DISTRICT TECHNICAL SPECIFICATIONS

OWNER
Sammamish Plateau Water and Sewer District
1510 - 228th Avenue SE
Sammamish, Washington 98075
(425) 392-6256  FAX (425) 391-5389

Revised October 2017
TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

PART ONE - DESIGN STANDARDS .............................................................................................................. 1-1

SECTION 1.1 - WATER SYSTEMS ............................................................................................................ 1-1

A. Watermain Extension ......................................................................................................................... 1-1
B. Main Location ........................................................................................................................................ 1-1
C. Easements ............................................................................................................................................ 1-1
D. Location of Line within Street Corridor ............................................................................................... 1-1
E. Water Line Cover ................................................................................................................................. 1-2
F. Separation Between Other Utilities ..................................................................................................... 1-2
G. Line Size .............................................................................................................................................. 1-2
H. Pipe Material ...................................................................................................................................... 1-2
I. Dead-end Water Lines ......................................................................................................................... 1-2
J. Blocking on End of Mains ................................................................................................................... 1-2
K. Connection to Existing Mains ............................................................................................................ 1-2
L. Fitting Material .................................................................................................................................... 1-3
M. Multiple Fitting .................................................................................................................................. 1-3
N. Lines Entering/Exiting Structures ...................................................................................................... 1-3
O. Pipe Anchors ..................................................................................................................................... 1-3
P. Hill Holders ......................................................................................................................................... 1-3
Q. Fire Hydrant Location ....................................................................................................................... 1-3
R. Fire Hydrant Line Size ....................................................................................................................... 1-3
S. Hydrant Guard Posts ......................................................................................................................... 1-3
T. Valve Type ......................................................................................................................................... 1-3
U. Valve Locations .................................................................................................................................. 1-4
V. Blow-offs ............................................................................................................................................ 1-4
W. Air and vacuum release valves ........................................................................................................... 1-4
X. Meters ................................................................................................................................................. 1-4
Y. Service Lines ...................................................................................................................................... 1-6
Z. Backflow Prevention ............................................................................................................................ 1-7
AA. Fire Sprinkler Lines ......................................................................................................................... 1-7
BB. District Sampling Stations ................................................................................................................ 1-7

SECTION 1.2 - SANITARY SEWER SYSTEMS ......................................................................................... 1-8

A. Sewer Extension .................................................................................................................................. 1-8
B. Design Criteria .................................................................................................................................... 1-8
C. Sewer Flow ......................................................................................................................................... 1-8
D. Storm/Surface/Ground Water Restrictions ......................................................................................... 1-8
E. Main Location ..................................................................................................................................... 1-8
F. Easements .......................................................................................................................................... 1-8
G. Location of Line within Street Corridor .............................................................................................. 1-8
PART TWO - MATERIAL STANDARDS ........................................................................... 2-1

SECTION 2.1 - GENERAL ......................................................................................... 2-1

A. Foundation Gravel .......................................................................................... 2-1
B. Controlled Density Fill (CDF) .......................................................................... 2-1
C. Pea Gravel ......................................................................................................... 2-1
D. Sand Bedding Material .................................................................................... 2-2
E. Concrete Encasement ....................................................................................... 2-2
F. Native Backfill Material ................................................................................... 2-2
G. Imported Backfill Material ................................................................. 2-2
H. Hot Mix Asphalt (HMA) ................................................................. 2-2
I. Crushed Surfacing ........................................................................ 2-2
J. Not Used ......................................................................................... 2-2
K. 7/8-Inch Drain Rock ..................................................................... 2-2
L. Not Used ......................................................................................... 2-3
M. Grout ............................................................................................. 2-3
N. Trench Plug ................................................................................... 2-3
O. Unsuitable Materials ..................................................................... 2-3
P. Ductile Iron Pipe ........................................................................... 2-3
Q. Polywrap for Ductile Iron Pipe ................................................... 2-4
R. PVC Pipe for Watermains ............................................................. 2-4
S. PVC Pipe for Non-Pressure (Gravity) Sewers .............................. 2-4
T. HDPE Pipe for Water Mains and Pressure Sewers .................... 2-5
U. C-905 PVC Pipe for Non-Pressure (Gravity) Sewers .................. 2-5
V. Gate Valves ................................................................................... 2-5
W. Valve Boxes ................................................................................. 2-6
X. Valve Marker Posts ...................................................................... 2-6
Y. Concrete Blocking ........................................................................ 2-6
Z. Bolts In Piping .............................................................................. 2-6
AA. Flange Gaskets .......................................................................... 2-6
BB. Flexible Coupling ...................................................................... 2-6
CC. Galvanized Steel, Pipe And Fittings For Blowoffs And Air Vacuum Relief Valves ..... 2-6

SECTION 2.2-WATER SYSTEMS .................................................................... 2-6

A. Butterfly Valves ........................................................................... 2-6
B. Fire Hydrants ............................................................................... 2-7
C. Tapping Sleeve And Valve Assembly ........................................... 2-7
D. Corporation Stop .......................................................................... 2-7
E. Service Saddle ............................................................................. 2-7
F. Water Service Pipe ...................................................................... 2-7
G. Air And Vacuum Relief Valve Assemblies .................................. 2-8
H. Hydrant Guard Posts ................................................................... 2-8

SECTION 2.3 - SEWER SYSTEMS .................................................................. 2-8

A. Sewer Pipe And Appurtenances, Non-Pressure ......................... 2-8
B. Sewer Pipe And Appurtenances, Pressure .................................. 2-8
C. Side Sewer Pipe, Non-Pressure ................................................... 2-8
D. Side Sewer Pipe, Pressure ............................................................ 2-9
E. Low Pressure Mainline Sewer Pipe And Appurtenances ........... 2-9
F. Manholes ....................................................................................... 2-9
G. Air And Vacuum Relief Valve Assemblies .................................. 2-11
H. Cleanout Assemblies ................................................................... 2-11
PART THREE - CONSTRUCTION STANDARDS .......................................................... 3-1

SECTION 3.1 - GENERAL .................................................................................. 3-1

| A. Alignment .......................................................... 3-2 |
| B. Trench Excavation ............................................... 3-3 |
| C. Timbering and Sheeting ...................................... 3-3 |
| D. Pipe Laying .......................................................... 3-4 |
| E. Pipe Joints .......................................................... 3-5 |
| F. Bedding Material Placement .................................. 3-5 |
| G. Backfilling .......................................................... 3-6 |
| H. Grade Lines .......................................................... 3-8 |
| I. Boring and Casing ................................................. 3-8 |
| J. Pipe in Fills .......................................................... 3-8 |
| K. Highway Crossings .............................................. 3-8 |
| L. Valve Installation .................................................. 3-9 |
| M. Valve Box Installation ........................................... 3-9 |
| N. Valve Marker Posts .............................................. 3-9 |
| O. Concrete Blocking ................................................ 3-9 |
| P. Air and Vacuum Release Valve Installation ............ 3-9 |
| Q. Access Roads ....................................................... 3-9 |
| R. Painting .............................................................. 3-10 |
| S. Raising Structures to Grade .................................... 3-11 |

SECTION 3.2 - WATER SYSTEMS ................................................................ 3-11

| A. Fire Hydrant Installation ........................................ 3-11 |
| B. Water Service Connections .................................... 3-11 |
| C. Meter Box Installations ......................................... 3-11 |
| D. Backflow Prevention (Cross Connection Control) .... 3-12 |
| E. Connections To Existing Water Mains ...................... 3-12 |
| F. Operation of District Valves .................................... 3-13 |

SECTION 3.3 - SEWER SYSTEMS .................................................................. 3-13

| A. Manholes .............................................................. 3-13 |
| B. 6-Inch Side Sewer from Main to Property Line ........ 3-14 |
| C. Connection to theExisting Sewer System ................ 3-15 |
| D. Side Sewers (Gravity or Pressure) ............................ 3-16 |
| E. Use of Ductile Iron Pipe for Sewers ....................... 3-16 |
| F. Lift Stations .......................................................... 3-16 |

SECTION 3.4 - TESTING FOR WATER AND SEWER PIPELINES .................. 3-16

| A. Hydrostatic Tests For Ductile Iron Water Mains ........ 3-16 |
| B. Hydrostatic Tests For HDPE Water Mains ................ 3-17 |
| C. Sterilization And Flushing Of Water Mains ............... 3-178 |
| D. Cleaning And Jetting Of Sewer Mains ...................... 3-18 |
E. Testing Of Non-Pressure Sewer Pipe ................................................................. 3-19
F. Hydrostatic Tests For Pressure Sewer Pipe ...................................................... 3-22
G. Testing For Low Pressure Mainline Sewers And Grinder Pump Systems .......... 3-22

