



Asotin County Public Utility District
1500 Scenic Way, Clarkston WA 99403

Dated: January 8, 2024

Project: 2023 Sewer Main Replacement Project

From: Craig Riehle, Director of Operations

ADDENDA NO. 2

The following changes, additions, and/or deletions are hereby made a part of the Bidding Requirements and Contract Documents. Bidders shall acknowledge receipt of this addenda in the Bid Form.

GENERAL

1. Reference the attached Pre-Bid Meeting Agenda and Minutes with sign-in sheet.
2. Reference the Bidder question-and-answer document.
3. A file sharing link for viewing sewer main CCTV has been shared to plan holders via email.

STANDARD TECHNICAL SPECIFICATIONS AND DRAWINGS

The attached Sections of the Standard Specifications and Drawings for Asotin County Public Utility District have been revised in response to Washington State Department of Ecology review and shall be hereby incorporated into the project. The Sections are attached for the Bidders Reference. A complete set of Standard Specifications and Drawings with changes will be reissued after the Bid Opening.

ATTACHMENTS

- Pre-Bid Meeting Agenda and Minutes.
- Pre-Bid Meeting sign in sheet.
- Bidder question-and-answer document.
- Revised STANDARD TECHNICAL SPECIFICATIONS AND DRAWINGS (Revised Sections Listed Below).
 - Revised Specification Section 020 Table of Contents
 - Revised Specification Section 200 PVC Pipe for Storm Drainage and Sanitary Sewer



- Revised Specification Section 210 Sanitary Sewer manholes and Cleanouts
- Revised Specification Section 230 Pipe Bursting
- Revised Specification Section 231 Cured-in-Place Pipe
- Revised Specification Section 240 Sewage Bypass Systems

A handwritten signature in blue ink, appearing to read "C. Riehle", positioned above a horizontal line.

Craig Riehle, Director of Operations
Asotin County Public Utility District

PRE-BID MEETING AGENDA

Client: Asotin County PUD

Project Name: 2023 Sewer Replacement

Meeting Description: Pre-Bid Meeting

Date and Time: January 4, 2024; 10:00 am PST

Location: Asotin Co PUD

Notes In Red

1. Introductions

- a. Sign-in Sheet
 - i. Virtual Attendees - send email to criehle@asotinpud.org
 - 1. Name, Organization, Phone Number, Email.
- b. Agenda Overview
- c. Introductions
 - i. Asotin County PUD (ACPUD)
 - ii. Consor

2. Bid Period Questions

- a. Sent in writing via email to:
 - i. Craig Riehle criehle@asotinpud.org
 - 1. Register with Craig for notifications

3. Bidding Highlights

- a. ACPUD Website: <https://asotinpud.org/resources/>
- b. Contract Documents include:
 - i. Bidding Documents
 - ii. Contract Forms
 - iii. Conditions of the Contract
 - iv. General Requirements
 - v. Standard Technical Specifications and Drawings
 - vi. Plan Drawings
 - vii. Appendices
- c. Qualifications of Bidders
 - i. General Contractor Experience
 - ii. Pipe Bursting Experience
 - iii. CIPP Experience
- d. All documents have been reviewed by the Washington State Department of Ecology and we have received initial comments.

- e. Addenda will be submitted to bidders describing changes to the standards. All changes made to the standards will be required on this project. Only responses issued via addenda are binding prior to bid opening. – There will be at least two addenda.
- f. Bid Security (ITB): 5% Bid Amount
- g. Submission of Bids
 - i. Mailed or delivered by hand, No Electronic Submission
- h. Schedule for Unit Price Work
 - i. Three Bid Schedules (A, B, C)
 - 1. ACPUD may award schedules as budget is available
 - ii. Contractor may bid as open cut or pipe bursting for schedules A and B
- i. Agreement
 - 1. Contract Times
 - a. NTP After March 1, 2024
 - b. Substantially Complete on or before September 1, 2024
 - c. Final payment on or before September 30, 2024
 - 2. Liquidated Damages
- j. EJCDC General Conditions and Supplementary General Conditions
- k. Washington Prevailing Wage
- l. Interlocal agreement between City of Clarkston and Asotin County PUD
 - i. Contractor submits payment application to PUD and City of Clarkston issues payment.
 - ii. Asotin County PUD is an authorized agent for the execution of the project.

4. Bid Timeline

- a. No timeline on the issuance of Addenda, however, please have all questions into the ACPUD by January 9, 2024.
- b. January 16, 2024, 2:00 p.m. local time, Bid Closing/Opening of Bids
- c. January 18, 2024, 2:00 p.m. local time, Apparent Low Bidder provides supplemental bidder criteria documents.

5. Project Description

- a. The work consists of three schedules replacing approximately 3,200 lineal feet of 6-inch and 8-inch gravity sewer through open cut and/or pipe bursting methods, replacement of approximately 1,000 lineal feet of 6-inch and 8-inch gravity sewer by open cut methods, and Cured-in-Place Pipe (CIPP) rehabilitation of approximately 1,300 lineal feet of gravity sewer. The project includes replacement or rehabilitation of various manholes throughout the project schedules.
- b. Schedule A: Pipe Bursting or Open Trench replacement of Sewerline on McCarroll Street from Highland Avenue to Chestnut Street
- c. Schedule B: Pipe Bursting or Open Trench replacement of Sewerline on Portion of Libby Street to University Street then University from Libby to Chestnut Street
- d. Schedule C: CIPP rehabilitation of Sewerline on the alley between 5th and 6th Street from Chestnut Street to Elm Street

6. Questions

- a. Online Caller: is there video of the pipe available in alley?
 - i. Yes. We also require pre- and post-construction video
 - ii. Timing of video: PUD to verify. Last 2-3 years
 - iii. Can they be made available? PUD: Yes. All schedules can be made available.
- b. Clarified where PVC is on Schedule A
- c. Previous point repairs – none known
- d. Age of existing - unknown
- e. Staging areas – none identified. Contractor responsibility
- f. Flexibility can be discussed about how to cover trenches over night
- g. Connections to MHs. Detail shows new pipe into MH. Is it possible to consider new pipe stub into MH and connect to new pipe burst pipe and make connections with coupling
 - i. Alternatives may be considered during construction.
- h. Concerns about reinstating lateral new connection same day as pull with pipe relaxation.
 - i. Consor understands the specified time for relaxation and service outage conflict and will review these specifications for a potential clarification.



Asotin County PUD
2023 Sewer Replacement
Thursday, January 4, 2024, 10:00 am

#	NAME	ORGANIZATION	PHONE NUMBER	EMAIL
1	Derek Johnson	Roach Construction	208-301-3289	rcr@roachconstruction.biz
2	Joaquin Guitron	Debco Construction	208-827-6767	jguitron@debcousa.com
3	Jim Moore	Hammerhead Trenchless	262-443-5197	jmoore@hhtrenchless.com
4	Seth Melton	Debco Construction	208 553 6784	seth@debcousa.com
5	Connor Shockman	Debco Construction	208-555-2105	connor@debcousa.com
6	Bradlee Roberts, (Virtual Attendee)	Insta-Pipe	206-265-0321	Brad.Roberts@irc-corp.com
7	Larry Pennock, (Virtual Attendee)	Devout Excavation, LLC	208-818-0951	lpennock@devoutexcavation.com
8	Chantal Evans, (Virtual Attendee)	Insituform Technologies, LLC	303-482-6178	cevans@aegion.com
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Asotin County Public Utility District
1500 Scenic Way, Clarkston WA 99403

Dated: January 8, 2024

Project: 2023 Sewer Main Replacement Project

From: Craig Riehle, Director of Operations

BIDDER QUESTION-AND-ANSWER

In the CIPP section 231-3.13 It states internal reinstatements need to be watertight. I just want to clarify that you are not asking for a T Liner or CIPP Connection of some sort. The CIPP does not bond to the host pipe so these connections without some sort of connection liner or injection grout are not considered watertight. Please advise. **We are not requiring anything other than cutting out the lateral coupon.**

Are the manhole for this project going to require waterproofing requirements? **The manholes in the project are not specified as watertight.**

Are there any current videos of the pipes that are to get CIPP Lined we can review? **Yes, a file sharing link will be sent to plan holders of all available videos in the project areas.**

**STANDARD SPECIFICATIONS AND DRAWINGS
FOR
ASOTIN COUNTY PUD**

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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
 - 1. 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.
 - 2. References herein to the “Orange Book” shall mean the most recent edition of the most recent edition of the State of Washington Department of Ecology Criteria for Sewage Works Design.

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 102 EXCAVATING, BACKFILLING, AND COMPACTING FOR UTILITIES, UTILITY CROSSINGS.
 - 3. Side Sewer Pipe (Sewer Laterals):
 - a. Pipe for side sewers may be PVC as specified herein or Schedule 40 DWV pipe, meeting the requirements of ASTM D1785.
- 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.
3. Side sewer pipe may also be joined by chemical welding or Fernco-style couplings.

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 black spray paint and removed from the job site before the end of the day.

3.3 SURVEY LINE AND GRADE AND SURVEY MONUMENT REPLACEMENT

- A. Refer to Section 102 – Excavating, Backfilling, and Compacting for Utilities, Part 3.2.

3.4 PRE-INSTALLATION OPERATIONS

- A. Location of Sewer Laterals
 1. Existing active sewer laterals shall be marked in the field. The CONTRACTOR shall work with the Asotin County PUD to assist in verifying the status (active or inactive) of any sewer laterals if there is uncertainty as to its status.

2. Where indicated on the Drawings, the CONTRACTOR shall provide dye testing to verify active laterals.
- B. Cleaning and CCTV
1. Clean the host conduit per Section 220, Sanitary Sewer Main Cleaning and TV Inspection, prior to commencing pipe bursting operations.
 2. Provide CCTV of the existing line per Section 220, Sanitary Sewer Main Cleaning and TV Inspection, and verify location of services.

