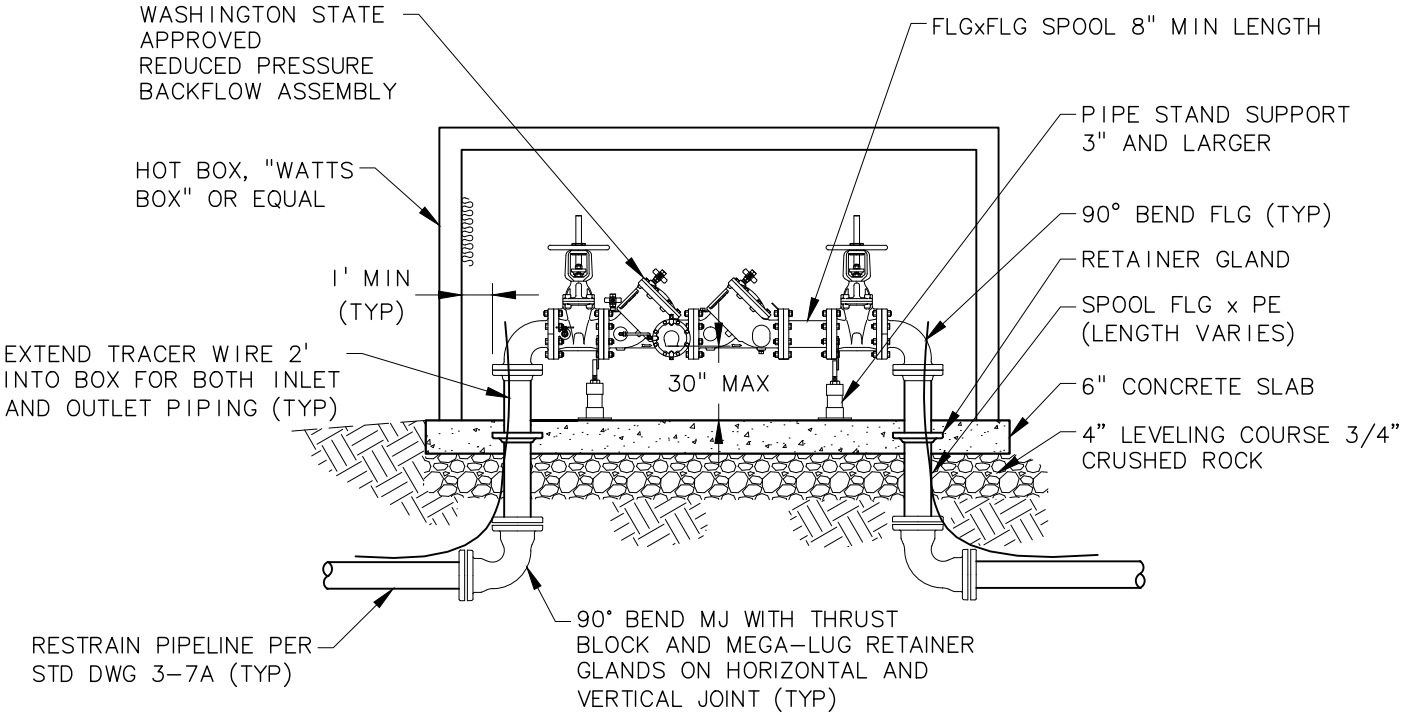

ELEVATION

NOTES:

1. REDUCED PRESSURE BACKFLOW ASSEMBLY SHALL BE INSTALLED HORIZONTALLY UNLESS APPROVED FOR OTHER ORIENTATION.
2. ALL CLEARANCES APPLY TO OUTSIDE AND IN-BUILDING INSTALLATIONS.
3. STRUCTURE TO BE INSULATED AND HAVE A HEAT SOURCE TO PROVIDE PROTECTION FROM FREEZING TO -30° F.
4. ENCLOSURE SHALL INCLUDE A DRAIN TO EXTERIOR CAPABLE OF DRAINING A FULL RELIEF VALVE DISCHARGE.
5. ALL ASSEMBLIES SHALL BE FLANGED.
5. SEAL ALL OPENING IN CONCRETE PAD WITH NON-SHRINK GROUT.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

REDUCED PRESSURE BACKFLOW ASSEMBLY - LARGER THAN 2"