SECTION 3.5 – ABANDONMENT OF WATER AND SEWER FACILITIES .............. 3-22

A. Abandonment of Water Mains ........................................................................... 3-22
B. Abandonment of Fire Hydrants ....................................................................... 3-23
C. Abandonment of Water Services ..................................................................... 3-24
D. Abandonment of Manholes or Vaults ............................................................... 3-24
E. Abandonment of Pressure Sewer Mains ......................................................... 3-24
F. Abandonment of Gravity Side Sewers .............................................................. 3-25

PART FOUR - DISTRICT STANDARD DETAILS AND NOTES ......................... 4-1

SECTION 4.1 WATER DETAILS

1” Service Line Detail .......................................................................................... WD-1
Water Service Notes and Meter Box Requirements ............................................. WD-1
3/4” and 1” Meter Setter Detail ......................................................................... WD-2
1-1/2” and 2” Meter Setter Detail ....................................................................... WD-3
3” and 4” Compound Meter Detail ..................................................................... WD-4
Water Main Trench Section ................................................................................ WD-5
3” and 4” Compound Meter Notes and Materials .............................................. WD-5
1” And 2” Air and Vacuum Relief Valve Assembly ........................................... WD-6
Type I and II Blow-Off Assembly ...................................................................... WD-7
Fire Hydrant Assembly ....................................................................................... WD-8
Valve Box Pavement Patch Detail for Paved Areas ........................................... WD-9
Valve Box Asphalt Collar Detail for Non Paved Areas ....................................... WD-9
Hill Holder Detail ............................................................................................... WD-10
Pipe Anchor Detail ............................................................................................. WD-10
Concrete Blocking ............................................................................................. WD-11
Deadman Detail ................................................................................................. WD-12
Tie Rod Attachments ......................................................................................... WD-12
Testing Connection Detail ................................................................................. WD-13
Valve Operating Nut Extension Detail ............................................................... WD-14
Valve Marker Post Detail ................................................................................... WD-14
Water Sampling Station Detail ........................................................................... WD-15

SECTION 4.2 SEWER DETAILS

Standard Sanitary Manhole Detail .................................................................... SD-1
Manhole Asphalt Collar Detail for Non-Paved Areas and Gen'l Notes .......... SD-2
Manhole Pavement Patch Detail for Paved Areas and General Notes ........ SD-2
Manhole Step and Ladder Details .................................................................... SD-3
Drop Manhole Detail ........................................................................................ SD-3
Pressure Line Connection Detail ..................................................................... SD-4
Concrete Encasement for Sanitary Sewers .......................................................... SD-4
Sanitary Force Main Cleanout, Type II Detail ...................................................... SD-4
Single Side Sewer Detail .................................................................................. SD-5
Double Side Sewer Detail .............................................................................. SD-5
Side Sewer Details .......................................................................................... SD-5
Sanitary Manhole Inlet Connection ................................................................. SD-6
Side Sewer Cleanout Detail ............................................................................ SD-6
Side Sewer As-Built Detail ............................................................................... SD-6
Sanitary Sewer Trench Section ....................................................................... SD-7
Force Main Tracer Wire Locate Station ............................................................ SD-7
Standard Grease Interceptor Detail (1000 Gallon Min.) ................................... SD-8
Cut-In ("Saddle") Manhole Detail ................................................................... SD-9
Sanitary Force Main Cleanout Detail, Type II Detail ......................................... SD-10
Vactor Truck Minimum Hammerhead Turnaround .......................................... SD-11
Vactor Truck Minimum Circular Turnaround .................................................. SD-11
Recessed Socket Detail ................................................................................... SD-12
Davit Socket Installation Detail ....................................................................... SD-12
Davit Spindle Detail ........................................................................................ SD-12

SECTION 4.4 CROSS CONNECTION DETAILS

Standard RPBA Notes and Installation Requirements ...................................... CCD-1
Reduced Pressure Backflow Assembly (RPBA) Installation .......................... CCD-2
Double Check Valve Assembly (DCVA) Installation ..................................... CCD-3
Standard Fire Sprinkler DCVA Connection Detail ............................................ CCD-4
Double Check Detector Assembly Notes ....................................................... CCD-5
2-1/2” Double Check Detector Assembly ....................................................... CCD-6
4” and Larger Double Check Detector Assembly ............................................. CCD-7

SECTION 4.5 GRINDER PUMP PLANS

Grinder Pump Installation Detail ................................................................. GPD-1
Grinder Pump Site Layout Instructions .......................................................... GPD-2
Typical Circuit Diagram ................................................................................ GPD-2
Grinder Pump Cleanout Detail ...................................................................... GPD-3
Collection Valve Box ....................................................................................... GPD-3
Pressure Line Connection Detail ................................................................... GPD-4
Pressure Line Connection to Gravity Sanitary Sewer Detail .......................... GPD-4
Pressure Sewer Drop Connection ................................................................ GPD-5
Type II Low Pressure Cleanout with Manhole (For Traffic Areas) .............. GPD-6
Type I Low Pressure Cleanout Detail (For Non-Traffic Areas Only) .......... GPD-6
Section A-A Detail for Low Pressure Cleanouts .............................................. GPD-7
Low Pressure Cleanout Notes and Materials List ........................................... GPD-7

PART FIVE - DRAWING STANDARDS .................................................................. 5-1
SECTION 5.1 - GENERAL

A. Plan Set
B. Overall Drawing(s)

TABLE 5-1 Standard Water Symbols
TABLE 5-2 Standard Water Symbols

C. District Standards Sheets
D. Shop Drawings

SECTION 5.2 - WATER SYSTEMS

SECTION 5.3 - SEWER SYSTEMS

SECTION 5.4 - AS-BUILT DRAWINGS

A. Project Field Drawings
B. Changes in Street Names and/or Lot Lines/Numbers
C. Plats and Short Plats
D. As-Built Submittals
E. Water System As-Built Details
F. Sewer System As-Built Details
PART ONE - DESIGN STANDARDS

1.1 WATER SYSTEMS

The work shall be done in accordance with the Plans and Specifications prepared by the District's Engineer and/or Developer's Engineer and approved by the District. As a preliminary guide to applicants, the following general standards of design are set forth:

A. Watermain Extension –

1. Watermains shall be extended from the existing District water system to the Developer’s Real Property. Such offsite watermains shall include watermain laterals and/or service lines, as directed by the District at its sole discretion, to all real property adjacent to the watermain so that future water service can be provided to such other real property.

2. Watermains shall be extended across the Real Property in all directions, as required by the District at its sole discretion, so as to provide for future extension of the water system beyond the Real Property.

3. Watermains shall be constructed within the Real Property so that they are adjacent to all proposed and existing lots and/or buildings within the Real Property.

B. Main Location - Mains shall be laid only in right-of-way or proposed right-of-way or within separate utility tracts in easements that have been or will be granted to the District. Easements across individual lots require District approval during preliminary design.

C. Easements - All easements shall be a minimum of fifteen (15) feet in width and shall be subject to standard District easement restrictions. Piping shall be installed no closer than five (5) feet clear from the easement’s edge. Widths in excess of fifteen feet may be required by the District for locations where the District feels that construction, maintenance or repair of the water line within the easement would not be feasible.

The standard District Easement restrictions are set forth in the easement form included as a part of this Agreement. Prohibited items include locating structures over the easement, such as rockeries, walls, concrete slabs and fences.

D. Location of Line within Street Corridor - Normally the water lines shall be located on the North and/or East side of the street. Exceptions to these criteria may be granted based on excessive crossings of other utilities, separation from other utilities or other extenuating circumstances.

Criteria for location within the street cross-section:

1. Thickened edge - Locate 1-1/2 feet behind the edge of the asphalt.

2. Curb/gutter
   a) Sidewalks - locate 6 feet off of street centerline.
   b) No Sidewalks - locate 3 feet behind back of curb
   c) Combination - keep the water line location consistent throughout the project.
3. Shoulder roads - locate 1 foot behind the fog line.
4. Access tracts – extend watermain down access tract (either 4” or 8” diameter pipe), unless only 1 or 2 lots are served AND the lots are within 50 feet of the edge of right-of-way
5. Valves kept out of curb/gutter and avoid storm lines.
6. Need minimum 5 foot run to hydrants.
7. Maintenance of water line possible within the Right-of-Way.

E. Water Line Cover - Minimum depth of cover over top of water main shall be 3 feet. Maximum depth of cover over the top of water main shall be 5 feet.

F. Separation Between Other Utilities
   1. Sanitary Sewer - in accordance with criteria set forth in DOE guidelines
   2. Storm Sewer - Three (3) foot horizontal clearance.
   3. Underground Power, Gas, Telephone and Cable - A three (3) foot horizontal clearance is preferred when utilities are aligned parallel to the water main. In any case where less than three-foot separation occurs exact measurements to the utility lines shall be provided on the As-Built drawing.

G. Line Size - Minimum line size shall be eight (8) inch diameter. In certain cul-de-sac streets or other similar circumstances the District may allow reduction to a four (4) inch diameter line size. For non-single family residential developments, the minimum line size shall be twelve (12) inch diameter unless the requirement is waived by the District.

