SECTION 33 30 00 – SANITARY SEWERAGE UTILITIES

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. The work under this section shall consist of providing all work, materials, labor, equipment, and supervision necessary to provide for the sanitary sewer work required in these specifications and on the drawings.

1.02 RELATED SECTIONS

A. Division 1 Specification Sections.

B. Specification Section 31 20 00 – EARTHWORK

C. Specification Section 31 23 19 – DEWATERING

D. Specification Section 31 25 00 – EROSION AND SEDIMENT CONTROL

E. Specification Section 32 12 00 – FLEXIBLE PAVING

1.03 REFERENCE STANDARDS

A. Technical specifications, design details, construction details and materials shall conform to the following reference documents:

1. Sanitary Sewer Design Standards, City of Marysville, April 1997, Revised May 2007.

2. Standard Specifications for Road, Bridge and Municipal Construction, WSDOT/APWA, latest edition.

3. Standard Plans for Road and Bridge Construction, WSDOT/APWA, latest edition.

B. Where conflicts between Standards and specifications occur, the more stringent shall apply.

1.04 SUBMITTALS

A. Provide manufacturers product information for the following:

1. Pipe

2. Fittings

3. Structures

4. Castings

B. Provide Shop Drawings for the following list of items. Shop Drawings shall include plans, elevations, details, and attachments.

1. Precast concrete manholes.

2. Castings

3. Cleanouts

C. Provide reports documenting pressure testing, mandreling, and televising.

D. Provide surveyed As-Built Plans.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic structures, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle precast concrete manholes and other structures according to manufacturer's written rigging instructions.

1.06 PROJECT CONDITIONS

A. Site Information:

1. Contractor shall verify existing utility locations.

B. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.

2. Provide alternate routes around closed or obstructed traffic ways.

C. Existing Utilities:

1. Locate and identify existing utilities and other below grade improvements that are to remain and protect these from damage.

2. Locate, identify, disconnect and seal or cap off utilities and other below grade improvements indicated to be removed.

a. Arrange with utility companies to shut off indicated utilities.

b. Arrange with Owner to shut off indicated below grade improvements

3. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

   a. Notify Owner not less than 10 days in advance of proposed utility interruptions.

   b. Do not proceed with utility interruptions without Owner's written permission.

   c. Arrange to shut off indicated utilities with utility companies and Owner's Representative

1.07 QUALITY ASSURANCE

A. Provide at least one (1) person who shall be present at all times during execution of this portion of the work, be thoroughly familiar with the type of work being performed and the best methods for its execution and who shall direct all work performed under this section.

B. Contractor shall be responsible for all testing and inspections requirements, including all associated costs.

PART 2 – MATERIALS

2.01 GENERAL

A. All materials shall conform to the size and type shown on the plans or as called for in the specifications and to applicable Laws, Codes, and Ordinances.

B. All products and materials are to be new, undamaged, clean, and in good condition. Existing products and materials are not to be reused unless specifically indicated.

C. Be responsible for the safe storage and handling of all materials utilized in the work. Store all materials in areas designated by the Owner's Representative in cooperation with the Owner.

D. Perform all work in accordance with any applicable manufacturer's instructions.

2.02 PIPE AND FITTINGS

A. PVC Sewer Pipe: ASTM D 3034 for gasketed joints.

   1. Gaskets: ASTM F477, elastometric seal.

B. Ductile Iron Sewer Pipe: ASTM A 746, for push on joints.

   1. Standard Pattern Ductile Iron Fittings: AWWA C110, CL 50, ductile or gray iron for push on joints.

2. Compact Pattern Ductile Iron Fittings: AWWA C153, for push on joints.

3. Gaskets: AWWA C111, rubber.

C. Reinforced Concrete Pipe: ASTM 67.

2.03 MANHOLES

A. General

1. Provide precast concrete manholes per the City of Marysville's Sanitary Sewer Design Standards.

a. Submit manufacturer's preproduction (shop) drawings for approval prior to the start of manufacturing.

B. Precast Manhole Sections

1. Precast concrete manhole sections, including bottom and top shall meet the requirements of ASTM C478.

2.04 CASTINGS

A. All manhole castings shall be heavy duty iron conforming to ASTM A48, Class 20 and rated for AASHTO H-20 loading as Specified in the City of Marysville's Sanitary Sewer Design Standards.

B. Drop Manholes: The need for drop manholes and the design for inside and outside drops are to be found in the City of Marysville's Sanitary Sewer Design Standards.

