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Sewer Specifications

Materials

MS-1 GENERAL

The Developer shall furnish all materials. All materials shall be new. Prior to approval, a material submittal package shall be submitted in pdf format for review by the District and District's Engineer. Products submitted shall note where they are to be used. Manhole submittals shall include the projected components and their lay heights. Cored locations shall be shown along with angles between the outlet and inlet(s).

MS-2 SEWER PIPE

PLASTIC SEWER PIPE AND FITTINGS (GRAVITY)

Plastic gravity sewer pipe may be used in sizes 6-inch through 12-inch and shall be Type PSM (polyvinyl chloride) (PVC) sewer pipe meeting the requirements of ASTM 03034 for SDR-35 wall thickness. The pipe and fittings shall be furnished with bells and spigots which are integral with the pipe wall. Pipe joints shall use flexible elastomeric gaskets conforming to ASTM D3212; solvent cement joints shall not be used. Nominal laying lengths shall be 20 feet and 13 feet.

DUCTILE IRON PIPE AND FITTINGS (GRAVITY AND FORCE MAIN)

All cement lined ductile iron pipe shall be thickness Class 52 minimum, or as noted on the plans. Pipe shall conform to Specification ANSI/AWWA C151/A21.51. Lining shall conform to Specification ANSI/AWWA C104/A21.4. Ductile iron pipe and fittings with Protecto 401 lining shall be used in locations where depth of cover over the pipeline exceeds 15 feet, for all installations of pipe 14" or greater in diameter, for force mains, and in augered or bored casings. Ductile iron pipe with mechanical joints or Field-Lok gaskets shall be used on slopes of 20 percent or greater. Cut ends of Ductile Iron pipe shall be field coated with Protecto 401 lining.

HDPE PIPE AND FITTINGS (GRAVITY AND FORCE MAIN)

High Density Polyethylene (HDPE) pipe for gravity and force main sewer may be used in specific situations where Ductile Iron or PVC is not appropriate or feasible. The class and specifications of the HDPE will be determined on a project-specific basis.

MS-3 MANHOLES

Concrete manholes shall have fiberglass reinforced base or polypropylene base liner or an approved equal as determined by the District. See Standard Plans No. 2 thru 7.

Modifications are as follows:

1. Manhole steps and handholds shall be steel-reinforced copolymer polypropylene (ASTM D4101) with 1/2-inch steel reinforcing bar (ASTM A615 Grade 60) and in conformance with ASTM C478. See Standard Plan No. 18.
2. Handholds (WSDOT/APWA Standard Plan B-24) shall be used in lieu of steps in the neck, and the first (top) step of the cone.
3. Pipe connection at manhole shall be accomplished using Kor- N-Seal boots or Pipe specific bells and compression seal gaskets as approved by the District with a minimum of 10 feet to the nearest pipe joint from the manhole.
4. Manhole access, section joints, pick holes, and riser neck sections shall be sealed with Wrapid Seal (sold by CANUSA, The Woodlands Texas) sheet roll encapsulation or NPC External Joint Wrap (sold by Trelleborg Engineered Systems).
5. Manhole sections shall be jointed with mortar and with flexible joint using rubber gaskets conforming to ASTM C443. Joint shall be watertight. Mortar shall be applied to the inside and outside of the structure after the flexible joint is initially made. External Joint Wrap shall be installed on the exterior seams, after grouting and prior to backfilling the structure.
6. Frames and covers shall be designed for a minimum loading of 20,000 pounds. Castings shall be free of any porosity, shrinks, cracks, or other defects. Manhole frame shall be gray iron. Cover shall be watertight ductile iron with three 5/8-inch-diameter countersunk N.C. socket head cap screws and lift handle in the cover. A bituminous coating shall be applied to all surfaces of the castings. Manhole frames and covers shall be 24" x 6", as manufactured by East Jordan Iron Works, Model No. 00370005, with locking ring and ductile iron cover, or approved equal, in accordance with Standard Plan No. 20. Ring gasket shall be glued into place, prior to setting the ring and cover.
7. New manholes shall require fiberglass channels.

MS-4 SIDE SEWERS

Materials for side sewers shall match the material of the mainline sewer. Change in pipe material shall be made upstream of the District Cleanout. The District Cleanout standpipe shall be the same size and material as the side sewer pipe.

MS-5 SEWER CLEANOUTS

All materials incorporated into the total cleanout structure shall meet the requirements of the applicable sections of these specifications and as shown on the standard detail.