H. Pipe Material - Pipe shall be cement-lined, Class 52 ductile iron unless otherwise indicated on the plans. Pipe shall be wrapped with a polywrap material conforming to AWWA C-600, unless otherwise indicated on the plans.

I. Dead-end Water Lines - Dead-end lines are not permitted, except in certain cul-de-sac streets, in which case hydrants or blow-offs must be provided at the end of the main.

J. Blocking on End of Mains - Concrete Deadman Blocking is required for mains that may be extended in the future.

K. Connection to Existing Mains
   1. End of Main Line - A main line valve, sized the same as the main line size, may be required to be installed at the end of the existing main and new main construction connected to the new valve. Exceptions shall be considered where there is an existing valve in close proximity to the new connection.
   2. Tee Connection by Wet Tap - Where the tee connection has the same size diameter as the main being tapped and the main is ductile iron, or the tee connection has a smaller diameter than the main being tapped, a wet tap of the main under pressure shall be used for connection, unless otherwise directed by the District.
   3. Cut-in - Cut-in connections shall be utilized in cases where wet taps are not used or when crossing under an existing AC watermain. The cut-in connection normally consists of a
ductile iron tee, appropriate valving, two 10-foot lengths of ductile iron pipe (one on each side of the tee), and fittings necessary to connect the ductile iron pipe to the existing pipe.

L. Fitting Material - Fittings must be cement-lined ductile iron.

M. Multiple Fittings - Where more than one fitting occurs in close proximity to each other, i.e. a tee and valve, the fittings shall be flanged to each other.

N. Lines Entering/Exiting Structures - A flexible fitting shall be placed on all lines entering/exiting vaults or other structures, outside of the structure, within five feet of the structure, for protection from earthquake shaking by providing a point where the difference in vibration rates of the pipe and the structure can be absorbed. The fitting shall be a mechanical joint ductile iron sleeve. If a mechanical joint or bell connection occurs within 5 feet of the structure, outside of the structure, the flexible fitting may be omitted.

O. Pipe Anchors - Pipe anchors shall be required on all lines where the slope of the line is equal to or in excess of 20 percent. For grades up to 35 percent, anchors shall be placed at not over 36 feet on center. For grades between 35 and 50 percent, anchors shall be placed at not over 24 feet on center. For grades over 50 percent, anchors shall be placed at not over 16 feet on center.

P. Hill Holders - Hill holders shall be required where the finished grade is greater than or equal to 15 percent.

Q. Fire Hydrant Location - Standard 5-1/4 inch Main Valve Opening (MVO) fire hydrants are required approximately every 500 feet in urban areas and every 700 feet in rural areas. Standard 5-1/4 inch MVO fire hydrants are required approximately every 300 feet in commercial areas. The location of the fire hydrants shall be approved by the King County Fire Marshall's Office. Hydrants shall not be located within 3 feet of water meter boxes on center. The trunk of trees and bushes shall not be planted within 5 feet of the hydrant.

R. Fire Hydrant Line Size - Pipe runs from main line to standard hydrants less than or equal to 50 feet in length must be a minimum of 6 inches in diameter. Pipe runs from main line to standard hydrants greater than 50 feet in length must be a minimum of 8 inches in diameter. No other water connections shall be allowed on fire hydrant runs.

S. Hydrant Guard Posts - Hydrant Guard Posts shall be required wherever their installation does not violate the King County Road Standards for obstacle placement. Unless otherwise required by the District, guard posts shall be required with hydrants located on streets without vertical curb and gutter sections and in all multi-family/commercial/industrial developments. Use of guard posts for hydrants located in easements in situations other than those mentioned above shall be evaluated on an individual case basis. A minimum of two, and up to four, guardposts may be required for each hydrant.

T. Valve Type

1. Gate valves shall be used for all water mains less than 12 inches in diameter. Gate valves are allowed for wet taps that are 12 inch or larger, provided adequate cover exists.
2. Butterfly valves shall be installed on all water mains 12 inches and larger. Butterfly valves may require plugging for testing purposes.

3. All valves installed for future extensions shall be plugged by blind flange or mechanical plug.

U. Valve Locations

1. Not more than 800 feet between valves in residential areas, not more than 500 feet in commercial areas.

2. At intersections:

3. Full valve clusters at all major water line intersections.

4. Valve on dead end line where dead end line intersects the main water line.

5. Provide ability to serve water line from alternate directions in a looped system, while isolating a section of main for maintenance, repair or continuation.

6. Locate at positions that will be readily located in the future. i.e., at intersections or in conjunction with a fire hydrant.

7. Local circumstances, such as construction requirements.

V. Blow-offs – Blow-offs shall be located at the end of all dead end mains. The District has two standard types of blow-offs, as shown on the Standard District Details. See Part Four of these Technical Specifications. Type I blow-offs are normally used where the main may be extended in the future. Type II blow-offs are required where the main will not likely be extended in the future. Type II blow-offs may be substituted for Type I blow-offs. If a hydrant is located at the end of a dead end main, the District may consider waiving the blow-off requirement.

W. Air and Vacuum Release Valves - Two-inch air and vacuum release valves shall be installed at high points in the system. One-inch air and vacuum release valves may be allowed upon District approval, where calculations indicate the anticipated air volume is within manufacturers specifications for one-inch valves. The depth of the watermain near the air/vacuum release valve shall be deep enough to achieve at least the minimum upslope (2%) to the air/vacuum release valve. The depth of the watermain shall be shown on the drawings.

X. Meters

1. Single-Family Residential

   a) Location

   All lots shall have meters located along their frontage. Wherever possible, meters shall be located within 5 feet of the property line.

   If a lot does not have frontage on a water main, the meter shall be located on the lot’s legal access route. Meters must be located within 50 feet of the property line on the access route. If the distance is greater than 50 feet, a watermain must be extended along the access route to the property to be served. The District shall approve all other
locations. The private water service line between the meter and the property must be located under the pavement to protect the private water service line from damage from other utilities, landscaping, fencing, and other construction activities.

All meter locations shall be within the right-of-way or easements granted to the District. The location shall be easily accessible by District personnel at all times.

The trunks of trees and structures shall not be located within 5 feet of meter boxes. Meter boxes shall be positioned with at least 18 inches clearance from any other utilities, bushes or obstructions. Meters shall be located, where practical, on lot corners. A single meter setter for each lot shall be used.

Locating meter boxes in driveways or paved areas shall not be permitted, except with written District approval. Where unavoidable traffic bearing meter boxes shall be used, a 3/4 inch expansion joint shall be provided around the box with a eighteen (18) inch gap between the expansion joint and meter box on all sides. Sanitary side sewers shall be a minimum of 10 feet away from the meter location.

b) **Size** - Meter size shall be based on the lot or house size, total plumbing fixture count, system pressure, the use of in-ground irrigation and/or the need for fire sprinkler systems. The standard meter sizes are 3/4” and 1”. If there are lots that have specific meter size requirements based on the need for fire sprinkler systems, or other reasons, they shall be called out on the design. Single family houses with separate ADUs (accessory dwelling unit) may be served by a single meter. The plumbing fixture count shall be the combined total for both structures.

c) The following are the District criteria for meter and service line sizes:

<table>
<thead>
<tr>
<th>Type of Service</th>
<th>Service Line Size</th>
<th>Setter Size</th>
<th>Meter Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>1”</td>
<td>Single ¾”</td>
<td>¾”</td>
</tr>
<tr>
<td>No. of Plumbing Fixtures Requiring Greater than ¼” Meter*</td>
<td>1”</td>
<td>Single 1”</td>
<td>1”</td>
</tr>
<tr>
<td>Fire Sprinklers</td>
<td>1”</td>
<td>Single 1”</td>
<td>1”</td>
</tr>
</tbody>
</table>

*Requires that the property owner apply for a larger meter and pay all necessary fees.

2. Multi-Family/Commercial/Industrial

a) **Service to Each Building** – For non-single family residential developments, each building shall be served by at least one individual meter. Where a building has service from multiple meters, the plumbing system served by each meter shall be separate, so that service is provided only from one meter.
b) **Location** - The District shall approve all meter locations. All meter locations shall be within the right-of-way or easements granted to the District. The location shall be easily accessible by District personnel at all times. Locating meter boxes in driving areas shall not be allowed. Traffic bearing meter boxes shall be used if the location is in an area where vehicles may enter within 2 feet of driving surface. Sanitary sewers or side sewers shall be a minimum of 10 feet away from the meter location. A single meter setter for each lot shall be used.

c) **Size** - Meter size shall be based on the needs and requirements of the development. Specific meter sizes shall be called out on the design. With 3” and 4” meters the meter should be specified as a Compound or other type meter.