3.5 PREPARATION

- A. Excavate trenches and prepare and maintain subgrade as described in Sections 100, 101, and 102; and as 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.

3.6 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:
 1. All new joints on the main line shall be gasketed. No joints in right-of-way, other than those for sewer laterals, 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.
 - 1. Where longitudinal slopes are 20% or greater, all pipe joints shall be restrained. Anchor blocks shall be used in conjunction with pipe joint restraint. Anchor blocks shall be 12 inches long and shall encase the pipe 12 inches thick at a minimum. Anchor blocks shall be placed 20 feet on center.
 - 2. On unpaved slopes 20% or greater, timber baffles/hill holders shall be required at a maximum spacing of 18 feet on center, and a minimum of one (1) timber baffle/hill holder per each pipe length.
- E. Lay pipe from the low end toward the high point. Provide a continuous, smooth invert. Bell holes shall be dug where necessary to ensure pipe lays flat 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 1/8 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 metal post four (4) feet long buried in the ground a depth of three (3) feet. The bottom end shall have a wood 2 by 4 inch post nailed to it to

prevent withdrawal of the post. 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 metal post. In addition, a length of 12-gauge tracer wire shall be provided to extend from the sewer main end of the side sewer and shall emerge at the 4-foot metal post, 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.
- N. 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.

3.7 PIPELINE INSPECTION

- A. General: All sanitary sewer lines shall be inspected by the use of a television camera before final acceptance. The sewer line 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:
 - 1. 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	No Standing Water

3.8 PIPELINE TESTING

A. General:

1. 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.
2. 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.
3. 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.
4. 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.
5. 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:

1. 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.

2. 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.
3. 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

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

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

Where:

D = diameter (in.)

L = length of pipe (ft.)

H = test head (ft.)

- d. 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

- a. 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.
- b. 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:

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

Where:

D = diameter (in.)

L = length of pipe (ft.)

H = test head (ft.)

- c. 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 for Sanitary Sewers Constructed of Air Permeable Materials

- a. 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.
- b. 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.

- c. 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.
- d. 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.
- e. Air shall be slowly supplied to the plugged pipe section until the internal air pressure reaches four (4) psig. At no point should the air pressure be allowed to exceed nine (9) psig. Wait at least two (2) minutes to allow for pressure and temperature stabilization to occur within the pipe.
- f. 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.

$$K = 0.0111 * d^2 * L$$

$$C = 0.0003918 * d * L$$

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

$K_T = K_1 + K_2 + \dots$ = sum of all K values

$C_T = C_1 + C_2 + \dots$ = sum of all C values

Table: Low Pressure Air Test for Air Permeable Materials
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

- g. 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.
 - h. Pipe over 30 inches in diameter shall be tested one joint at a time in accordance with ASTM C1103
4. Low Pressure Air Test for Sanitary Sewers Constructed of Non Air Permeable Materials
- a. Non air permeable materials include ductile iron, ABS composite, polyvinyl chloride (PVC), and polyethylene (PE). When non air permeable pipe is subjected to a low-pressure air test, all of the provisions of Section 200, Part 3.8 C.3. shall apply, except that the time in seconds for the pressure drop shall be equal to or greater than four times the required time calculated in Section 200, Part 3.8 C.3.
 - b. Pipe over 30 inches in diameter shall be tested one joint at a time in accordance with ASTM C1103.
 - c. Reaches of thermoplastic pipe containing no joints shall be exempt from testing requirements.

Table: Low Pressure Air Test for Non Air Permeable Materials
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	160	284	444	639	999	1439	1958	2557	3060	3400
150	240	426	666	959	1499	2040	2380	2720	3060	3425
200	320	568	888	1279	1700	2040	2380	2923	3699	4567
250	400	710	1110	1360	1700	2055	2797	3653	4624	5709
300	480	852	1133	1360	1713	2466	3357	4384	5549	6850
350	559	907	1133	1360	1998	2877	3916	5115	6474	7992
400	639	907	1133	1461	2283	3288	4476	5846	7398	9134
450	680	907	1142	1644	2569	3699	5035	6576	8323	10275
500	680	907	1269	1827	2854	4110	5594	7307	9248	11417
550	680	907	1395	2009	3140	4521	6154	8038	10173	12559
600	680	974	1522	2192	3425	4932	6713	8768	11097	13701

5. Deflection Testing for Flexible Pipe (Mandrel Test)

- a. If required by the Contract Documents, deflection test all flexible pipelines no sooner than 30 days after trench backfill and compaction is completed. Unless otherwise provided in the contract, the Contractor shall bear costs associated with completing surface repair or wither work prior to all required testing. The maximum allowable deflection is to be 5.0% of the nominal pipe diameter.
- b. Provide test mandrels with a diameter at least 95% of the actual inside diameter (ID) of the pipe. For pipes with controlled outside diameter, calculate the actual ID of the pipe by taking the average outside diameter (OD) as set by the ASTM standard and subtracting 2 times the minimum wall thickness as set by the ASTM standard. For pipes with control inside diameter, use the ID set by the ASTM Standard.
- c. Pull the appropriate mandrel through the pipe using one of the following methods:
 - 1) Pull the mandrel through the pipe by hand. If the pipe will not allow the mandrel to pass, repeat the test from the opposite direction to determine the limits of failure.
 - 2) As a part of the CCTV inspection, pull the mandrel through the pipe by connecting it in front of the CCTV camera lens at a distance equal to the camera's focal length. Notify Engineer of time and date of test at least 1 day (24 hours) prior to testing to allow for Engineer, at Engineer's discretion, to witness test. Provide tag line to reverse mandrel and camera should mandrel fail to pass through line. Perform test as a separate step

from the CCTV inspection thus a separate DVD record must be made of the mandrel test. Clearly mark DVD identifying project name, mandrel test. If the pipe will not allow the mandrel to pass, repeat the test from the opposite direction to determine the limits of failure.

- d. Uncover and, if required by the Engineer, remove and reinstall new pipe section for reaches with excessive deflection or recompact bedding if, in the opinion of the Engineer, existing pipe is not damaged. Retest pipe after any repair work is completed. Do not reinstall damaged pipe.
- e. Use a “Go-Nogo” pin gauge instead of a mandrel if “Insta-Tap” tee fittings are used for service connections. Use test diameter per 4.b above.
- f. The Asotin County PUD may conduct additional deflection testing prior to expiration of the warranty period. Uncover and reinstall sections of the pipe found to have excessive deflection. Do not reinstall damaged pipe.

6. Test Results

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

3.9 PIPE ABANDONMENT AND REMOVAL

- A. 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.

3.10 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.

3.11 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.

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.

1.2 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

1. 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 six (6) inches high. Total height of grade rings shall not exceed eight (8) inches high. Grout between and inside 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 a resilient connector conforming to ASTM C923 such as Kor-N-Seal, A-Lok, or approved equal.

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.
- C. Non-Shrink 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.
- D. 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.
- E. Exterior joint waterproofing for watertight manholes shall be “Bestseal Wrap” joint sealant from Bestfitt Gasket Co. or approved equal.
- F. Watertight manholes shall be a coal tar epoxy Bitumastic® 300M system as manufactured by Carbolite, Inc. or approved equal.
- G. 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 less than 8-inch shall not be installed into manholes unless otherwise shown on the Drawings or directed by the Asotin County PUD. Service connections that are 8-inch or larger shall be required to be installed into manholes and new manhole may be required. 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 13 feet outside the manhole wall, at grade and 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 core drilled into the existing manhole base and include a sand collar. 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.

3.8 MANHOLE ABANDONMENT AND REMOVAL

- A. 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 shall properly dispose of such items free of charge to the Asotin County PUD.

END OF SECTION

SECTION 230

PIPE BURSTING FOR GRAVITY SEWER AND STORM DRAIN

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. “Pipe Bursting” gravity sewer or storm drain pipe repair/rehabilitation method including materials, installation and testing.

1.2 REFERENCES

- A. ASTM F 714: Polyethylene Plastic Pipe Based on Outside Diameter
- B. ASTM D 1248: Polyethylene Plastics Molding and Extrusion Materials
- C. ASTM D57: Standard Practice for Heat Fusion Jointing of Polyethylene Pipe and Fittings
- D. ASTM D 3034: Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- E. ASTM D 3350: Extra High Molecular Weight, High Density Polyethylene Pipe
- F. AWWA C 906: High Density Polyethylene Pipe for Water Distribution

1.3 SUBMITTALS

- A. Submit the following information for ENGINEER’s review prior to work:
 - 1. Qualifications of the Pipe Bursting Contractor
 - a. Name, business address and telephone number of the Pipe Bursting Contractor including certification by the Pipe Bursting System Manufacturer that the Contractor is a licensed installer of their system, and the designated installer has been trained on the fusion equipment required for the Work.
 - b. Name(s) of all supervisory personnel to be directly involved with pipe bursting for the project.
 - c. Sign and date the information provided and certify that to the extent of his knowledge, the information is true and accurate, and that the supervisory personnel for the pipe bursting method will be directly involved with and used on the project. Substitutions of personnel and/or methods are not allowed without written authorization of the ENGINEER.

- d. The Pipe Bursting Contractor shall have experience with projects of similar size and complexity as this project, minimum of 10,000 feet of pipe bursting within the last 5 years, or otherwise allowed prior to bid acceptance. Experience shall apply if footage installed was of a diameter within two standard pipe sized of the proposed pipe, no smaller than six-inch diameter.