Clean-out frames and covers shall be locking 5/8-inch-diameter countersunk N.C. socket head cap screws and a single one-inch-diameter lift hole in the cover. Frame and cover shall be set on a 12" PVC collar or an approved equal, see Standard Plan No. 14. The frames shall be East Jordan Iron Works product number 00366102 or approved equal. Cleanouts shall be placed at the edge of Right of Way or Easement. A concrete collar is required around the casting. See Sewer Standard Plan 14 for more information.

MS-6 GRINDER PUMPS

Except as authorized by the Board of Commissioners, private pumps shall not be allowed and only properties that can be served by gravity side sewers will be permitted to connect to the District's sanitary sewer system. Under extreme conditions, the Board may authorize the use of private pumps to provide service to individual properties in accordance with Washington State DOE rules and regulations and the District's rules and regulations governing private pumps.

If private Grinder Pumps are allowed:

1. The served property owner shall be responsible for operating and maintaining the grinder pump. A grinder pump service agreement shall be completed, signed by the property owner and the District, and recorded with the King County Recorder's Office.
2. The Grinder Pump and force main shall not become a part of the District's public sewer system.
3. Grinder Pump shall be E-One Extreme WH231 with a 237gallon storage capacity. Grinder Pumps shall be internal to the structure.

MS-7 CEMENT MORTAR GROUT

Cement grout mortar shall be non-shrink and traffic rated.

MS-8 CONTROL DENSITY FILL

Controlled Density Fill (CDF) shall conform to the requirements of the local road agency.

MS-9 ASPHALT CONCRETE

Asphalt concrete shall conform to the requirements of Hot Mix Asphalt (HMA) class 1" PG 64-22 in accordance with the Standard Specifications for Road, Bridge, and Municipal Construction or as required by local jurisdictions.

Asphalt sealer for tacking joints shall be SS-1 emulsified asphalt. Asphalt sealer for sealing joints shall be AR-4000. Joints shall be cleaned prior to sealing. Joint sealer shall not be applied during wet conditions. Joints shall be heated, if necessary, prior to application. Joint Sealer shall be applied in a neat, narrow (3" max width) wafer thin fashion. Sand shall be placed on the joint until cured to prevent tracking.

Temporary patches shall be Hot Mix Asphalt (HMA) Class 1" PG 64-22. Minimum depth shall be 2".

MS-10 PIPE BEDDING

Flexible Pipe

Pipe bedding materials shall comply with Section 9-03.16 of WSDOT Standard Specifications.

Rigid Pipe

Pipe bedding materials shall comply with Section 9-03.15 of WSDOT Standard Specifications.

MS-11 FOUNDATION GRAVEL

Foundation gravel, Class A shall be coarse graded gravel and shall comply with Section 9-03.17 of WSDOT Standard Specifications. Local Jurisdictional requirements shall override if working in Public R/W when more stringent.

MS-12 BEDDING GRAVEL

Pipe bedding for flexible pipe shall be pea gravel or sand/gravel mixtures installed to the dimensions shown in the Standard Plans.

Material shall conform to the following gradations by weight: Sand/gravel mixtures shall contain a minimum sand equivalent of 35% in accordance with ASTM D2419.

% Passing 3/4-inch sq. Sieve	100%
% Passing 3/8-inch sq. Sieve	70-100%
% Passing No. 4 Sieve	55-100%
% Passing No. 10 Sieve	35-95%
% Passing No. 20 Sieve	20-80%
% Passing No.40 Sieve	10-55%
% Passing No. 100 Sieve	0-10%
% Passing No. 200 Sieve	0-3%

Alternatively, gravel complying with WSDOT Specifications, Section 9-03.13, Backfill for Sand Drains, may be used for bedding gravel.

MS-13 GRAVEL BACKFILL

The gravel backfill shall consist of naturally occurring or screened gravel. It shall be essentially free from wood, roots, bark, or other extraneous material. It shall have such characteristics of size and shape that it will compact readily to a firm, stable course. Gravel backfill materials shall comply with Section 9-03.10 of WSDOT Standard Specifications.