3. **Irrigation**

a) **Location** - The District shall approve all meter location. All meter locations shall be within the right-of-way or easements granted to the District. The location shall be easily accessible by District personnel at all times. Irrigation meters shall not be placed on double setters, where the other meter may be for domestic use. Locating meter boxes in driving areas shall not be allowed. Traffic bearing meter boxes shall be used if the location is in an area where vehicles may enter within 2 feet of driving surface. Sanitary sewers or side sewers shall be a minimum of 10 feet away from the meter location.

b) **Size** - Meter size shall be based on the needs and requirements of the development. Specific meter sizes shall be called out on the design. With 3” and 4” meters the meter should be specified as a Turbine or other type meter. Non single-family residential customers shall have an irrigation meter that is separate from the domestic supply water meter.

c) **Cross-Connection Control** - Irrigation water meters shall have a cross-connection control device, approved in the State of Washington, installed on the customer side of the meter, near the meter box. The cross-connection control device shall be tested at the time of installation by a State-certified backflow prevention tester.

Y. **Service Lines**

1. **Location** - Service lines shall run as close to perpendicular across the street and/or right-of-way as possible, from the main to the meter box. The maximum length service line shall be 60 feet. Where "bubbles" are located off to the side of a street, the length may be increased if there are two or less service lines that are greater than sixty feet in length. If the right-of-way width is greater than sixty feet, the service line length may be increased accordingly.

2. **Size** - Service line size shall be based on the number of meters that will be served by the line, the size of the meter(s) to be served, system pressure and/or the size of the lots being served. Within a development, if there are more than one service line size based on the District criteria, the larger line size shall be used for all domestic services. District criteria for single family residential development services are given in the Meters section above. Irrigation, multi-family, commercial or industrial service line sizes shall be based on the request and needs of the developer.
3. **Obstructions** - Structures that shall not be constructed over the service lines include, but are not limited to: fences, carports, buildings, landscape timbers, retaining walls, mailbox stands, trees, and rockeries.

Z. Backflow Prevention

1. For non single-family structures, double check detector assemblies (DCDA) shall be provided on fire sprinkler lines. DCDA’s shall be located in vaults as shown in Part Four.

2. Additional backflow prevention devices may be required depending on type of facility. For facilities designated by the State of Washington as high hazard facilities (such as car washes, service stations, multi-use commercial building pads, mixed-use multi-family, etc.), premise isolation of all water service lines shall be provided using reduced pressure backflow assemblies (RPBA). Such high hazard facilities shall be required to have a DCDA for the fire sprinkler system, unless such fire sprinkler system has chemicals added.

3. For single-family structures, backflow prevention devices shall be provided for in-ground irrigation systems at the point where the irrigation lines are connected to the domestic supply line to the house, and for fire sprinkler systems. Backflow devices for fire sprinkler systems shall be double check valve assemblies (DCVA) installed directly behind the water meter.

4. For multi-family residential structures greater than 30 feet in height shall have a DCVA installed directly behind the water meter. Mulit-family in a mixed use development shall require a RPBA.

5. For additional information, see the District’s Cross Connection Control Program requirements.

AA. Fire Sprinkler Lines

1. Fire sprinkler lines shall be a minimum of 4 inch diameter ductile iron between the main and the DCDA vault. The line shall be fully restrained with megalug fittings, field lock push on joints, and thrust blocks.

2. For non single-family customers, fire sprinkler service shall be provided through a separate tap to the water main, and a DCDA shall be required. Some single-family customers may also require a separate tap.

3. Additional backflow prevention devices may be required depending on type of facility or system.

BB. District Sampling Stations - District sampling stations, installed where directed by the District, shall consist of a 1-inch water service line and meter stop. District will install sampling station.
1.2 SANITARY SEWER SYSTEMS

The work shall be done in accordance with the Plans and Specifications prepared by the District's Engineer and/or Developer's Engineer and approved by the District. As a preliminary guide to applicants, the following general standards of design are set forth:

A. Sewer Extension

1. Sewers shall be extended from the existing District sewer system to the Developer’s Real Property. Such offsite sewers shall include sewer mains and/or side sewer stubs, as directed by the District at its sole discretion, to all real property adjacent to the sewer so that future sewer service can be provided to such other real property.

2. Sewers shall be extended across the Real Property in all directions so as to provide for future extension of the sewer system beyond the Real Property.

3. Sewers shall be constructed within the Real Property so that they are adjacent to all proposed or existing lots and/or buildings within the Real Property.

B. Design Criteria - All design shall be in accordance with Department of Ecology "Criteria for Sewer Works Design", latest revision.

C. Sewer Flow - All sanitary sewer design shall be by gravity flow, except by special arrangement with the District.

D. Storm/Surface/Ground Water Restrictions - No storm water, surface water or ground water shall be discharged into sanitary sewers.

E. Main Location - Mains shall be laid only in right-of-way or proposed right-of-way or within separate utility tracts in easements that have been or will be granted to the District. They shall be located in public right-of-way in preference to easements. Easements across individual lots require District approval during preliminary design.

F. Easements - All easements shall be a minimum of fifteen (15) feet in width and shall be subject to standard District easement restrictions. Piping shall be installed no closer than five (5) feet clear from the easement’s edge. Widths in excess of fifteen feet may be required by the District for locations where the District feels that construction, maintenance or repair of the sewer line within the easement would not be feasible.

The standard District Easement restrictions are set forth in the easement form included as a part of this Agreement. Prohibited items include locating structures over the easement, such as rockeries, walls, concrete slabs, fences, and trees.

G. Location of Line within Street Corridor - Normally the sewer lines shall be located on the South and/or West side of the street. Exceptions to these criteria may be granted based on excessive crossings of other utilities, separation from other utilities or other extenuating circumstances.

Criteria for Location within the Street Cross-Section

1. Thickened edge - Locate 6 feet off of street centerline.
2. Curb/gutter - locate 6 feet off of street centerline.
3. Shoulder roads - locate 2 feet behind the fog line.
4. Manholes kept out of curb/gutter and drainage courses.
5. Maintenance considerations - accessible and maintenance of sewer line possible within the Right-of-Way.
6. Amount of restoration that will be required following construction.

H. Sewer Line Depth
   1. All gravity sewer mains shall be a sufficient depth to drain basements and be protected against damage by frost and traffic. There shall be a minimum of five (5) feet of cover over the crown of the sewer line. At natural drainage crossings, this may be reduced to three (3) feet.
   2. A minimum of four (4) feet of cover shall be provided over low pressure mainlines.

I. Separation Between Other Utilities
   1. Water - in accordance with criteria set forth in DOE guidelines
   2. Storm Sewer - Three (3) foot horizontal clearance.
   3. Underground Power, Gas, Telephone and Cable - A three (3) foot horizontal clearance is preferred when utilities are aligned parallel to the water main. In any case where less than three foot separation occurs exact measurements to the utility lines shall be provided on the As-Built drawing.

J. Line Size
   1. Minimum gravity line size shall be eight (8) inch diameter.
   2. Minimum low pressure mainline size shall be two (2) inch diameter.
   3. The extension shall incorporate adequate capacity to provide the future expansion of the system in conformity with the District's comprehensive planning and future needs.

K. Pipe Material
   1. Gravity pipe shall be PVC or ductile iron unless otherwise indicated on the plans. Ductile iron pipe shall be wrapped with a polywrap material conforming to AWWA C-600 and shall be lined with Protecto 401, unless otherwise indicated on the plans. C-905 pipe may be considered for lines fourteen (14) inches and greater in diameter. Pipes with slopes greater than or equal to twenty (20) percent shall be ductile iron or C-900 or C-905. Pipes buried twenty (20) feet deep or deeper shall be ductile iron, C-900 or C-905. Ductile iron pipe shall be lined with Protecto 401 ceramic epoxy lining.
   2. Low pressure pipe shall be HDPE SDR 11 with tracer wire.
L. Gravity Pipe Grade
   1. Lines shall be on straight alignment and uniform grade between manholes.
   2. No grade shall be permitted resulting in a velocity of less than two feet per second at design flow.
   3. If slope and volume are such that velocities above twelve feet per second are realized at average flow, special provisions shall be made for anchoring the pipe and protect against erosion of the sewer system. In any case where the slope of the pipe is greater than twenty (20) percent, pipe anchors shall be required.
   4. The crowns of pipes of different diameters entering a manhole shall be installed at the same elevation.
   5. If the slope of the sewer pipe upstream or downstream of a manhole exceeds five (5%) percent, the greatest slope shall be conveyed through the manhole. Manhole invert elevations shall be calculated reflecting this condition and shall be shown on the drawings.

M. Hill Holders - Where the finished grade of the ground is in excess of fifteen (15) percent, hill holders shall be required.

N. End of Sewer Mains - All sewer mains shall end in a manhole. Cleanouts may be considered on an individual case basis with written District approval.

O. Manhole Location - A manhole shall be provided at each grade, alignment or size change. No distances in excess of 300 feet shall be permitted between manholes unless authorized in writing by the District.