2. Construction Procedures

- a. Written descriptions of the construction method(s), materials, and equipment to be used and pit dimensions and locations required for equipment and material access.
 - b. Written descriptions of the construction method(s) and equipment to be used to penetrate blockages and/or partially collapsed sections of the host conduit. Such work to be accomplished without excavation from the surface unless written authorization is obtained from the ENGINEER for surface excavations to remove blockages.
 - c. Detailed descriptions of the methods of modifying existing manholes to accept bursting head and pipe.
 - d. Descriptions of methods for making a water-tight seal between new pipe and existing manholes.
- 3. Submit traffic control plans and obtain permits as required by local jurisdiction.
 - 4. Submit a sewage bypass plan that complies with Section 240, Sewage Bypass Systems

1.4 QUALITY ASSURANCE

- A. Quality assurance of the pipe shall include certified laboratory data confirming that the tests have been performed on a sample of the pipe provided or on pipe from the production run. Tests must show that satisfactory results were obtained prior to installation of the pipe.

1.5 WARRANTY

- A. The CONTRACTOR shall provide a warranty to be in force and effect for a period of one year from the date of final acceptance. The warranty shall cause the CONTRACTOR to repair or replace the new HDPE pipe should failure result from faulty materials or installation.

1.6 PROJECT RECORD DOCUMENTS

- A. Accurately record actual location of constructed pipelines and service reconnections in relation to existing permanent benchmarks.

- B. Submit drawing showing accurate dimensions, elevations, details of pipe and appurtenances including reconnection locations to the ENGINEER within 30 days of completion of the project.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Unload, store and load pipe and ancillary items in a manner which prevents shock, damage or excessive exposure to sunlight and weather.

PART 2 PRODUCTS

2.1 PIPE BURSTING EQUIPMENT

- A. Equipment for mainline pipe bursting equipment shall be either:
 - 1. Constant tension, variable speed winch and pneumatic hammer; or
 - 2. Static hydraulic system with use of steel rods. Systems using chain or cable are not allowed for mainline work.

2.2 PIPE SIZE, TYPE AND STRENGTH

- A. Comply with pipe size, type, and strength classifications indicated in the Contract Documents.
- B. Notify the ENGINEER if installation conditions, such as soils not matching conditions contemplated by the Contract Documents.

2.3 PIPE BURSTING PIPE

- A. Pipe for pipe bursting shall be Solid Wall High Density Polyethylene (HDPE) per the requirements of Section 303

2.4 SEWER LATERALS

- A. Unless otherwise indicated in the Contract Documents, service line replacement pipe to be PVC conforming to ASTM D 3034.
- B. Inserta Tee, or approved substitution.
- C. Heat Fusion weld saddle/tee may be used with ENGINEER approval.
- D. Size to match existing service line.

2.5 MANHOLE CONNECTIONS

- A. Kor-N-Seal manhole adapter or approved substitution.

PART 3 EXECUTION

3.1 NOTIFICATIONS/PERMITS

- A. Notify ENGINEER at least two working days (48 hours) in advance of mobilizing to a line segment for pipe bursting.
- B. Notify Local One Number Locator Service at least two working days (48 hours) in advance of any excavation.
- C. If access to provide property will be impacted, notify affected property owner(s) at least two working days (48 hours) in advance of mobilizing to a line segment for repair. Make suitable arrangements for property owner access to property.
- D. Obtain all necessary permits including right-of-way permits.

3.2 PIPE JOINING

- A. Prepare pipe per Section 303.

3.3 EXAMINATIONS

- A. Verify utility locations, existing piping locations, and structure where pipe bursting is to be made prior to beginning work. Notify the ENGINEER if field conditions are different from the Contract Documents. If necessary, allow 4 hours for the ENGINEER to modify the design without the Asotin County PUD incurring increased project cost.
- B. Verify that trench conditions and shoring, sheeting, and bracing protect workers and meet the requirements of OSHA.
- C. Examine Pipe and Fittings.
- D. Verify pipe, fittings and materials delivered to the site meeting the requirements of the Contract Documents.

3.4 SEGMENT MOBILIZATION/DEMOBILIZATION

- A. Place construction traffic control devices in accordance with the Traffic Control Plan.
- B. Move necessary equipment and materials to the site.
- C. After completion of pipe bursting, perform surface restoration, remove equipment and excess material from site. Dispose of any removed materials at the CONTRACTOR's designated disposal site. Provide final clean up of the site. Remove construction traffic control devices.

3.5 SEWAGE BYPASS SYSTEMS

- A. Prior to pipe bursting, implement bypass flow procedures in accordance with Section 240, Sewage Bypass Systems.

3.6 PRE-PIPE BURSTING OPERATIONS

A. Location of Sewer Laterals

1. Existing active sewer laterals shall be marked in the field for the sewer main section to be burst. The CONTRACTOR shall work with the Asotin County PUD to assist in verifying the status (active or inactive) of any sewer laterals if there is uncertainty as to its status.
2. Where indicated on the Drawings, the CONTRACTOR shall provide dye testing to verify active laterals.

B. Pre-Excavation of Sewer laterals

1. Conduct pre-excavation of sewer laterals only when specifically required in the Contract Documents.
 - a. Locate, excavate and expose all sewer laterals before pipe bursting operations commence.
 - b. Do not reconnect service to the replacement pipe until installation and testing are complete.

C. Existing Manholes

1. If the pipe bursting tool and the replacement pipe is to traverse any existing manhole which is to remain in-place without interruptions during the pipe bursting operation (as shown on the Drawings), open the conduit entrances and exits to the manhole to the required dimensions and modify the manhole invert before the pipe bursting operations commence.

D. Cleaning and CCTV

1. Clean the host conduit per Section 220, Sanitary Sewer Main Cleaning and TV Inspection, prior to commencing pipe bursting operations.
2. Provide CCTV of the existing line per Section 220, Sanitary Sewer Main Cleaning and TV Inspection, and verify location of services.

E. Point Repairs or Removal of Line Obstructions

1. Point repairs or removal of obstructions shall be performed by the CONTRACTOR where video inspections reveal heavy solids, dropped or offset joints, or collapsed pipe that cannot be removed by conventional sewer cleaning

equipment and may prevent the proper completion of the pipe bursting process. The work shall include verifying the location of the point repair, locating all interfering utilities, temporary flow bypassing, traffic control, excavation, shoring, dewatering, pipe repairs or replacements, connections to the existing pipe, backfilling and surface restoration. If such repairs are not previously indicated on the drawings or elsewhere in the contract documents, then the work will constitute extra work when approved by the ENGINEER.

F. Sags in Existing Sewer Mains

1. Sags in existing sewers are to be corrected by the CONTRACTOR and will be identified by the ENGINEER in the field. After the sewer has been cleaned and inspected using CCTV the ENGINEER will review the video and determine which portions of sewer main lines need sag removal. Sags will be remedied by the excavation around and removal of the existing host pipe in the vicinity of the sag. The new HDPE sewer pipe will then be routed through the open excavation thereby eliminating the sag. Once the new HDPE pipe is in place, bedding and backfill is to be placed under the pipe per Section 102.

G. Relief Pits

1. Where indicated on the Drawings, provide a relief pit by exposing crossing utilities to a depth of a minimum of 1-foot below the invert of the utility and support in accordance with purveyor requirements. Protect all utilities unless otherwise noted.

3.7 PIPE BURSTING OPERATIONS

A. General

1. Carry out operations in strict accordance with all applicable OSHA Local, and State Safety Standards.
2. Do not change any material, thickness, design values or procedural matters stated in the submittals, without the prior knowledge and approval of the ENGINEER.
3. At the receiving manhole, verify that the existing manhole can withstand the winching force needed for operation of the pipe bursting tool.

B. Pit Locations

1. If the locations of pits are shown on the Drawings, submit any proposed revisions to the planned locations and reasons for relocation to the ENGINEER for review, prior to construction. Include any appropriate sketches deemed necessary by the ENGINEER.

2. If pit locations are not shown on the Drawings, submit proposed locations and dimensions to the ENGINEER for review prior to construction.
3. Obtain all necessary permits for work on the final pit locations.

C. Staging

1. If not indicated on the Drawings, delineate the proposed staging areas and submit to the ENGINEER for review.
2. Secure required approvals and permits for assembly and storage of pipe materials in the staging areas.
3. Transport pipe materials to the job site and assemble as close to the work area as practicable. Provide protection to pipe if dragging more than 300 feet to the insertion point. Replace pipe that has been damaged in the opinion of the ENGINEER.

D. Operation of Pipe Bursting Machine and Installation of Replacement Pipe

1. Install the specific type of replacement pipe material in the locations as shown on the Drawings. Allow for expansion and shrinkage to provide the correct length of pipe from manhole to manhole.
2. Limit vibrations transmitted to the surrounding soils to a peak particle velocity at ground of 0.5 inches per second.
3. As the pipe bursting tool is advanced through the host conduit, advance the replacement pipe directly behind the tool to fill the void left by the fragmented host conduit.
4. Limit the length of continuous replacement pipe assembled on the surface and pulled into the insertion to a maximum of three hundred (300) feet, or provide countermeasures to reduce the amount of length the pipe is to be dragged, or provide calculations that show additional length can be installed without damage to the pipe or receiving manhole. When requested, provide measurement information to the ENGINEER documenting compliance with this requirement.
5. Fuse pipe segments together per ASTM D 2657 or use heat fusion coupling as approved by the ENGINEER.
6. Remove internal bead so weld is flush with pipe interior surface.

E. Connections to Manholes

1. Allow main line to acclimate to new temperature for a time recommended by the pipe manufacturer but not less than four hours prior to final finishing of manhole connections.

2. Connect replacement pipe to new manholes using a Kor-N-Seal manhole adaptor.
3. Grout any removed portions of the manhole barrel or invert that was removed to allow pipe bursting activities.

3.8 SEWER LATERALS

- A. Reconnect all active existing service lines, as indicated on the Drawings or as identified in CCTV taping, after the replacement pipe has been completely installed and tested.
- B. Allow main line to acclimate to new temperature for a time recommended by the pipe manufacturer but not less than four hours prior to reconnecting any service lines.
- C. Provide couplings as required to make a watertight connection between the tee and the service line. Refer to Section 200, PVC Pipe for Storm Drainage & Sanitary Sewer.