2.05 CONCRETE

A. Structure Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio. Include channels and benches in manholes.

1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

a. Invert Slope: 2 percent through manhole.

2. Benches: Concrete, sloped to drain into channel.

a. Slope: 4 percent.

PART 3 – Execution

3.01 PREPARATION

A. Contractor, prior to excavation work, shall notify all utilities, governmental agencies, or entities, known to, or which can reasonably be assumed to, have above or below ground pipe, conduit cables, structures or similar items within limits of project, to locate and mark location of such items. The Contractor shall expose potential pipe conflicts prior to installation of sewers to allow for any field changes to the design to be made.

3.02 EARTHWORK

A. Excavating, trenching, and backfilling requirements are specified in Specification Section 31 20 00 – EARTHWORK.

3.03 IDENTIFICATION

A. Affix an indicating wire directly to all pipes and install a plastic non-biodegradable warning tape 24 inches above all pipes.

3.04 PIPING APPLICATIONS

A. General: Include watertight joints.

B. Refer to Part 2 of this Specification Section for detailed specifications for pipe and fitting products listed below. Use pipe, fittings, and joining methods according to applications indicated.

C. Gravity-Flow Piping: Use the following:

1. SDR 35 PVC Pipe per ASTM D 3034 for sizes 12 inches in diameter and below.

2. Reinforced concrete pipe per ASTM 67 for sizes above 12 inches in diameter.

3. Ductile iron pipe or ductile iron sleeve where high surface loads exist, under roadways, and where minimum cover cannot be achieved. NPS 8 to NPS 16.

a. Ductile iron sewer pipe; standard-pattern, ductile iron fittings, gaskets, and gasketed joints in NPS 8 to NPS 12.

b. Use ductile iron culvert pipe, standard pattern ductile iron fittings, gaskets, and gasketed joints in NPS 14 to NPS 16.

3.05 SPECIAL PIPE COUPLINGS AND FITTINGS APPLICATIONS

A. Special Pipe Couplings: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.

1. Use the following pipe couplings for nonpressure applications:

a. Sleeve type to join piping, of same size, or with small difference in OD.

b. Increaser/reducer-pattern, sleeve type to join piping of different sizes.

c. Bushing type to join piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.06 PIPE INSTALLATION, GENERAL

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to the extent practical.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.

C. Use manholes for changes in direction, unless fittings are indicated. Use fittings for branch connections, unless direct tap into existing sewer is indicated.

D. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. Install gravity flow sanitary sewerage piping of sizes and in locations as indicated. Terminate piping as indicated.

1. Install piping pitched down in direction of flow at minimum slope of 1 percent, unless otherwise indicated.

2. Install piping with 36 inch of cover, minimum.

3.07 PIPE JOINT CONSTRUCTION AND INSTALLATION

A. General: Join and install pipe fittings according to installations indicated.

B. Use fittings made of same material as connecting pipe.

C. Ductile iron Sewer Pipe with Ductile Iron Fittings: According to AWWA C600.

3.08 MANHOLE INSTALLATION

A. Contractor shall determine the proper location, size, elevation, and orientation of all pipes entering new manholes before ordering. Do not connect abandoned pipes to new manholes. Manholes having improper location and/or orientation of

the pipe connections will be rejected. Field repairs or adjustments of connection points are not permitted.

B. Limit the excavation for manholes so as to provide only the necessary amount of space to sufficiently prepare the subgrade, set the base, set the manhole or structure, and lay pipe. Provide a minimum of 1' of clearance between structure and trench wall for adequate backfilling and compaction.

C. Where excavation occurs below the bottom elevation of the structure's base, bring the excavation to the required elevation by the use of compacted crushed stone bedding. A minimum of 8 inches of compacted Crushed Stone Bedding shall be placed below manhole base.

D. Set manhole base in accordance with elevation and location as indicated on the plans. Install base plumb and level. Install subsequent pre-cast manhole sections in accordance with shop drawing layout. Provide watertight gaskets between each manhole section.

E. Form continuous concrete channels and benches between inlets and outlet.

1. Channel with smooth surface draining to downstream pipe.

2. Where two or more lines meet at an angle, provide curved channel.

F. Drop manholes shall be constructed in accordance with the City of Marysville's Sanitary Sewer Design Standards.

3.09 CASTING INSTALLATION

A. Install casting type as indicated on the plans.

1. Set tops of frames and covers flush with finished surface of manholes that occur in pavements.

2. Set tops of frames and covers 3 inches above finished surface elsewhere, unless otherwise indicated.

3.10 CONNECTIONS TO EXISTING STRUCTURES

A. Make connections to existing underground structures so finished Work complies as nearly as practical with requirements specified for new Work.