P. Manhole Size - All manholes less than 20 feet deep shall be forty-eight (48) inch minimum diameter, and eight (8) foot minimum depth from invert to rim elevation. The District may, at its sole discretion, allow manholes between six (6) feet and eight (8) feet in depth from invert to rim elevation. Manholes 8 feet deep and shallower shall have two (2) foot cones. If the depth of the sewer is 20 feet or greater, sixty (60) inch minimum diameter manholes shall be used. If the diameter of the sewer is 15 inches or greater, seventy-two (72) inch minimum diameter manholes shall be used.

Q. Direction Change through Manholes - The change in direction between flow entering and exiting a manhole shall not be less than ninety (90) degrees. (Any change in direction requiring an acute angle in the manhole channel is not permitted.)

R. Manhole Channels - Manholes shall be full-channel with a minimum of one-tenth (0.1) foot drop in elevation through the manhole. Where the slope of a sewer line is greater than five (5%) percent as discussed above, the greater slope shall be continued through the manhole. The channel for sewer lines entering manholes perpendicular to the through direction of flow shall be curved in a sweeping radius to direct the flow downstream. No pre-channeled manholes shall be allowed.
S. Transition Manholes – In cases where a sewer main with a slope in excess of four (4) percent must turn through a manhole at an angle between 45° and 90°, a transition manhole shall be provided upstream to reduce the slope to a maximum of 2 percent and/or to reduce the angle of the turn to between 0° and 45°. Outside drop connections may be used ONLY where the angle of the downstream direction of flow is between 0° and 45°.

T. Manhole Lining – The manhole into which a force main or low pressure mainline discharges shall be lined with 5-9 mils of Tnemec Series 141 Epoxoline or Wasser Aeroshield. In addition, the two manholes downstream of that manhole shall be lined with Tnemec Series 141 Epoxoline or Wasser Aeroshield, if installed as part of the same project. If existing, the two downstream manholes shall be lined with a protective coating resistant to hydrogen sulfide corrosion, such as Wasser Aeroshield, or Tnemec Series 141 Epoxoline. Submit product information for District review. Coating thickness shall be per the manufacturer’s recommendations.

U. Manhole Cone - Manholes eight (8) feet and less in depth shall have cones a maximum of two (2) feet in height.

V. Manhole Access Roads – Wherever possible, access to manholes shall be provided on public or private roads to which the District has access. Where such access is not possible, access roads shall be required to ALL manholes not located within or immediately adjacent to public or private roads. Turnarounds conforming to the District’s standard detail shall be provided at the end of dead end manhole access roads.

W. Gravity Side Sewer Connections - Connections to a new sewer main shall be made with tee fittings. Connections to an existing sewer main of a single-side sewer not associated with a new development may be made, with written District approval, by cut-in tee fitting or side sewer saddle connection conforming to the requirements in Part 2.

X. Low Pressure Side Sewer Connections – Connections shall be made with SDR 11 or Schedule 80 threaded fittings and shall terminate in Collector Valve Boxes as shown in the Standard Details.

Y. Joint Gravity Side Sewers - Double side sewers shall be split with wye fittings. If a side sewer serves three or four housing units, a minimum of six (6) inch diameter pipe shall be used to the last (upper) wye. A cleanout will be required at the wye where the upper connection is made. Side sewers serving more than two residential structures shall be subject to approval by the District. Up to three housing units in one building (triplex) may be served by one side sewer. Joint side sewers for commercial structures are not permitted. Each commercial structure shall be equipped with its own side sewer.

Z. Gravity Side Sewer Grade - Side sewers from the sewer main to the building shall have a minimum slope of two (2) percent. At the District’s sole discretion, slopes may be reduced to one (1) percent; in that case, the side sewer diameter shall be increased to six (6) inches.

AA. Side Sewer Cleanouts – Cleanouts shall be installed at intervals not to exceed one hundred (100) feet in straight runs and for each aggregate horizontal change in direction exceeding one hundred thirty-five (135) degrees per the Uniform Plumbing Code. The maximum length of side sewer shall be 200 feet unless the requirement is waived by the District.
cleanouts shall be located no more than three feet from the building foundation. For single-family residential developments, cleanouts located in unimproved or landscaped areas shall be no more than 12 inches below ground surface. Cleanouts located in sidewalks, pavement, or other improved areas and cleanouts for non-single family developments shall be brought to grade as shown in the Standard Detail. For multiple single-family residential connections, a six (6) inch diameter wye and cleanout shall be installed where the last (upper) connection is made. The District may require a forty-eight (48) inch manhole at the upper terminus of such lines on both residential and commercial tracts in lieu of cleanouts.

BB. Side Sewer Locations

1. In single family residential developments the side sewers shall be extended at least ten (10) feet into the individual lots, and shall be at least five (5) feet from a side property line.
2. Side sewers shall be installed perpendicular to the main.
3. All lots shall have side sewers located along their frontage and shall not be located in private side sewer easements without the express prior written consent of the District.
4. On extensions through areas not currently being developed, side sewers shall be extended as close as practical to the property line.
5. In non-single family residential developments the locations of the side sewer extensions shall be decided on a case by case basis.
6. A minimum of ten (10) foot separation shall be maintained between the side sewer and water mains or water service lines.
7. Structures that shall not be constructed over the side sewer lines include, but are not limited to, fences, carports, buildings, landscape timbers, retaining walls, mailbox stands, trees, and rockeries.
8. A maximum of two (2) side sewers shall be connected to a manhole.

CC. Lift Stations - In any case where a lift station is being considered, the District shall be consulted for its latest criteria on lift stations standards for controls, telemetry, generators and other associated components. Permanent lift stations shall have permanent standby generators.

DD. Lift Station Rock Catch Basin - The last manhole in the lift station site before entering the wet well shall have a two (2) foot deep catch below the lowest pipe invert. This manhole shall be located so that it is accessible for regular cleaning of the manhole by a vactor truck.

EE. Lift Station Water Service - A water service with a 3/4-inch hose bib shall be provided at all lift stations, with a Reduced Pressure Backflow Assembly (RPBA) backflow prevention device, located at the property line. In wet well/dry well installations the service shall be located within the dry well.

FF. Grinder Pump Stations - Grinder pumps may be installed for individual structures as designated by the District. Standard lift stations will normally be required where gravity flow cannot be achieved. See Standard Details.
GG. Force Main Size - The force main shall be sized to maintain a minimum velocity of three (3) feet per second (fps) with design flows and a maximum velocity of 8 fps. A minimum diameter of four (4) inches shall be used with sewage pumps that can pass a three (3) inch solid.

HH. Force Main Material – Permanent force mains shall be ductile iron for diameters of four (4) inches or greater, and high-molecular weight polyethylene pipe (HDPE) for diameters less than four (4) inches. Permanent ductile iron force mains under gas easements shall be AWWA C900, Class 150 pipe. Temporary force mains may be AWWA C900, Class 150 for diameters of four (4) inches or greater, and high-molecular weight polyethylene pipe for diameters less than four (4) inches. The determination of whether a force main is temporary or permanent shall be made solely by the District.

II. Force Main Depth - A minimum cover of six (6) feet is required. This cover may be reduced to four (4) feet when ductile iron pipe is used. The cover may be reduced to three feet when crossing a drainage course. The cover for grinder pump collector force mains shall be a minimum of three (3) feet.

JJ. Force Main Cleaning – For force mains 8 inches in diameter and larger, the lift station will be equipped with a pig launch facility unless otherwise directed by the District. The manhole into which the force main discharges shall be equipped with an aluminum pig catch grating. Cleanouts will be provided on force mains 6 inches in diameter and smaller, with the cleanouts spaced at 500-foot intervals.

KK. Force Main Tracer Wire Locate Stations – Test stations containing tracer wire shall be located over the centerline of all force mains at 500-foot intervals and at bends.

LL. Force Mains Entering/Exiting Structures - A flexible fitting shall be placed on all lines entering/exiting vaults or other structures, outside of the structure, within five feet of the structure, for protection from earthquake shaking by providing a point where the difference in vibration rates of the pipe and the structure can be absorbed.

MM. Force Main Air Release/Vacuum Breaker Valves - Air release/vacuum breaker valves shall be required at high points in the force main and as designated by the District.

NN. Grease Interceptors – All commercial or industrial facilities, schools, churches, or other non-single family residential facilities that have food service facilities or car washes shall be equipped with an approved type and adequately sized grease interceptors or oil/water separators. Submit sizing calculations for District review. Piping shall be a minimum of 6 inches in diameter and the discharge pipe shall be connected directly to a manhole. Connection to the blackwater building sewer requires written District approval. All commercial building pads with unidentified or potentially variable uses must be provided with a grease interceptor at the time of initial construction. Provide graywater plumbing to building pad(s). If discharge into manhole is not feasible, in the sole opinion of the District, provide a sampling point prior to discharge to sewer. Submit plan and product submittal for District review. For additional information, see the District’s Fats, Oils, and Grease regulations.