3.9 FIELD QUALITY CONTROL

- A. Testing
 1. General
 - a. Testing is required after the replacement pipe has been installed but before it has been sealed in place at the manholes and any service reconnections have been made. The Purpose of this test is to check the integrity of the joints that have been made and to verify that the replacement pipe has not been damaged during installation.
 2. Testing
 - a. After manhole-to-manhole section of the existing host conduit has been replaced, and prior to any service lines being connected to the replacement pipe, test pipe per Section 303.
 - b. If test fails, make necessary repairs and retest at no additional cost to the Asotin County PUD.

3.10 CLEANING AND SURFACE RESTORATION

- A. Upon completion of the pipe bursting operations, restore all areas disturbed by operations in accordance with the Drawings. If not specifically indicated, restore all areas to pre-project conditions.

END OF SECTION

SECTION 231

CURED-IN-PLACE PIPE

PART 1 GENERAL

1.1 SCOPE

- A. This section contains requirements for the materials, labor and equipment required to rehabilitate existing active sanitary sewer using cured-in-place pipe (CIPP). This section also contains other items required to accomplish the WORK (ie, bypass pumping, traffic control and public outreach).
- B. For CIPP design purposes; all existing pipe segments are assumed to be fully deteriorated and shall be rehabilitated as defined and directed by ASTM F1216 – 09, and treated with a Full Structural CIPP System.
- C. After installation of the liner, full and functional access shall be re-established at manholes. When complete, the liner shall extend from manhole to manhole.
- D. Prior to CIPP lining, the pipe shall be bypassed, cleaned and CCTV inspected to confirm segments that will require point repair of localized defects as noted in the DRAWINGS. All portions of existing pipe are to be provided with new pipe lining.
- E. The CONTRACTOR shall take measurements in the field to properly size diameter of pipe and liner and shall verify the length of the pipe prior to ordering the liner.

1.2 REFERENCES

- A. This Specification references ASTM International (ASTM) Standard Specifications, which are made a part hereof by such reference and shall be the latest edition and revision thereof. In case of conflicting requirements between this Specification and these referenced documents, this Specification shall govern.

1. ASTM:

- a. ASTM F412 – Definitions of Terms Relating to Plastic Piping Systems.
- b. ASTM D543 - Standard Test Method for Resistance of Plastics to Chemical Reagents.
- c. ASTM D638 – Standard Test Method for Tensile Properties of Plastics.
- d. ASTM D790 – Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

- e. ASTM D792 – Standard Test Methods for Density and Specific Gravity of Plastics by displacement.
- f. ASTM D883 – Definitions and Terms Relating to Plastics
- g. ASTM F1216 – Rehabilitation of Existing Pipelines and Conduits by Inversion and Curing of Resin-Impregnated tube.
- h. ASTM D1682 – Standard Test Method for Breaking Load and Elongation of Textile Fabric.
- i. ASTM F1743 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP).
- j. ASTM F2019 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP).
- k. ASTM D2122 – Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings.
- l. ASTM D2990 – Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics.
- m. ASTM D3567 – Standard Practice for Determining Dimensions of Reinforced Thermosetting Resin Pipe (RTRP) and Fittings.
- n. ASTM D5813 – Cured-in-Place Thermosetting Resin Sewer Pipe.
- o. National Association of Sewer Service Companies – NASSCO. Pipe Assessment and Certification Program (PACP).

1.3 DEFINITIONS

- A. Defect: A portion of a buried pipe that is defective and requires point repair. The ENGINEER and Asotin County PUD have identified defects for repair on the project DRAWINGS.
- B. Point Repair: A point repair is an attempt to repair a relatively localized defect. Point repairs identified in the DRAWINGS shall include the following WORK:
 - 1. Removal and replacement of pipe segments identified. The finished liner shall extend through each of the point repairs.

1.4 PACKAGING, HANDLING, SHIPPING, AND STORAGE

- A. The CONTRACTOR shall be responsible for the delivery, storage, handling, and installation of all materials for CIPP or point repair in accordance with the written manufacturer's requirements and recommendations.
- B. The CONTRACTOR shall exercise adequate care during transportation, handling, and installation to ensure the CIPP material is not torn, cut, exposed to direct sunlight or otherwise damaged or result in any public safety hazard. If any part or parts of the CIPP materials becomes torn, cut, or otherwise damaged before or during insertion, it shall be repaired or replaced in accordance with the manufacturer's recommendations and approval by the ENGINEER before proceeding further; and at the CONTRACTOR's expense.
- C. Onsite storage locations shall be approved by the ASOTIN COUNTY PUD and ENGINEER.

1.5 CIPP SYSTEM DESIGN CRITERIA

- A. The CIPP system design criteria shall be as follows:
 - 1. A Fully Deteriorated Pipe condition (per ASTM F1216-09, Appendix X1.1.2),
 - 2. Type III Classification (per ASTM D5813-04),
 - 3. Grade 2, or 3 (per ASTM D5813-04), the CONTRACTOR and CIPP system manufacturer shall recommend which Grade condition best suits the project or project segments.
- B. The CIPP structural requirements are as follows:

Property	ASTM Test Method	Polyester System	Filled Polyester System	Vinyl Ester System
Flexural Strength	D790	4,500 psi	4,500 psi	5,000 psi
Flexural Modulus (Initial	D790	250,000 psi	400,000 psi	300,000 psi
Flexural Modulus (50 yr)	D790	125,000 psi	200,000 psi	150,000 psi
Tensile Strength	D638	3,000 psi	3,000 psi	4,000 psi

- C. The required structural CIPP wall thickness shall be based on the physical properties of the cured composite and per the design of the Professional Engineer

and in accordance with the Design Equations contained in the appendix of the ASTM standards, and the following design parameters:

Design Parameter Table	
Host Pipe Condition	Fully Deteriorated
Design Safety Factor	2.0
Ovality (calculated from [X1.1 of ASTM F1216])	0 to 5% Measured Ovality Design for 6% 5 to 10% Measured Ovality Design for 10% Greater than 10% Measured Ovality provide repair to a maximum of 5%.
Soil Modulus	1,000 psi
Groundwater Depth	Ground Surface
Soil Depth (above crown of existing pipe)	Varies, see plans
Live Load	AASHTO HS-20 Highway
Soil Load	140 pcf
Minimum Service Life	50 years

1. The manufacturer must have performed long-term testing for flexural creep of the CIPP pipe material installed by the CONTRACTOR. Such testing results are to be used to determine the long-term, time dependent flexural modulus to be utilized in the product design. This is a performance test of the materials (tube and resin) and general workmanship of the installation and curing. A percentage of the instantaneous flexural modulus value was used in design calculations for external buckling. The percentage, or the long-term creep retention value utilized, will be verified by this testing; retention values exceeding 50 percent of the short-term test results shall not be applied. The materials utilized for the WORK shall be of a quality equal to, or better than, the materials used in the long-term test with respect to the initial flexural modulus used in the CIPP design.
2. The layers of the cured CIPP shall be uniformly bonded. It shall not be possible to separate any two layers with a probe or point of a knife blade so that the layers separate cleanly or the probe or knife blade moves freely between the layers. If the layers separate during held sample testing, new samples will be required to be obtained from the installed pipe. Any reoccurrence may cause rejection of the WORK.
3. Any layers of the tube that are not saturated with resin, prior to insertion into the existing pipe, shall not be included in the structural CIPP wall thickness computation.
4. The CIPP shall meet the chemical resistance requirements of ASTM F1216, Appendix X2, CIPP samples for testing shall be of tube and resin system similar

to that proposed for actual construction. It is required that CIPP samples, with and without plastic coating, meet these chemical testing requirements.

5. The hydraulic profile shall be maintained as large as possible. CIPP shall have a minimum of the full-flow capacity of the original pipe before rehabilitation. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition.

D. Approved curing methods:

1. Hot Water
2. Steam
3. Ultraviolet Light (UV)

1.6 SUBMITTALS

A. CONTRACTOR shall furnish data covering the CIPP system, design options and installation. Submittals shall be made in a timely manner so that the project schedule can be met. Submittals shall include the following:

1. Qualifications of the CIPP Manufacturer

- a. Company specializing in manufacturing the Products specified in this section with minimum 3 years' experience, or otherwise allowed prior to bid acceptance.
- b. Manufacturer: Company shall be ISO 9001 certified.

2. Qualifications of the CIPP Installer

- a. Name, business address and telephone number of the CIPP Installer including certification by the CIPP Manufacturer that the Contractor is a currently licensed installer of their system, and the designated installer has been trained on the fusion equipment required for the Work. Certification shall be provided to the ENGINEER before any materials are ordered.
- b. Name(s) of all supervisory personnel to be directly involved with CIPP replacement. A certified affidavit, signed by an officer of the CIPP system manufacturing company, shall be provided stating that the CIPP installer's on-site Field Superintendent has received proper training by the manufacturer for the UV, steam or hot water CIPP liner installation methods and procedures, as applicable. Certification shall be given to the ENGINEER before any materials are delivered to the job site.
- c. Sign and date the information provided and certify that to the extent of his knowledge, the information is true and accurate, and that the supervisory personnel for the pipe bursting method will be directly involved with and

used on the project. Substitutions of personnel and/or methods are not allowed without written authorization of the ENGINEER.