Gravel Backfill shall meet the following requirements:

Maximum Particle Size	3 inches
% Passing 2-1/2-inch Square Opening	75% Minimum
% Passing No. 4 Sieve	22% Minimum
% Passing No. 200 Sieve	10% Maximum

Dust Ratio: $\frac{\% \text{ Passing No. 200 Sieve}}{\% \text{ Passing No. 40 Sieve}}$	2/3 Maximum
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% Sand Equivalent	30 Minimum
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Gravel backfill material retained on a No. 4 sieve shall contain no more than 0.20 percent by weight of wood waste.

MS-14 CRUSHED SURFACING

Crushed surfacing materials shall comply with Section 9.03.9(3) of WSDOT Standard Specifications. Crushed surfacing shall be manufactured from ledge rock, talus, or gravel. The materials shall be uniform in quality and substantially free from wood, roots, bark, and other extraneous material and shall meet the following test requirements:

Los Angeles Wear, 500 Rev.	35% Maximum
Degradation Factor- Top Course	25 Minimum
Degradation Factor- Base Course	15 Minimum

Crushed surfacing of the various classes shall meet the following requirements for grading and quality:

	% Passing	% Passing
	Base Course	Top Course
1-1/4-inch Square	100	
1-inch Square	80-100	
3/4-inch Square		100
5/8-inch Square	50-80	
1/2-inch Square		80-100
U.S. No. 4	25-45	46-66
U.S. No. 40	3-18	8-24
U.S. No. 200	7.5 Max.	10.0 Max.
% Fracture	75 Min.	75 Min.
% Sand Equivalent	40 Min.	40 Min.

All percentages are by weight.

The fracture requirement shall be at least one mechanically fractured face and will apply to the combined aggregate retained on the No. 4 sieve in accordance with FOP for AASHTO PT 61.

The portion of crushed surfacing retained on a U.S. No. 4 sieve shall not contain more than 0.15 percent wood waste.

MS-15 LIFT STATIONS

GENERAL

The stated requirements below represent regulatory minimums however, the District Standard's intent is to exceed these minimums to provide a lift station that meets site specific operation needs as determined during the design review process.

Sewer lift station design shall comply with the recommendations of the District's Seismic Study and Class I Reliability requirements as defined by the Department of Ecology (DOE).

PRECAST CONCRETE UTILITY VAULT

Woodinville Water District requires the precast vault to be sized per the latest edition of DOE Criteria for Sewage Works Design (Orange Manual) or one-hour of peak flow storage time, whichever is greater.

The vault shall be constructed of reinforced concrete with a minimum strength of 4500 psi at 28 days. The vault including joints and pipe penetrations shall be totally watertight and shall show no evidence of seepage or damp spots. Exterior seams shall be sealed using Wrapid Seal (sold by CANUSA, The Woodlands Texas) sheet roll encapsulation or NPC External Joint Wrap (sold by Trelleborg Engineered Systems).

Interior walls and ceiling finish of the concrete shall be smooth, hard, and uniform texture. Tie holes and defects larger than 1/8-inch shall be neatly patched with mortar. Floor finish shall be hand steel trowel and lightly brushed to produce a nonslip texture. Floor shall be sloped to drain to the sump. All walls, floor, ceiling, hatch and joints shall be water-tight and not leak. Ceiling and walls shall be painted with Epoxytec CPP (sprayable).

The vault shall be furnished with manhole steps and handholds and shall be steel-reinforced copolymer polypropylene (ASTM D4101) with 1/2-inch steel reinforcing bar (ASTM A615 Grade 60) and in conformance with ASTM C478. The vault shall also include a Ladder Up, manufactured by LW products or approved equal. Submittal with shop drawing shall be required.

A second structure shall be provided upstream of the Wet Well that can be "valved off" to allow work or maintenance inside the main structure. The secondary structure shall meet all requirements covered in this section.

ACCESS DOOR

Access door shall be LW Products Hatch or approved equal. Door leaf shall be aluminum diamond pattern to withstand H-20-wheel loadings and sized according to the structure. Channel frame shall be 1/4-inch aluminum with an anchor flanged around the perimeter. Doors shall be equipped with stainless steel hinges, pins, spring operators for easy operation and protection against slamming, and an automatic hold-open arm with release handle. A snap lock with removable handle shall be provided. A 1-1/2-inch drainage coupling shall be located in the front right corner of the channel frame. Drainage shall be directed to the inside of the structure through 1-1/2-inch pipe or as directed by the Engineer. Hardware shall be stainless steel and mill finish shall be bituminous coating applied to the exterior of the frame.

Manufacturer shall guarantee against defects in material or workmanship for a period of five years.