OO. Oil/Water Separators – Oil/water separators shall be provided for parking garages, car washes, service stations, and other covered facilities where gasoline and oil may contaminate storm water handling facilities. Submit sizing calculations for District review. The oil/water
separator shall be located on the side sewer just upstream from the District’s sewer system, and shall be privately maintained and owned. Open air parking lots, although they may be equipped with oil/water separators, shall not be routed to the sewer system since they will introduce stormwater inflow to the sewer system. If discharge into manhole is not feasible, in the sole opinion of the District, provide a sampling point prior to discharge to sewer. Submit plan and product submittal for District review. For additional information, see the District’s Fats, Oils, and Grease regulations.

PP. Backwater Valves – “The Uniform Plumbing Code requires backwater valves on building sewers where the finished floor is below the rim of the upstream manhole. Backwater valves, if they are installed, must be located within the building footprint upstream of the cleanout. The District is not responsible for their installation, maintenance, or operation. The side sewer permit for a building with a backwater valve shall include a hold harmless clause which indemnifies the District against any liability, damage, or cost which may accrue from the installation and operation of a backwater valve in the side sewer.” A note with the exact wording shown in quotes above shall be placed on the drawings with an asterisk, and each building or lot whose finished floor elevation indicates the need for a backwater valve shall have an asterisk next to the building number or lot number as reference to the note.
PART TWO - MATERIAL STANDARDS

2.1 GENERAL

All materials and equipment shall be new and undamaged. Where possible, the same manufacturer of each item shall be used throughout the job. In accordance with paragraph WS-20 "Material and Equipment List" of this Agreement, the Developer or Contractor shall file a material and equipment list with the District including the quantity, manufacturer, model number and technical specifications, if applicable, of material and equipment to be installed as part of the work. If requested by the District, five (5) copies of all information concerning the specifications, installation, operation and maintenance of material and equipment installed as part of the work shall be furnished to the District in five separate labeled binders.

A. Foundation Gravel

Foundation gravel used for backfill of over-excavated trenches shall conform to the requirements of WSDOT/APWA 9-03.17, “Foundation Material, Class B.”

B. Controlled Density Fill (CDF)

Controlled Density Fill (CDF) shall be a mixture of Portland cement (Type I or II), fly ash (ASTM C618, Class F), fine aggregates (coarse sand with 100% passing 3/8-inch sieve, 60-100% passing No. 4 sieve, and 0-5% passing No. 200 sieve), and water, with a maximum 28-day compressive strength of 100 psi, conforming to following proportions:

<table>
<thead>
<tr>
<th>Material</th>
<th>Batch Weight/Cubic Yard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixing Water</td>
<td>50 lb/cu yd</td>
</tr>
<tr>
<td>Portland Cement</td>
<td>30 lb/cu yd</td>
</tr>
<tr>
<td>Fly Ash</td>
<td>200 lb/cu yd</td>
</tr>
<tr>
<td>Fine Aggregate</td>
<td>3200 lb/cu yd</td>
</tr>
</tbody>
</table>

Submit CDF mix design for District review prior to use.

C. Pea Gravel

Bedding material for PVC or HDPE pipe shall be well graded, clean granular gravel material commonly known as pea gravel. Material slightly smaller than pea gravel may be used.

Bedding material shall meet the following requirements:

<table>
<thead>
<tr>
<th>U.S. STANDARD SIEVE SIZE</th>
<th>PERCENT PASSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot; Square Opening</td>
<td>100%</td>
</tr>
<tr>
<td>No. 8 Sieve</td>
<td>0 - 5%</td>
</tr>
</tbody>
</table>
D. Sand Bedding Material

Bedding material for ductile iron pipe shall conform to the requirements of WSDOT/APWA 9-03.13, Backfill for Sand Drain”.

E. Concrete Encasement

Concrete material for encasing water mains crossing over sewer pipes shall have a 30-day compressive strength of not less than 1,500 psi. The mix shall have a slump of between one (1) and five (5) inches.

F. Native Backfill Material

Native materials will be considered suitable for use in backfilling if the material is not sensitive to moisture (compactable if moisture content is greater than optimum). Native materials shall be a sand and gravel combination with no deleterious materials. All materials shall pass a 3-inch sieve.

G. Imported Backfill Material

Durable crushed gravel or rock; or naturally occurring sands and gravels free from wood, bark, roots or other extraneous material, meeting the requirements of WSDOT/AWPA 9-03.19 for “Bank Run Gravel for Trench Backfill”, with percent passing the No. 200 sieve limited to 5 percent max.

H. Hot Mix Asphalt (HMA)

Hot Mix Asphalt (HMA) shall be CL ½” as specified in WSDOT/APWA Section 9-03.9(6) Aggregates for Hot Mix Asphalt, HMA Proportions of Materials, and Performance Graded PG 58-22. Aggregate for asphalt concrete shall conform to the requirements of WSDOT/APWA Sections 9-03.8(1) through 9-03.8(6) for Aggregates for Hot Mix Asphalt, inclusive.

I. Crushed Surfacing


2. Base Course Material (1 ¼” Minus): Base Course Material shall conform to the requirements of WSDOT/APWA 9-03.9(3), “Crushed Surfacing” for Base Course.

J. Not Used

K. 7/8-inch Drain Rock

Material for drains around facilities such as hydrants, blowoffs, and hill holders shall conform to the requirements of WSDOT/APWA 9-03.12(5), “Gravel Backfill for Drywells”, except that the material shall be washed to remove fines.
L. Not Used

M. Grout

Grout shall consist of one part Portland Cement, three parts fine sand, and sufficient water to allow proper workability. “Jet-Set” is not allowed.

N. Trench Plug

Low permeable fill material, a non-dispersible clay material having a minimum plasticity index of 10.

O. Unsuitable Materials

1. Unsuitable materials include the materials listed below:

   (a) Soils which, when classified under ASTM D 2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System), fall in the classifications of Pt (Peat), OH (organic clays of medium to high plasticity, organic silts), CH (inorganic clays of high plasticity, fat clays), MH (inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts), or OL (organic silts and organic silty clays of low plasticity). OH, CH, MH with liquid limits of greater than 50 and OL liquid limit less than 50.

   (b) Soils which cannot be compacted sufficiently to achieve the density specified for the intended use or as determined by the District. Soil additives for drying or stabilization will not be allowed, including but not limited to fly ash, Portland cement, or kiln dust.

   (c) Materials that contain organic material, hazardous or designated waste materials including petroleum hydrocarbons, pesticides, heavy metals, and any material which may be classified as hazardous or toxic according to applicable regulations.

   (d) Soils that contain greater concentrations of chloride or sulfate ions, or have a soil resistively or pH less than the existing on-site soils.

P. Ductile Iron Pipe

Ductile Iron pipe shall be cement mortar-lined and zinc coating as specified herein unless otherwise indicated on the plans. Any pipe found to have dimensional tolerances in excess of those prescribed by the manufacturer or having defects which prevent adequate joint seal or any other damage shall be rejected. If requested by the District, not less than three nor more than five pipe lengths of pipe for each size, selected from stock by the District, shall be tested as specified for maximum dimensional tolerance of the respective pipe.
Ductile Iron pipe shall conform to AWWA Standard C151, Thickness Class 52 or as indicated on the Drawings. Pipe with cement mortar lining shall conform to AWWA C104. The exterior of Ductile Iron pipe shall be coated with a layer of arc-sprayed zinc per ISO 8179. The mass of the zinc applied shall be 200g/m². A finishing layer topcoat shall be applied to the zinc. The mean dry film thickness of the finishing layer shall not be less than 3 mils with a local minimum not less than 2 mils. The coating system shall conform in every respect to ISO 8179-1 “Ductile iron pipes- External zinc-based coating – Part 1: Metallic zinc with finishing layer” Second edition 2004-06-01 Ductile Iron pipe and fittings for sewer shall be lined with PROTECTO 401 ceramic epoxy coating (Manufacturer – Induron, Birmingham, Alabama (888) 773-2401). Joints shall be mechanical joint or push-on joint and shall conform to AWWA C111.

1. Ductile Iron and Cast Iron fittings shall conform to AWWA Standard C110. Mechanical or push-on joints shall conform to AWWA Standard C111. Flanged joints shall conform to ASA Standard B-16.1, Class 125 with ductile iron followers. All fittings shall be cement mortar lined in conformance with AWWA Standard C104.

2. Where required on the Drawings, restrained push-on joint pipe and fittings shall be provided. Restrained joint pipe shall conform to AWWA Standard C151, Thickness Class 52 or as indicated on the Drawings. Pipe shall have cement mortar lining conforming to AWWA C104. Push-on restrained joints shall conform to AWWA C111. Restrained joints shall be designed for a water working pressure of 350 psi for sizes 4-inch through 24-inch, 250 psi for sizes 30-inch through 48-inch, and 150 psi for sizes 54-inch through 64-inch. Submit type of restrained joint pipe to the District for approval.

3. Where fittings are called for on restrained joint pipes, mechanical joints with megalugs or Alpha fittings shall be used.