- d. Company shall have experience with projects of similar size and complexity as this project, minimum of 100,000 feet of installed CIPP product within the last 5 years, or otherwise allowed prior to bid acceptance. Experience shall apply if footage installed was of a diameter within two standard pipe sizes of the proposed pipe to be lined as part of this project.
 - e. Project Superintendent: Project Superintendent shall have a minimum of 5 years' experience as a Superintendent on CIPP projects and have supervised the installation of 50,000 feet of installed product within the last 5 years, or otherwise allowed prior to bid acceptance. Experience shall apply if footage installed was of a diameter within two standard pipe sizes of the proposed pipe to be lined as part of this project.
3. The CONTRACTOR shall submit the Vendor's specific technical data with complete physical properties of the liner and dimensions pertinent to this job including the type of tube material, resin and catalyst/hardener to be used; certification stating CIPP tube has been manufactured in accordance with ASTM F1216 (or ASTM F1743 or F2019 if applicable), and resin is suitable for its intended use. Prior to insertion, the CONTRACTOR shall provide data on the maximum allowable stresses, maximum pulling force (if pull-in-place method is used), and maximum elongation of the tube. Submittals shall detail short and long term properties (providing all supporting test data) of all component materials and construction and recommendations for material storage and temperature control, CIPP liner handling, insertion, curing, trimming and finishing shall also be provided.
 4. The CONTRACTOR shall submit structural design calculations for each CIPP liner segment (manhole to manhole) for fully deteriorated pipe condition to include size, the recommended thicknesses, resin types and mixes, field measurements, and assumptions used as the basis for calculations which demonstrate that the liner has been properly sized to avoid the creation of wrinkles or folds shall be provided. All calculations shall be signed and sealed by a Registered Professional Engineer in the state of Washington and submitted in duplicate to the ENGINEER at least 10 working days prior to the start of WORK.
 5. The CONTRACTOR shall take the necessary measurements in the field to properly size the liner and shall verify the length and diameter of the pipe to be lined prior to ordering the liner. The CONTRACTOR will be allowed access to the existing project structures 7 days after the Notice to Proceed is issued by the ASOTIN COUNTY PUD to verify pipe diameters. For bidding purposes, the CONTRACTOR shall assume that the nominal pipe diameter for estimating the size of the CIPP liner is as shown on the DRAWINGS.

6. The CONTRACTOR shall submit a certificate of "Compliance with Specifications" for all materials supplied.
7. The CONTRACTOR shall submit a site health and safety plan and a traffic control plan which provides for the passage of pedestrians and vehicles, and a bypass pumping plan before beginning any WORK.
8. The CONTRACTOR shall submit an installation access plan which includes access structures or manhole locations, a site plan sketch showing dimensions of access within WORK limits and utilities, approximate installation rate (ft/day), appropriate excavation/backfill/resurfacing procedures where applicable, and a schedule and timeline of CIPP activities identified by line segment.
9. The CONTRACTOR shall provide a delivery manifest for each CIPP liner delivered to the site with the following information:
 - a. The inversion location where the liner will be installed.
 - b. Provide the manhole numbers for either end of the installation.
 - c. If the CONTRACTOR has assigned an installation number provide that number as well.
 - d. Liner diameter, length and thickness.
 - e. Type and amount of resin.
 - f. Proposed curing method.
10. The CONTRACTOR shall submit copies of all appropriate construction permits.
11. The CONTRACTOR shall submit a work plan for acceptance. The WORK plan shall address the following:
 - a. Proposed WORK Schedule broken into major operations for each site.
 - b. Equipment schedule with hourly rental rates that define:
 - 1) The price per hour of the equipment while operating, without operator.
 - 2) The price per hour of the equipment in stand-by mode.
 - c. Personnel roster with
 - 1) Position
 - 2) Experience with CIPP or the assigned task
 - 3) Price per hour for the person including all overhead costs.

- d. Preparation steps required for pre-installation, installation, curing and clean up.
- 12. The CONTRACTOR shall submit information for approval of the procedure and the steps to be followed for the installation of CIPP pipe lining method selected. Any proposed changes in installation procedures shall require a submittal of revised procedures.
- 13. From Part 1.05 – CIPP Design Criteria, the CONTRACTOR shall submit engineering design calculations, in accordance with the Appendix of ASTM F1216 and the design criteria listed herein. CIPP wall thickness calculations and resin selections shall be submitted for each length of liner to be installed. These calculations shall be performed and certified by a, qualified Washington Registered Professional Engineer. All calculations shall include data that conforms to the requirements of these specifications.
- 14. The CONTRACTOR shall submit full technical data with complete physical properties for lining materials and resins and their properties, including, but not limited to, fabric tube, flexible membrane and coating, and raw resin data.
- 15. The CONTRACTOR shall submit a public information and notification program, including examples of information that shall be distributed to each property and an information delivery schedule that shall be coordinated with the construction schedule for each site.
- 16. The CONTRACTOR shall submit copies of NASSCO-PACP training certificates for employees performing the WORK.
- 17. The CONTRACTOR shall submit labeled inspection hard drive or DVD and inspection logs (NASSCO PACP format only) immediately following completion of CCTV inspection after cleaning prior to CIPP lining operations and again after completion of CIPP lining operations prior to removal of bypassing system for approval by the Asotin County PUD or ENGINEER. Information shall include all video files as well as still photographs of each significant defect encountered organized into individual folders by pipe segment. Label shall contain the following information:
 - a. Name of facility owner
 - b. Project title, project number, address and locations of inspections.
 - c. Pipe segments inspected including structure identification numbers and stationing.
 - d. Date of inspection.
 - e. Name of video inspection company.

- f. Reverse setups (if any).
- 18. The CONTRACTOR shall submit certification that staff to be used for the WORK is properly trained in confined space entry and hazardous atmospheres.
- 19. The CONTRACTOR shall submit a detailed quality control plan as specified herein.
- 20. The CONTRACTOR shall submit process control sheet including temperature/time log information and curing cycle, vendor certification of proper installation, and certified copies of test reports on CIPP coupons obtained during actual installation.
- 21. The CONTRACTOR shall submit proposed method and materials to be used to access and provide point repairs where required on the DRAWINGS.
- 22. The CONTRACTOR shall submit a detailed site specific bypass plan per Section 240.

1.7 RESPONSIBILITY FOR CONTROL OF GROUNDWATER

- A. CONTRACTOR shall control groundwater intrusion to ensure the proper install of the CIPP system and all appurtenances. Groundwater control is specified in the Dewatering Section(s).
- B. In addition to dewatering efforts the CONTRACTOR shall install a moisture barrier between the host pipe and the CIPP liner in the form of a Preliner Tube.
 - 1. The Preliner Tube shall prevent reduction in physical properties and contamination of the resin by water or other contaminants.
 - 2. The Preliner Tube shall prevent the CIPP resin from migrating to the exterior of the host pipe through cracks or holes in the host pipe.
 - 3. The Preliner Tube may be omitted from the project only from a Value Engineering analysis. Only the ASOTIN COUNTY PUD will be allowed to omit this requirement from the project. If the CONTRACTOR wishes to omit this from the project, the following must be submitted to the ASOTIN COUNTY PUD 10 working days prior to approval for consideration.
 - a. Reason for eliminating the Preliner Tube
 - b. Estimated cost savings to the project
 - c. Method the CONTRACTOR recommends to prevent groundwater from compromising the integrity of the liner or resin concentration.

PART 2 PRODUCTS

2.1 GENERAL

- A. Liner pipe shall be a resin-impregnated flexible felt tube that is inserted in one of the following ways:
 - 1. Hydro-statically inverted into place into the existing (host) sewer pipeline. Hydrostatic inversion is specifically required for inversion of the pipe. Curing shall be accomplished by circulating hot water or pressurized steam to cure the resin into a hard, impermeable, corrosion resistant pipe-within-a-pipe.
 - 2. Pulled in place into the existing (host) sewer pipeline with a winch and cable system. Prior to installation using this method a removable barrier shall be installed to protect the liner as it is pulled in place. The barrier shall not remain in place after the liner is installed. Curing shall be accomplished by exposing the interior of the liner to a UV emitting light train specifically designed to cure CIPP products. When installed using either of the above methods and cured, the finished pipe will be continuous, tight fitting against the interior wall of the existing sewer and will be a structurally stand-alone pipe capable of withstanding exterior loading and interior stresses.
- B. All materials provided by the CONTRACTOR for use in the CIPP installation process shall be equal to or exceed the requirements of Section 5 in ASTM F1216-09, as is applicable.
- C. CONTRACTOR shall be responsible for the control of all material and CIPP process variables required to provide the desired project results. The completed CIPP system shall provide to the ASOTIN COUNTY PUD the properties in ASTM F1216-09 applicable to this WORK.
- D. Other proposed liner products must be pre-approved by the ENGINEER. Alternate liner products will be considered if the liner meets the design SPECIFICATIONS contained in section 1.05 of this SPECIFICATION and the following are submitted to the ENGINEER for consideration 10 working days prior to bid opening:
 - 1. Liner manufacturer.
 - 2. Resin properties.
 - 3. Curing method.
 - 4. Installation method.
 - 5. Preliner availability.
 - 6. Advantages over the specified product.
- E. The ENGINEER or other designated representative shall be entitled to inspect CIPP lining and witness the CIPP manufacturing, preparation, and installation.

- F. The Preliner Tube shall be a reinforced plastic sheet formed to fit the host pipe being lined and shall be continuous from manhole to manhole. The Preliner Tube shall be a rated gas barrier for styrene.