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	3-19

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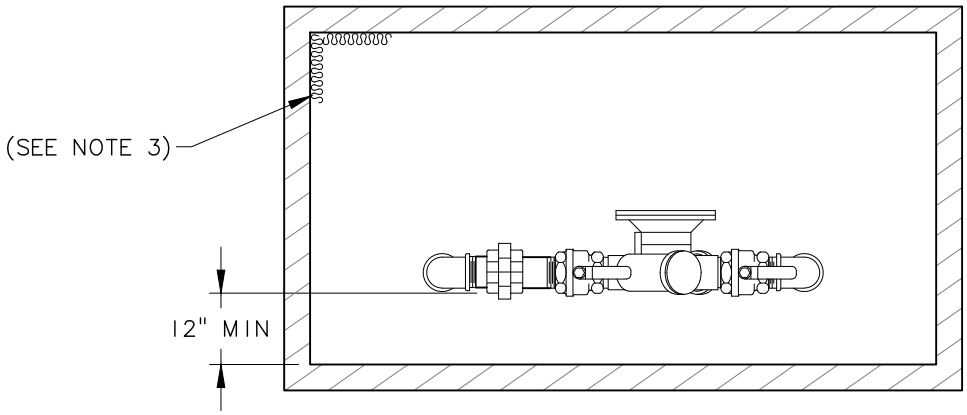

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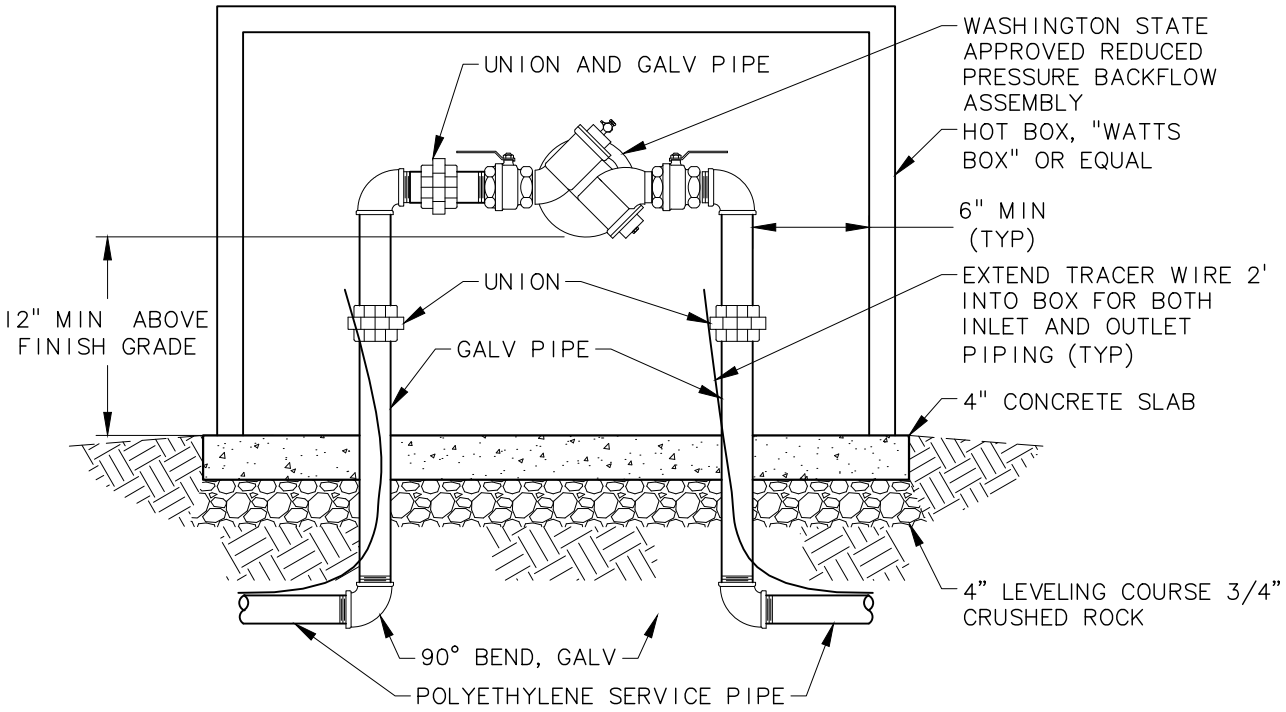

ELEVATION

NOTES:

1. REDUCED PRESSURE BACKFLOW ASSEMBLY SHALL BE INSTALLED HORIZONTALLY UNLESS APPROVED FOR OTHER ORIENTATION.
2. ALL CLEARANCES APPLY TO OUTSIDE AND IN-BUILDING INSTALLATIONS.
3. STRUCTURE TO BE INSULATED AND HAVE A HEAT SOURCE TO PROVIDE PROTECTION FROM FREEZING TO -30° F.
4. ENCLOSURE SHALL INCLUDE A DRAIN TO EXTERIOR CAPABLE OF DRAINING A FULL RELIEF VALVE DISCHARGE.
5. SEAL ALL OPENINGS IN CONCRETE PAD WITH NON-SHRINK GROUT.

PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

REDUCED PRESSURE BACKFLOW ASSEMBLY - 1" TO 2"

REVISION DATE:	STD. DWG. NO.
MAY 13, 2016	3-20

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