4. Ductile Iron pipe shall be polywrapped.

5. Ductile Iron pipe shall be furnished with factory-installed plugs in each end of each stick of pipe. Such plugs shall remain installed until the pipe is ready to be installed in the trench.

Q. Polywrap for Ductile Iron Pipe

Polywrap shall conform to ANSI/AWWA A21.5/C105 (See AWWA C600) for linear low-density polyethylene film. The inside surface of the polyethylene wrap to be in contact with the pipe exterior shall be infused with a blend of anti-microbial biocide to mitigate microbiologically influenced corrosion and volatile corrosion inhibitor to control galvanic corrosion.

R. PVC Pipe for Watermains

PVC pipe 4 inches or larger in diameter shall conform to AWWA C900, Class 150. PVC pipe for water service shall only be used where crossing the gas pipeline easement. The pipe shall conform to WSDOT/APWA 9-30.1(5).

S. PVC Pipe for Non-Pressure (Gravity) Sewers

PVC pipe for depths up to twenty (20) feet, and less than 14 inches in diameter shall conform to ASTM D3034 and shall be defined as flexible conduit. Joints shall conform to ASTM D3212 using a restrained rubber gasket conforming to ASTM F477. Fittings shall be injection molded tees. Saddles fastened to pipe with external bands are not acceptable on any new system.
PVC pipe used for depths twenty (20) feet and greater and less than 14 inches in diameter shall conform to AWWA specification C900, Class 150 (DR 18). Joints shall conform to ASTM D3139 with rubber gaskets meeting ASTM F477. Fittings shall be Class 150 injection molded tees, meeting the requirements of AWWA C-907 and ASTM D1784.

T. HDPE Pipe for Water Mains and Pressure Sewers

HDPE pipe for water mains and pressure sewers may be used in specific situations where Ductile Iron pipe is not appropriate or feasible. The use of HDPE requires written District approval. The specifications and class of the HDPE will be determined on a project-specific basis including such factors as working pressure.

U. C-905 PVC Pipe for Non-Pressure (Gravity) Sewers

C-905 PVC pipe may be considered for lines that are fourteen (14) inches and greater in diameter. Pipe shall conform to the requirements of AWWA C905 and Uni-B-11.

All pipe joints shall be rubber gasketed. Rubber gaskets shall conform to ASTM F477.

V. Gate Valves

1. Gate valves shall conform to AWWA C-515, be epoxy coated, resilient seated, have a non-rising stem, a minimum of 200 PSI working pressure unless otherwise specified, shall have a standard 2-inch operating nut, and the standard opening rotation shall be counter-clockwise.

2. Gate valves shall be used for all water mains less than 12 inches in diameter. Gate valves are allowed for wet taps.

3. Butterfly valves shall be installed on all water mains 12 inches and larger. Butterfly valves may require plugging for testing purposes.

4. Where called for on the plans, gate valves shall be used for sewers four (4) inches and larger.

5. Special valves and fittings shall be as specified on the plans.

6. Gate Valves shall be one of the following types, with stainless steel bolts:
   a) Mueller
   b) Kennedy M & H
   c) Clow
   d) US Pipe
   e) American Flow Control Series 25002-17
   f) AVK
W. Valve Boxes

Valve boxes shall be Cast Iron, 2 piece, suitable for installation required, equal to Olympic Foundry Company/APWA Valve Box VB045. Valve box lids shall fit snugly in the casting. Valve Box Lid shall be marked “WATER” for water facilities. Valve boxes shall be equal to Olympic Foundry 940 and marked “SEWER” for sewer facilities.

X. Valve Marker Posts

Valve marker posts shall be reinforced concrete posts, 4"x4" on one end and 4"x6" on the other end, and 42" long. Posts shall be equipped with 1.5” raised Cole brand numbers referencing distance to the valve to the nearest foot. Cole brand numbers shall be installed using waterproof Liquid Nails brand glue suitable for metal surfaces.

Y. Concrete Blocking

Concrete blocking shall be a 1:3:6 mix with a six-inch (6") maximum slump.

Z. Bolts In Piping

All bolts shall be new and shall be of the same type and quality of the pipe or fittings as supplied by the manufacturer. Bolts shall be in conformance with AWWA Standard C110.

AA. Flange Gaskets

Flange gaskets shall be Ring-type cloth insert rubber gaskets 1/16-inch thick equal to Rainbow or Durable Garlock. Gaskets shall cover the full face of flanged fitting ends.

BB. Flexible Coupling

Flexible couplings shall be cement-lined, Mechanical Joint, Ductile Iron long-pattern sleeves unless otherwise approved by the District.

CC. Galvanized Steel, Pipe And Fittings For Blowoffs And Air Vacuum Relief Valves

Galvanized steel pipe shall conform to ASTM A120-65, Schedule 40. Galvanized steel fittings shall be malleable galvanized.

2.2 WATER SYSTEMS

All water mains shall be cement-lined Ductile Iron as specified herein unless otherwise indicated on the Plans.

A. Butterfly Valves

Butterfly valves shall conform to AWWA C-504. Unless otherwise specified the valves shall be class 150, ductile iron, epoxy coated, stainless steel bolts, shaft seals shall be "O" ring type, the standard opening rotation shall be counter-clockwise and shall have a standard 2" operating nut.

I. Butterfly Valves shall be one of the following types:
a) Mueller/Pratt
b) Kennedy M & H

B. Fire Hydrants

1. Fire hydrants shall be a dry-barrel, compression-type traffic model with a 5-1/4 inch main valve opening (MVO) with brass on brass or brass on stainless steel seating as specified for 36-inch trench, unless otherwise designated, flanged at ground line, 6 inch MJ connection with lugs suitable for rods; two 2-1/2 inch hose connections, National Standard Thread; pumper connection shall be a 4-inch Seattle Standard Thread 4.875 x 6 equipped with a five (5) inch, 125-5 Storz quick connect fitting, unless otherwise noted on the drawings or as required by the local fire department jurisdiction. Operating nut shall be 1-1/4 inch pentagon and shall open counter-clockwise. Hydrant shall be so constructed that the direction facing of pumper connection may be rotated to face the roadway. Hydrants shall comply with AWWA C502. Unless otherwise specified, hydrant shall be of dry barrel traffic type with break flange construction.

2. Hydrants shall be one of the following types:
   a) Dresser M&H 129
   b) Mueller A423 (Super Centurion 250)
   c) Clow Medallion
   d) American Darling B-62-B
   e) AVK Series 2780
   f) U.S. Pipe Sentinel 250

C. Tapping Sleeve And Valve Assembly

   Where required by the District, tapping sleeves shall be Romac FTS 420 or JCM 412, with fusion-bonded epoxy coating and Type 304 stainless steel fasteners. The gate valve shall conform to the requirements herein.

D. Corporation Stop

   See Standard Details - Service Connections.

E. Service Saddle

   See Standard Details - Service Connections.

F. Water Service Pipe

   Water service pipe shall be DRISCOPLEX 5100 ULTRA-LINE or equal manufactured from a high density, extra high molecular weight pipe resin polyethylene defined by ASTM D3350 having a cell classification of 345564C as polyethylene type III, grade, PE4710. Pipe shall be Iron Pipe Size – ID ASTM D2239 – SIDR 7 and have a working pressure of 200 PSI at 73.4 degrees F. The polyethylene extrusion compound from which the PE pipe and tubing are

October 2017 2-7 Technical Specifications Part 2 – Material Standards
extruded shall be made of virgin quality material. The polyethylene pipe or tubing shall be marked in accordance with ASTM D-2239 for IPS pipe sizes and carry the National Sanitation Foundation (NSF) seal of approval. See Standard Details for installation procedures.

G. Air and Vacuum Relief Valve Assemblies

Air and Vacuum Relief Valve assemblies shall be APCO No. 143-C, Crispin UL10 or District approved equal for one (1) inch assemblies and APCO No. 145-C, Crispin UL20 or District approved equal for two (2) inch assemblies, or approved equal, equipped with a brass plug on top service port, and shall conform to WSDOT/APWA 9-30.3(7).

H. Hydrant Guard Posts

Hydrant guard posts shall be reinforced concrete posts, 8"x8"x6' long, 8" diameter x 6’ long, or 9” diameter x 6’ long. The same size and type of guard posts shall be used around each hydrant.

2.3 SEWER SYSTEMS

A. Sewer Pipe and Appurtenances, Non-Pressure

Gravity sewer pipe shall be either PVC Pipe for Non-Pressure (Gravity) Sewer Service or PROTECTO 401 ceramic epoxy lined Ductile Iron pipe as specified herein. Pipes with slopes greater than or equal to twenty (20) percent shall be PROTECTO 401 ceramic epoxy lined Ductile Iron pipe or C-900 PVC. C-905 PVC pipe may be considered for lines which are fourteen (14) inches in diameter or greater.

B. Sewer Pipe and Appurtenances, Pressure

High pressure sewer pipe and appurtenances shall be Ductile Iron or HDPE pipe as specified herein.