2.2 MATERIALS

- A. Resins shall be tinted for visibility and provide positive indication of adequate liner wet-out. The resin systems for the rehabilitation of pipelines shall be a corrosion-resistant thermoset polyester resin and a catalyst system or epoxy resin and hardener that is compatible with the inversion process or a vinyl ester thermoset resin systems with catalyst system that is compatible with the installation process. The systems when properly cured shall meet the requirements of ASTM F1216-09 and ASTM D5813. The resin shall produce a CIPP that shall comply with structural and chemical resistance requirements of this specification. Resins should be appropriate for conditions encountered in a sanitary sewer environment. Resins should withstand the corrosive effect of residential, commercial, and industrial effluents, liquids, and/or gases common to sewers. Resins should be resistant to abrasion caused by solids, grit, aggregate, and/or sand.
- B. The woven tube (tube) shall consist of one or more layers of absorbent, flexible felt fabric. The layers may be woven or non-woven materials or a combination thereof, capable of carrying resin, able to withstand installation pressures, and hold up under curing temperatures and processes. The tube shall be sewn or spot-welded and shall be constructed to withstand installation pressures, have sufficient strength to bridge missing pipe segments, and stretch to fit irregular pipe sections. The seams of the tube must be leak free and stronger than the non-seamed felt. Seams in the tube shall be stronger than the non-seamed felt material. The CONTRACTOR shall verify the lengths in the field prior to ordering and prior to impregnation of the tube with resin, to ensure that the tube will have sufficient length to extend the entire length of the run. The CONTRACTOR shall also measure the inside diameter of the existing pipelines in the field prior to ordering the liner so that the liner can be installed in a tight-fitting condition.
- C. The outer layer of the tube before wet out (impregnation) shall be coated with an impermeable, flexible membrane that will contain the resin and facilitate monitoring of resin saturation during the resin impregnation procedures and to facilitate post installation inspection.
- D. The wet out tube shall have a uniform thickness that when compressed at installation pressures shall meet or exceed the design thickness. The tube shall be homogeneous across the entire wall thickness. No dry or unsaturated layers shall be evident. The wet out tube shall have a relatively uniform thickness that when compressed at installation pressures shall equal or exceed the calculated minimum design CIPP wall thickness. The outside of the tube shall be marked for distance at regular intervals along its entire length, not to exceed 5 feet. Such markings shall include the manufacturer name.

- E. The chemical resistance tests should be completed in accordance with Test Method D543. Exposure should be for a minimum of one month at 73.4 degrees Fahrenheit. During this period, the CIPP test specimens should lose not more than 20 percent of their initial flexural strength and flexural modulus when tested in accordance with Section 8 of ASTM F1216 or ASTM F1743, when subjected to the following solutions:

Chemical Solution	Tube Concentration (%)
Tap Water (pH 6-9)	100
Nitric Acid	5
Phosphoric Acid	10
Sulfuric Acid	10
Gasoline	100
Vegetable Oil	100
Detergent	0.1
Soap	0.1

- F. The tube shall be free from defects, such as, tears, holes, cuts, foreign materials, blisters, cracks, and other surface defects. The tube shall be homogenous across the entire wall thickness. No dry or unsaturated layers shall be evident.
- G. All materials used to cross traffic pathways are required to be traffic rated.

PART 3 EXECUTION

3.1 CONTRACTOR'S RESPONSIBILITIES

- A. Locate and designate all proposed manhole access points as necessary for the WORK.
- B. Provide water from designated and metered fire hydrants for cleaning, installation and other process related WORK items requiring water. CONTRACTOR shall comply with all Asotin County PUD connection and use requirements.
- C. Locate and mark all existing utilities in areas where excavation is to be performed prior to beginning any excavation. Protect utilities in place or relocate at no additional cost to the ASOTIN COUNTY PUD.
- D. CONTRACTOR shall conduct operations in strict accordance with all applicable Federal, State, City, and OSHA standards and shall secure the site for the working conditions in compliance with the same.
1. The CONTRACTOR shall submit a proposed safety plan, prior to beginning any WORK, identifying all competent persons. The plan shall include a description of a daily safety program for the job site and all emergency procedures to be implemented in the event of a safety incident. All WORK shall be conducted in accordance with the CONTRACTOR's submitted safety plan.

3.2 INSTALLATION ACCESS PLAN

- A. Submit an Installation Access Plan. Plan shall include:
 - 1. Proposed access/insertion pit locations.
 - 2. Site plan sketch showing dimensions of access within WORK limits and utilities.
 - 3. Limits of any excavation and other work that may be required for CIPP installation.
- B. Schedule and timeline of CIPP lining activities identified by line segment.

3.3 FIELD VERIFICATION OF DIMENSIONS

- A. The CONTRACTOR is responsible for field verifying the inside dimensions of the sewer and the lengths between access manholes/structures prior to ordering the flexible liner tube.

3.4 TEMPORARY FLOW DIVERSION AND BYPASS PUMPING

- A. CONTRACTOR shall provide for flow of sewage around the section or sections of pipe designated for repair. Bypassing operations shall be per Section 240.

3.5 CIPP THROUGH MANHOLES AND STRUCTURES

- A. Where shown on the DRAWINGS or otherwise designated, the CIPP shall pass through the manhole or concrete structure without interruption. In such cases, the top of the liner shall be removed in workmanship like manner and prepared for the integration into existing structure per the manufacturer's instructions.
- B. Where shown on the DRAWINGS or otherwise designated, the CIPP liner shall be terminated at the end of the host pipe. The CIPP liner shall be terminated per the manufacturer's instructions.
 - 1. If the structure is coated with a corrosion resistant liner, the CIPP liner shall be integrated into the manhole coating system as directed by the DRAWINGS or per the manufacturer's instruction to create a permanent seal between all surfaces and coating and lining systems.
 - 2. The CONTRACTOR shall integrate the liner end into the existing structure per the manufacturer's instruction to create a permanent seal between the liner and the structure surface.

3.6 NON-UNIFORMITY OF HOST PIPE

- A. The design for the sewer lining shall recognize the non-uniform cross section, deterioration of the host pipe, and the bifurcation which may be present at the springline of the pipe.
- B. No excessive internal pipe deformities, sharp edges or broken reinforcing shall remain in the pipe in preparation for CIPP operations.

3.7 CLEANING

- A. CONTRACTOR shall clean sewers per Section 220.

3.8 CCTV INSPECTION

- A. After cleaning, inspection of pipelines shall be performed by the CONTRACTOR using closed circuit television (CCTV) inspection techniques. See Section 220.
- B. If point repairs are required on the project, the CONTRACTOR shall re-inspect the interior of the pipe prior to commencing lining operations.
- C. Internal inspection data will be used by the CONTRACTOR, and verified by the Asotin County PUD or ENGINEER to determine any potential conflicts with the rehabilitation technique proposed for the project, including the following:
 - 1. Cleaning certification prior to rehabilitation
 - 2. Identification of pipeline condition and defects that make rehabilitation unsuitable and requires repair of the pipe.
 - 3. Establish/confirm the size and location of lateral sewers where a connection liner will be installed after pipe rehabilitation.
 - 4. Final acceptance of the WORK.
- D. After each pipe segment is cleaned and inspected, the CONTRACTOR shall notify the onsite representative (Asotin County PUD or ENGINEER) to confirm the information, review the footage and either give approval or give the CONTRACTOR direction as to what remains to be done to finish the cleaning for the subject pipe segment. The CONTRACTOR shall not be allowed to line a segment without the approval by all required parties.

3.9 POINT REPAIRS

- A. Defects: There are localized defects identified in the project DRAWINGS that are located within the pipe and require point repairs prior to commencement of CIPP operations.

- B. Method of Point Repair: All identified point repairs shall be excavated and the section of the main that is defective physically removed from service and replaced. See the Drawings for details, locations and pipe lengths.

3.10 SEALS

A. Manhole Connections

1. If the liner is installed through manholes, the top half of the CIPP liner shall be neatly cut off, the liner shall not be broken or sheared off. The remaining liner shall be transitioned to the existing structure bench/channel by filling any void spaces with non-shrink grout and sealed with corrosion resistant sealant. The transition shall be watertight, flexible and impervious to hydrogen sulfide.
2. In cases where the liner terminates at a structure the liner shall be transitioned to the existing structure channel by filling any void spaces with non-shrink grout and sealed with corrosion resistant sealant. The transition shall be watertight, flexible and impervious to hydrogen sulfide.

3.11 INSTALLATION

- A. Install in accordance with ASTM F1216, Section 7, or ASTM F1743, Section 6, with the following modifications for water or steam cured CIPP liners:
 1. The CONTRACTOR shall designate the location where the CIPP felt tube would be impregnated with resin ("wet-out"). Locations shall be subject to approval by the ENGINEER and applicable local agencies. The CONTRACTOR shall allow the ENGINEER to inspect the materials and "wet-out" procedure. If the "wet-out" location is not at the project site, the impregnated CIPP tube shall be transported to site under controlled environmental conditions. Transport vehicles shall include a tamper-resistant, sealed temperature-recording device which records the temperature of the liner at all times after leaving the wet-out site. The CONTRACTOR shall decide when to transport the impregnated CIPP tube to site and when to commence insertion with respect to weather conditions.
 2. The quantity of resin used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and the loss of resin through cracks and irregularities in the original pipe wall. A vacuum impregnation process shall be used to ensure thorough resin saturation throughout the length of the felt tube.
 3. Vacuum impregnation process is required. The point of vacuum shall be no further than 25 feet from the point of initial resin introduction. After vacuum in the tube is established, a vacuum point shall be no further than 75 feet from the leading edge of the resin. The leading edge of the resin slug shall be as near to perpendicular to the longitudinal axis of the tube as possible. A roller system

shall be used to uniformly distribute the resin throughout the tube. If the Installer uses an alternate method of resin impregnation, the method must produce the equivalent results. Any alternate resin impregnation method must be documented to the ENGINEER and Asotin County PUD's satisfaction that the saturation of the CIPP is sufficient.