Other items required for the Access Door are Magnetic light switch/intrusion switch and removable handrailing around the structure opening.

PIPE AND FITTINGS

The pipe and fittings shall be as specified in Ductile Iron Pipe and Fittings, except flanged pipe shall be ductile iron ANSI/AWWA C151/A21.51, standard thickness, Class 53.

Adjustable flanges to adapt to plain end pipe shall be EBAA Iron series 2100 Megaflange or approved equal. Adjustable flanges shall only be allowed inside of the station. Stainless steel bolts with brass nuts shall be used on all flanged fittings. An inlet catch or screen shall be installed on the inlet piping.

All pipes and fittings inside the wet well shall be thermocoated.

WET WELL PUMPS

A total of three pumps shall be supplied for the station, of which, two shall be installed inside the structure and the third delivered to the District. All pumps supplied shall be the same make, model, and brand. Pumps shall be set inside the structure opposite of the inlet, to prevent build up on the pumps and wires.

EMERGENCY BY-PASS

An emergency by-pass shall be supplied. A Godwin Pump, furnished by Xylem, shall be provided for the emergency by-pass. The pump shall be a Dri-Prime Series and sized according to the flow requirements of the station.

ELECTRICAL (GENERAL)

All electrical work shall conform to the latest edition of the National Electrical Code. The contractor shall obtain an electrical permit from the Department of Labor and Industries.

All electrical outlets shall have ground fault interrupt protection.

SITE ELECTRICAL

The station shall have 3-phase electrical service to operate the following site items:

- Ventilation
- Manually controlled Site Lighting
- Non-Explosive Lighting inside the Wet Well
- Wet Well Pumps
- Telemetry Cabinet and all appurtenances associated with the Telemetry System.

AUXILIARY POWER

A District approved generator shall be provided for auxiliary power to the site. Generator shall be sized to run the entire station. The generator shall have an Automatic Transfer Switch, cold weather fuel heater, and battery tender.

CONDUITS (ELECTRICAL/TELEPHONE)

All conduits shall be noncorrosive and shall be sealed water-tight and protected from moisture. A pull cord shall be installed of permanent material and sufficient strength to pull any cable through the conduit. Conduits shall be oversized to accommodate future wires, cables or condition

TELEMETRY SYSTEM

A telemetry system is required for the operation of the Wet Well and shall be operational prior to the station being placed "In Service".

A District approved shed roof shall be constructed over the control panel. Approval shall include structure sizing/material and roof type/material.

The telemetry system shall be capable of the following callouts:

STATION CALL-OUT
Pump Run/Stop
High Level/Low Level (transducer)
High/High Level (float)
Power Fail/Phase Fail
Generator Fail to Start
Pump Seal Fail
Pump Temperature Fail
Intrusion Alarm

GENERATOR CALL-OUT
Door Open
Run/Stop
Fuel Level

WATER SERVICE

A 2-inch Domestic water service with backflow protection is required for the station to operate the following site items:

- A Frost-Free hose spigot.
- Washdown/Agitation system inside the structure.

MISCELLANEOUS

Woodinville Water District retains the right to require other safety or functional items as may be necessary to provide for the proper operation of the station. This includes site fencing, pavement, storm drainage, and storage shed.

START UP TESTING

The Contractor shall furnish a proposed testing and start-up schedule and procedure to the Engineer a minimum of three (3) weeks prior to such testing. All involved parties including but not limited to, factory representatives, system integrator, District Staff, shall be present to adjust and place Wet Wells in service. Sufficient tools and supplies shall be furnished to maintain isolation from the District system until approved for permanent connection and operation.

OPERATION AND MAINTENANCE MANUALS

The contractor shall furnish three bound copies of operation and maintenance data for the Lift Stations and Wet Wells.

The data shall be bound in heavy, permanent type binders and shall be indexed so that information on any piece of equipment can be easily found.

These manuals shall include:

1. Assembly and disassembly instructions
2. Parts list with diagrams and cut-away sections.
3. Operating and maintenance instructions for equipment along with recommendations for preventative maintenance.
4. Equipment specifications and guaranteed performance data.
5. Name, address, telephone number of manufacturers, vendors and spare parts sources.
6. Manufacturers' warranties.
7. Step by step start-up and operating procedures.
8. Factory parts listed with listings of all component sources, original manufacturer's part number, and interchangeability listings.
9. Lubrication charts.
10. Wiring diagrams of all control circuits supplied.