B. Make branch connections from side to underground structures by cutting opening into existing structure large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through structure wall to conform to shape of and be flush with inside wall. On outside of structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches.

1. Use concrete that will attain minimum 28-day compressive strength of 3000 psi.

2. Use epoxy bonding compound as interface between new and existing concrete and piping materials.

E. Protect existing piping and structures to prevent concrete or debris from entering while making connections. Remove debris and other extraneous material that may accumulate.

3.11 QUALITY CONTROL TESTING AND INSPECTIONS

A. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.

1. Place plug in end of incomplete piping at the end of day and when work stops.

2. Flush piping between manholes and other structures to remove collected debris, if required by authorities having jurisdiction.

B. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect at the completion of Project.

1. Submit separate reports for each system inspection.

2. Defects requiring correction include the following:

a. Alignment: Less than full diameter of inside of pipe is visible between structures.

b. Deflection: See test requirements listed below.

c. Crushed, broken, cracked, or otherwise damaged piping.

d. Infiltration: Water leaking into pipe.

e. Exhfiltration: Water leaking from or around piping.

3. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.

4. Reinspect and repeat procedure until results are satisfactory.

C. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.

2. Test completed piping systems as follows:

a. New gravity flow sanitary sewerage piping shall be tested with low pressure air test per WSDOT standards, as stated in the Marysville standards.

b. Manholes shall be tested per the City of Marysville's Sanitary Sewer Design Standards.

3. Schedule tests and inspections with Quil Ceda Village Utilities at least 48 hours in advance.

4. Submit separate reports for each test.

D. Deflection Testing:

1. Test all PVC sewer pipe in the presence of the Owner's Representative and Quil Ceda Village Utilities by a "go-no-go" deflection test mandrel furnished by the Contractor. Do not perform deflection testing any sooner than 30 days following the installation of the PVC pipe. Pull the mandrel by hand, or hand operated winch so as to avoid any damages to the pipe that may be caused by mechanized pulling equipment.

2. Size the mandrel to test the pipeline for a maximum allowable internal deflection of the pipe (in any direction) of not to exceed five (5) percent of the original internal diameter for the pipelines tested, regardless of how long after installation the testing takes place.

3. Deflection testing may be done concurrently with any necessary televising of the sewers. When done concurrently with sewer televising, the mandrel may be pulled by mechanized equipment, provided the mandrel is visible in the television picture during the testing and the operation of the mandrel can be quickly halted before damage to the pipe occurs.

4. Where poor trench soils conditions require the pipe excavation to be undercut and/or over excavated, the Owner reserves the right to require an additional deflection test prior to the expiration of the Contractor's one year warranty.

5. Remove and replace all pipe that fails to pass the five (5) percent internal deflection testing until the pipe passes the deflection test.

E. Sewer Televising

1. Upon completion of the sewer construction all new sewers shall be televised to provide a record of the actual conditions inside the newly constructed sewers via closed circuit televising equipment. The Owner's Representative may or may not be present during sewer inspections via this method.

2. Utilize televising equipment with a color camera specially designed and equipped for the conditions of the sewers to be televised, and with a monitor screen. Provide equipment equipped with a DVD so that the

televised picture, any on-screen data, and any audio notes of the sewer inspection may be permanently recorded on DVD.

3. Transport the camera equipment through the sewers by means of mechanical or hand operated winches, coordinated to provide speed and directional control necessary to fully observe the sewer interior. Provide a light source for the necessary illumination.

4. Provide televising equipment equipped with an on-screen distance meter, capable of registering distances in the sewer from the starting manhole, and accurate to the nearest 0.5 ‘station, so as to facilitate in the locating of sewer features and/or defects from the ground surface.

5. Provide televising equipment with an on-screen date and time clock, so as to permit the verification of the date and time of the television inspection.

6. Any video tapes of the sewer inspection shall contain audio notes describing the sewer location, direction of inspection, and a description of any pertinent features observed during the televised inspection (service locations, leaking or faulty joints, debris in the line, offset joints, etc.). In addition, record this information on a written log or record, in a format of the Contractor's choosing, as acceptable to the Owner.

7. The Contractor shall provide to the Owner’s Representative with 2 copies of the DVD.

END OF SECTION 33 30 00