4. The wet-out tube shall be positioned in the pipeline using inversion methods. The tube should be inverted through an existing manhole or approved access point and fully extend to the next designated manhole or termination point. There are to be no sections of pipe that are not lined.
 5. Prior to installation, and as recommended by the manufacturer, remote temperature gauges or sensors shall be placed inside the host pipe to monitor the temperatures during the cure cycle. At a minimum, temperature gauges shall be placed inside the tube at the invert level of each end to monitor the required temperatures during the cure cycle. Liner and/or host pipe interface temperature shall be monitored and logged during curing of the liner.
 6. The CONTRACTOR shall cap each end of the liner and use liner restraints in the manholes. The CONTRACTOR shall introduce water or air into the liner to inflate the liner until it has a tight fit against the inner walls of the host pipe producing dimples at lateral and side connections and flared ends at manholes. All hoses/pipes used for introducing water or air shall be ramped during the installation and curing process to allow for the ease of vehicular and pedestrian traffic. All hoses/pipes shall be color-coded for identification to prevent the use of hoses/pipes used for water conveyance are not used for wastewater conveyance or vice versa.
- B. Install in accordance with ASTM F2019 Section 6, manufacturer recommendations and the following for UV cured CIPP liners:
1. The CIPP liner shall make a tight-fitting seal with the existing pipe in the access structures. If the CIPP fails to make a tight seal, the CONTRACTOR shall apply a seal at that point using a sealant or caulking material that is compatible with CIPP materials, watertight, flexible and impervious to hydrogen sulfide.
 2. The finished CIPP liner shall be continuous over the entire length of an insertion run between two manholes and be free from visual defects such as foreign inclusions, dry spots, pinholes and delamination.
 3. The ultraviolet barrier that encases the CIPP liner may be considered a preliner.
 4. The liner shall be pulled into place per the manufacturer's recommendations. All point repairs shall be completed prior to installation so that there are no opportunities for liner to snag or get caught on protrusions and potentially damage the pipe.

5. The liner shall be inflated with air before curing with Ultraviolet light according to the manufacturer's specifications.
6. The CIPP liner shall be impregnated to meet the manufacturer's specifications with UV Curing Resins in the manufacturing facility prior to delivery to the site or installation. No onsite wet-out facility will be allowed. The CONTRACTOR shall allow the Asotin County PUD or ENGINEER to inspect the liner after delivery to the site and prior to installation.
7. The liner shall be inserted through existing structures. CONTRACTOR shall utilize a winch to pull the liner into place prior to curing. The winch shall be able to fully extend to the designated structure for attachment to the liner. The liner shall be inflated slightly per the manufacturer's specifications to facilitate insertion of the UV light chain. The liner shall be inspected with a camera mounted on the UV chain as it is pulled the entire length of the liner. The CONTRACTOR shall allow the Asotin County PUD or ENGINEER to view the inspection as it occurs.

3.12 CURING

A. HOT WATER CURING

1. CONTRACTOR shall use a flexible and impermeable calibration hose to inflate the tube. The calibration hose may or may not remain in the complete installation. Any dry tube or inflation hose material that enters the existing pipe that has not been previously vacuum impregnated with resin under controlled conditions cannot be included in the structural wall of the CIPP. The nominal thickness of this material shall be deducted from the field sample thickness measured in order to verify that the minimum specified wall thickness is achieved. Hose material remaining in the installation shall be compatible with the resin system used, shall bond permanently with the tube, and shall be translucent to facilitate post installation inspection. Hose materials which are to be removed after curing, shall be of non-bondable material. After the tube is inserted through the pipe section, the CONTRACTOR shall heat the water by circulating it through a boiler, where the hot water will cause the resin to cure.
2. The CONTRACTOR shall monitor the temperature of the tube liner during curing by remote temperature sensors placed at the interface of the existing pipe and the CIPP. A minimum of two temperature sensors shall be installed, one at either end of the length being lined. The curing process shall not be terminated until the temperature sensor readings indicate that a satisfactory cure has been completed. Any extended cure times shall not adversely affect the properties of the CIPP lining material.
3. Circulation water shall cool down to at least 100 degrees F for 1 hour before releasing the hydrostatic head.

4. The rate of temperature rise and fall during heating and cooling shall not exceed 2 degrees F per minute.
5. The water shall be evacuated from the pipe at a controlled rate to prevent negative pressure in the pipe. The water shall not be released until the water is at an ambient air temperature.

B. STEAM CURING

1. Steam source and air compressors are used to circulate the steam/air mixture through the pipe at a temperature recommended by the manufacturer causing the resin to harden.
2. The CONTRACTOR shall monitor the temperature of the tube liner during curing by remote temperature sensors placed at the interface of the existing pipe and the CIPP. A minimum of two temperature sensors shall be installed, one at either end of the length being lined. The curing process shall not be terminated until the temperature sensor readings indicate that a satisfactory cure has been completed. Any extended cure times shall not adversely affect the properties of the CIPP lining material.
3. The temperature of the air shall cool down to at least 140 degrees F for 1 hour before releasing air pressure. The outlet hose shall be equipped with a pressure regulating valve, temperature gauge, and pressures gauge.
4. After installation is completed, suitable heat source and water circulation equipment are required to circulate heated water throughout the pipe. The equipment should be capable of delivering hot water throughout the section to uniformly raise the temperature above the temperature required to effect curing of the resin. Water temperature in the line during the cure period should be as recommended by resin manufacturer. Once curing is complete, the CONTRACTOR shall cool the CIPP in accordance with approved CIPP manufacturer's recommendation.

C. ULTRAVIOLET CURING

1. After inspection and complete inflation to the manufacturer's specifications, the UV light bulbs will be activated. The curing shall commence at a rate specified by the manufacturer according to the total dimensions of the liner. The CONTRACTOR shall strictly adhere to the manufacturer's specified cure schedule.
2. As the light chain is pulled from one end of the liner to the other at a constant rate curing the liner, the equipment shall record all curing data in DVD format for the review and records of the Asotin County PUD.
3. Initial cure shall be deemed complete when the UV chain arrives at the initial insertion point.

3.13 REINSTATEMENT OF SERVICE CONNECTIONS

- A. Reinstatement of service connections shall consist of robotically cutting, brushing, and polishing the newly installed liner to allow sewer flows to resume through the service connection. No additional payment shall be made for reopening or providing satisfactory leak free piping connections and restoration from inside the pipe. The CONTRACTOR shall be responsible for all costs and liability associated with such reinstatement.
- B. It is the CONTRACTOR's responsibility to identify and ensure all active services are reconnected. CONTRACTOR shall be responsible for all damages caused by their failure to locate and properly restore all active service connections.

3.14 FINAL INSPECTION, TESTING AND ACCEPTANCE

- A. The rehabilitated pipeline with the newly installed CIPP liner and reinstated service laterals shall be cleaned in accordance with Section 3.07 of this SPECIFICATION. The cleaning shall be completed prior to the final inspection by CCTV per Section 3.08 of this SPECIFICATION. The post installation CCTV inspection shall be completed prior to flow being returned to the sewer. The finished product shall have no visual and material defects, infiltration, no defects in smoothness and continuity, except where anticipated by the precondition of the existing pipe and the installation of point repairs and service lateral reconnections. The finished product shall be free of pinholes and reasonably free of folds and wrinkles. The chemical and physical properties of the finished product shall meet or exceed the requirements of applicable ASTM values. The wall thickness of the sample shall be in accordance with ASTM F1743, Paragraph 8.1.6.
- B. If the groundwater level is above the top of the pipe throughout the length being reconstructed, an infiltration test shall be performed. If, at any time prior to expiration of the correction period stipulated in the General Conditions, CONTRACTOR shall locate the leaks and make repairs as necessary to eliminate the infiltration. All visible infiltration shall be eliminated.
- C. In the absence of groundwater, an exfiltration test shall be performed. The allowable rate of exfiltration shall be equal to the limits of infiltration.
- D. Acceptance of the installed liner shall be based on the post-construction video inspection per Section 3.08 of this SPECIFICATION. If repairs are required after viewing the post installation video, the CONTRACTOR shall re-video the segment after repairs are made before final acceptance will be granted.
- E. Correction of failed liner deemed defective from post-installation CCTV inspection shall be repaired at no extra cost to the Asotin County PUD. Method of repair shall be submitted by the CONTRACTOR and approved by the ENGINEER and Asotin County PUD prior to the WORK being performed.

3.15 SURFACE RESTORATION

- A. All surfaces and disturbed areas shall be restored to a condition equal to or better than it was prior to the CONTRACTOR's construction operations. Restoration standards shall be governed by these project documents, the See Asotin County PUD Standard Drawings.

3.16 CLEAN-UP

- A. Upon acceptance of the installation WORK and testing, CONTRACTOR shall restore the project area affected by the operations to a condition at least equal to that existing prior to the WORK.

END OF SECTION

SECTION 240

SEWAGE BYPASS SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Sewage bypass control systems.

1.2 SUBMITTALS

- A. Submit a sewage bypass plan to the ENGINEER for review prior to the preconstruction meeting. The Plan shall include a description and details of the system, product data on all equipment to be used, and capacity of pumps (if used), intended bypass locations, when system will be required in the work sequence, noise mitigation per local ordinances, and duration the system will be online.
- B. Submit a contingency plan in case of primary system failure and emergency notification protocols. A spill response plan shall be prepared and submitted for ENGINEER review. Include operation/maintenance plan of equipment, screenings, and fueling.
- C. Proposed methods to notify the Asotin County PUD, impacted property owners, affected agencies, and the ENGINEER 48 hours prior to commencing sewage bypass operations.
- D. ENGINEER will review the plan for sewage bypass operations and/or diversion prior to commencing sewage bypass pumping and/or diversion. The CONTRACTOR shall keep the latest plan on site at all times.

1.3 RESPONSIBILITY FOR OVERFLOWS AND SPILLS

- A. It shall be the responsibility of the CONTRACTOR to schedule and perform the WORK in a manner that does not cause or contribute to incidence of overflows or spills of sewage from the sewer system.
- B. In the event that the CONTRACTOR's WORK activities contribute to overflows or spills, the CONTRACTOR shall immediately take appropriate action to contain and report spillage immediately to the Asotin County PUD and Washington State Department of Ecology, isolate area from the public, and employ remediation procedures, such as stop the overflow, cleanup the spillage, and disinfect the area affected by the spill.
- C. The CONTRACTOR shall be fully responsible for any damage to public or private property, or costs incurred by the property owner due to sewer backups and overflows.

PART 2 PRODUCTS

2.1 FLOW CONTROL SYSTEM

- A. The flow control system shall provide adequate capacity and size to handle existing flows plus additional flows that may occur during periods of rainstorm. Capacity of the system shall be at least 100 percent of the peak flow and as additionally required based upon flow conditions. Capacity shall be determined for pipes and pumps by using a velocity of no more than 10-feet per second.
- B. Flow control systems receiving flows downstream of a lift station shall be sized for the lift station flow as well as the peak flow anticipated.
- C. The following data is provided for information and is based on estimated flow data for the project provided by the Asotin County PUD. The flow data is not guaranteed for accuracy. Use of this flow data in no way relieves the CONTRACTOR from their responsibilities for design, construction and operation of an adequately and properly functioning bypass system. All values are in gallons per minute.

Table: Flow Control System required flow Rates (gpm)

Slope (ft/ft)	Nominal Pipe Diam. (in)					
	6	8	10	12	15	18
0.002	45	97	176	286	519	844
0.004	64	137	249	405	734	1193
0.006	78	168	305	496	899	1462
0.008	90	194	352	572	1038	1688
0.010	101	217	394	640	1160	1887
0.012	110	238	431	701	1271	2067
0.014	119	257	466	757	1373	2233
0.016	128	275	498	810	1468	2387
0.018	135	291	528	859	1557	2532
0.020	143	307	557	905	1641	2669
0.022	150	322	584	949	1721	2799
0.024	156	336	610	992	1798	2923
0.026	163	350	635	1032	1871	3043
0.028	169	363	659	1071	1942	3158
0.030	175	376	682	1109	2010	3268
0.032	180	388	704	1145	2076	3376
0.034	186	400	726	1180	2140	3480
0.036	191	412	747	1214	2202	3580
0.038	196	423	767	1248	2262	3679
0.040	202	434	787	1280	2321	3774
0.042	207	445	807	1312	2378	3867
0.044	211	455	826	1343	2434	3958
0.046	216	466	844	1373	2489	4047
0.048	221	476	862	1402	2542	4134
0.050	225	485	880	1431	2595	4220

D. Plugs shall conform to the following minimum requirements:

1. Plugs shall have taps for connection of pressure gauges and air hoses and flow-through capability.
2. For pipe diameters of 24-inches and smaller mechanical plugs with rubber gaskets or pneumatic plugs with rubber boots shall be used.
3. For pipe diameters larger than 24-inches inflatable bag stoppers made in two or more pieces shall be used as manufactured by Lansas or Cherne Industries, no equal.

E. Bypass piping shall be restrained joint high-density polyethylene (HDPE) and shall meet the following criteria:

1. All piping shall be leak free.

2. All fusion joints shall meet the requirements of Section 303 including but not limited to fusion logging and approvals prior to use.
 3. Pressure rating at least 1.5 times the design operating pressure.
 4. Temporary HDPE pressure bypass piping shall meet ASTM D3350 and be a minimum SDR of 32.5. Joints shall be fully butt-fusion welded in accordance with ASTM 2026 and as specified in specification Section 303. All joints shall either be flanged or butt welded. Air valves shall be installed as required.
 5. Piping may be reused for subsequent flow bypass pumping system placements. The Asotin County PUD or ENGINEER, at their sole discretion, shall have the right to reject sections deemed unserviceable or AT RISK.
- F. Bypass pumps shall be fully automatic, self-priming units and shall conform to the following minimum requirements:
1. Open impeller design with the ability to pass minimum 3-inch-diameter solids.
 2. Able to run dry for long periods of time to accommodate cyclical nature of flows.
 3. The engine shall be equipped to minimize noise. All pumps shall be sound attenuated and provided with noise barricades as required. Noise levels shall comply with the local noise control ordinance. Noisy portable equipment, such as generators or compressors, shall be located as far away from sensitive noise receptor areas as practicable (sensitive noise receptors are defined as occupied buildings with windows or doors facing the site). Noise barriers shall be constructed around noisy stationary construction equipment such as compressors or generators that have to be utilized at locations near (within 100 feet of) sensitive noise receptors as defined above. Idling equipment not actively utilized for extended periods of time shall be shutoff.
 4. Backup pumping capacity shall be provided. 100% full redundancy of the pumping capability will be required. The backup pumps shall be fully installed, operational, and ready for immediate use.
 5. CONTRACTOR shall provide one dedicated fuel tank for every single pump if fuel driven pumps are used. CONTRACTOR shall provide a fuel level indicator outside each fuel tank. CONTRACTOR shall provide an emergency standby power generator if electric power driven pumps are used.
- G. The CONTRACTOR shall employ methods and procedures that mitigate the generation and discharge of objectionable odors to the surface environment at all times.
1. The CONTRACTOR shall add ferric chloride or approved equal to the wastewater flow upstream of bypass pumping operations to reduce odor. The

CONTRACTOR shall make his own determination of flow characteristic for required dosing.

2. The CONTRACTOR shall add the ferric chloride or approved equal from a location upstream that will allow 10 to 15 minutes reaction time before the flow enters the WORK area. The chemical dosing shall reduce odors generated from the wastewater stream to a level acceptable to the Asotin County PUD. If this is not accomplished by adding the ferric chloride only, an additional control may be required. If odors are still unacceptable after addition of ferric chloride, the CONTRACTOR may also add hydrogen peroxide or approved equal. The CONTRACTOR shall add hydrogen peroxide downstream to the flow that has been dosed with ferric chloride. The Hydrogen peroxide shall be added to allow a 5-minute reaction time before flow enters the WORK area. Any dosage combination of the two chemicals may be used to ensure continuous control of odors acceptable to the Asotin County PUD.

PART 3 EXECUTION

3.1 NOTIFICATIONS/PERMITS

- A. Notify ENGINEER at least two working days (48 hours) in advance of mobilizing to commence sewage bypass system or as specified in the Contract Documents.
- B. Notify Local One Number Locator Service at least two working days (48 hours) in advance of any excavation that may be required.
- C. If access to provide property will be impacted, notify affected property owner(s) at least two working days (48 hours) in advance of mobilizing. Make suitable arrangements for property owner access to property.
- D. Obtain all necessary permits including right-of-way permits.

3.2 PREPARATION/DEMONSTRATION

- A. Design, manage, and monitor a sewage bypass control system to adequately and continuously convey all wastewater flows during construction and maintain full functionality of upstream and downstream sewer collection sewers and service lines.
- B. Implement contingency plans as required.
- C. Prepare all necessary diversions and modifications in accordance with the submitted sewage bypass plan as specified in the Contract Documents.
- D. Provide independent temporary power sources for sewage bypass pumping equipment. Provide all necessary temporary electrical service to machinery and provisions for backup power generation. Provide personnel to operate and maintain system function throughout the bypassing period. Provide all temporary lighting,

safety control systems, and noise mitigation per local ordinances or as specified in the Contract Documents.

- E. If discharging to new downstream sewers, verify that they have passed leakage testing and are approved for receiving wastewater flows. Verify with the Asotin County PUD that downstream facilities have the capacity to received discharges.
- F. Bypass of sewage shall be in enclosed piping leak-tested prior to implementation. Wastewater is not permitted to flow in open trenches. Temporary gravity flow diversions through structures with partial pipes and/or baffles with concrete channels are permitted.
- G. Install discharge piping in a manner to provide safe and reliable service, without disrupting public access and incorporation with the Traffic Control Plan. Maintain access to businesses and residences.
- H. Notify affected property owner(s) of impending sewer service interruption, unless otherwise approved by the ENGINEER limit service interruptions to less than two (2) hours.

3.3 SEWAGE BYPASS CONTROL SYSTEM

- A. All materials and equipment used to control and/or divert flow, including, but not limited to pumps, plugs, and pipes, shall be designed and made of materials compatible with and capable of handling sewage flows without leaks or contamination of surrounding soils or surface property.
- B. The CONTRACTOR shall operate the sewage bypass control system during hours of operation defined in the Contract Documents.
- C. Bypass control systems shall not surcharge or in any way affect the full operating capacity of the upstream or downstream sewers, pressure sewers, or other collection system components. Surcharging shall be defined as depth of flow above the pipe crown.
- D. The bypass system pumping systems shall have a high levels switch to initiate a local horn and emergency light or beacon.
- E. The CONTRACTOR shall take all necessary precautions, including constant monitoring of the sewage bypass system pumping equipment, to ensure that the sewage bypass systems operations properly. The sewage bypass pumping system shall not be left unattended. The CONTRACTOR shall be liable for all cleanup, damages, and resultant fines, caused by sewage bypass system spills or inadequate system performance.
- F. Implement contingency plans for equipment or power failure and unexpected flow conditions. These plans shall be provided to the ENGINEER prior to operation.

- G. Provide a secondary, standby bypass system if utilizing a pumping system for sewage bypass. The secondary bypass system shall consist of a trailer-mounted unit sized for peak flow that starts automatically upon a high-level alarm in the primary bypass system. The secondary bypass system shall have an independent power supply.
- H. Implement all necessary diversions and modifications in accordance with the submitted plan.

3.4 MONITORING

- A. The CONTRACTOR shall provide personnel to completely and continuously monitor sewage bypass pumping, both upstream and downstream of the reach under construction in addition with an alarm/phone dialer. Bypass pumping at night will be allowed in most circumstances unless permitting agencies disapprove.
- B. Install temporary plug or approved materials to divert all flows, and isolate downstream existing piping.
- C. Monitor flow levels in the pipeline to ensure no backup occurs to unacceptable levels such as flooding basement floor drains. The CONTRACTOR is responsible for any damage resulting from backup flow.

3.5 SEQUENCING AND SCHEDULING

- A. The CONTRACTOR shall secure written approval from the Asotin County PUD a minimum of two days (48 hours) prior to implementing each stage of sewage bypass.

3.6 TERMINATION

- A. Remove equipment and appurtenances upon termination of sewage bypass control activities and restore disturbed areas to original condition.

END OF SECTION

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