C. Side Sewer Pipe, Non-Pressure


2. New side sewer connections on an existing sewer main for a single connection (not in conjunction with a new development) shall conform to the requirements listed below.

   a. For existing D3034 PVC Sewer Main (less than 20 feet in depth), the side sewer connection shall be one of the following:

      - Cut-in PVC side sewer tee

      - Romac “SST” Stainless Steel Tapping Sleeve (w/ stainless steel flange), with FLxMJ adapter with PROTECTO 401 ceramic epoxy lining and gasket sized for D3034 PVC side sewer. Romac side sewer saddle, Model CB, is NOT allowed.
b. For existing C900 PVC Sewer Main (20 feet or greater in depth), the side sewer connection shall be a cut-in tee of one of the following materials:

- C900 PVC side sewer tee with a C900 side sewer up to the transition point to D3034 PVC
- Epoxy-lined ductile iron tee with a C900 side sewer up to the transition point to 4-inch D3034 PVC

c. For existing ductile iron Sewer Main (20 feet or greater in depth), the side sewer connection shall be a cut-in tee of epoxy-lined ductile iron, with a C900 side sewer up to the transition to 4-inch D3034 PVC or Romac “SST” Stainless Steel Tapping Sleeve (w/ stainless steel flange), with FLxMJ adapter with PROTECTO 401 ceramic epoxy lining.

D. Side Sewer Pipe, Pressure

Grinder pump side sewer pipe shall conform to the requirements of the Sammamish Plateau Water and Sewer District “Side Sewer Regulations”, latest edition.

E. Low Pressure Mainline Sewer Pipe and Appurtenances

Low pressure mainline sewer pipe shall be either two (2) inch or three (3) inch diameter high-density polyethylene plastic pipe (HDPE SDR 11), conforming to the materials requirements in the Sammamish Plateau Water and Sewer District “Side Sewer Regulations”, latest edition.

F. Manholes

Galvanized steel shall not be used in manholes. See Standard Details for material requirements for standard manholes and for deep manholes.

1. Cast Iron Frames and Covers

Cast Iron frames and covers shall conform to the Olympic Foundry Company No. MH 30A Traffic Type or equivalent marked "SEWER" in two (2) inch raised letters. Castings shall conform to the requirements of ASTM A 48, Class 30 and shall be free of porosity, shrink cavities, cold shuts, or cracks or any surface defects which would impair service ability. Repair or defects by welding, or by the use of "smooth-on" or similar material will not be permitted. Cover shall have a maximum of one hole, and a rubber plug per the Standard District Detail shall be installed in the hole.

Manholes located outside of public rights-of-way shall be equipped with a 3-bolt, lockdown cover. All movable parts shall be made of noncorrosive metals otherwise arranged to avoid possible binding. The locking frame and cover shall be Olympic Foundry Company No. MH 30 D/T Traffic Type or equivalent marked "SEWER" in two (2) inch raised letters.

Manhole covers in pedestrian or bike lane areas shall have low embossment lids.

All manholes rings and covers shall be machine finished or ground on seating surfaces so as to assure nonrocking fit in any position, and interchangeability. At the request of the
District, there shall be made available at the foundry standard rings and standard covers for use by inspectors in testing fit and seating.

At the request of the District, there shall be made available at the foundry a testing device suitable for proving the capacity of the assembly to resist an uplift pressure on the lid equal to a 20-foot head.

All manhole frames and covers shall be identified by the name or symbol of the manufacturer. This identification shall be in a plainly visible location when the frame and cover is installed. In addition to the manufacturer's identification, the material shall be identified by the following "NOD" or "DUC" for nodular or ductile iron respectively. The manufacturer's identification and the material identification shall be adjacent to each other and shall be minimum 1/2 inch letters recessed to be flush with the adjacent surfaces.

2. Precast Manhole Components

Precast manhole components shall conform to ASTM C478 except as modified herein. Base section openings to receive pipe shall be circular and held to the minimum size practical to accommodate the pipe to be inserted to effectively seal the joint. Kor-n-Seal boots shall be used for all pipe penetrations. Connections shall conform to WSDOT/APWA 7-05.3. All manholes shall be channeled in the field. Pre-channeled manholes are not permitted.

Where the direction of future extensions from the manhole are known, a 2-foot stub and cap shall be installed in a Kor-n-Seal boot at that location and the manhole shall be channeled to receive the future flow. The 2-foot stub shall be removed and replaced when the future extension is installed.

Precast manhole elements shall be provided with steps and/or ladders such that the completed manhole will contain a continuous vertical ladder with rungs equally spaced at twelve (12) inches plus or minus 3/4 inch. The lowest rung shall be not more than sixteen (16) inches above the shelf, and the uppermost rung shall be not more than eighteen (18) inches below the street surface. Ladder rungs or handholds in the manhole neck area must be recessed 2 inches for improved clearance.

Joints between precast manhole elements shall be rubber gasketed with O-rings or approved equal conforming to AASHTO M198 and shall be grouted on the inside. Shop drawings of the joint design shall be submitted to the District for approval, prior to manufacture or purchase. Completed joints shall show no visible leakage and shall conform to the dimensional requirements of ASTM C478.

Drop manholes, wherever shown on the plans, shall conform in all respects to the requirements for standard manholes as specified above. Pipe and fitting materials shall be ductile iron and shall conform to the specifications for ductile iron pressure sewer main.

Standard precast cones shall provide an eccentric reduction from forty-eight (48) inches to twenty-four (24) inches and shall not be less than seventeen (17) inches in height. Precast cones shall conform to WSDOT/APWA 9-12.4.

3. Manhole Steps
Polypropylene plastic steps shall be a polypropylene plastic step injection molded around a 1/2 inch diameter ASTM A-615, Grade 60, steel reinforcing bar. Step dimensions and pattern shall conform to the WSDOT/APWA 7-03.5.

4. Ladders

Precast manhole base sections shall be provided with a ladder as shown in the Standard Details. Ladders shall be made of the same material as the steps installed in the manhole sections. All ladders shall be subject to approval by the District.

Ladders shall be installed so they are centered on the largest shelf of the manhole or as otherwise directed by the District.

5. Manhole Lining

The manhole into which a force main or low pressure mainline discharges shall be lined 5-9 mils of Tnemec Series 141 Epoxoline or Wasser Aeroshield. In addition, the two manholes downstream of that manhole shall be lined with Tnemec Series 141 Epoxoline or Wasser Aeroshield if installed as part of the same project.

Existing manholes downstream of the force main discharge shall be lined with a material resistant to hydrogen sulfide corrosion, such as Wasser Aeroshield or Tnemec Series 141 Epoxoline. Submit product information for District review.

G. Air And Vacuum Relief Valve Assemblies

Air and Vacuum Relief Valve assemblies, size 2-inch, shall be stainless steel ARI D-020 with flanged connection.

H. Cleanout Assemblies

Cleanout assemblies for private side sewers shall not be allowed in the right-of-way or in private access tracts. Cleanout assemblies shall be brought up to finished grade with a locking cleanout cover (Olympic Foundry No. M-1025, marked “SEWER”). See District Standard Detail.
PART THREE - CONSTRUCTION STANDARDS

3.1 GENERAL

Except as otherwise noted herein, all work shall be done in accordance with the Plans and Specifications approved by the District and as recommended in the applicable American Water Works Association (AWWA) specifications and/or the latest edition of the Washington State Department of Transportation/American Public Works Association, Washington State Chapter (WSDOT/APWA) Standard Specifications for Road, Bridge, and Municipal Construction, and/or the 10 States Standards, and according to the recommendations of the material or equipment manufacturer. In the event of a conflict between the specifications herein, the District shall determine which specification controls. Work shall be done only by contractors licensed and bonded with the State of Washington and experienced in the installation of public water and/or sewer mains.

The District will strictly enforce the erosion and sedimentation control requirements of other agencies. These requirements include, but are not limited to, silt fencing, check dams, catch basin filtration, and removal of debris from sawcuts by appropriate methods such as vacuuming.

Temporary lot numbers, addresses, or building numbers shall be clearly marked on the curb. These numbers are used by the District for side sewer inspections and water meter installations.

No work shall be done until all necessary permits have been received from the agencies having authority.

A preconstruction conference and a minimum of 48-hours notice will be required prior to starting construction.

Inspection shall be by a representative of the Sammamish Plateau Water and Sewer District. All work shall be inspected prior to backfill. All pressure testing shall be done in the presence of the District. The Contractor shall supply all equipment and materials necessary for testing.

ANY APPROVED CHANGES TO THE PLANS AS APPROVED SHALL BE NOTED ON THE CONTRACTOR’S CONSTRUCTION DRAWINGS. THE CONTRACTOR’S MARKUPS SHALL BE PROVIDED TO THE DISTRICT AT THE COMPLETION OF CONSTRUCTION.

All locations of existing utilities shown are approximate and it shall be the Contractor’s responsibility to verify the true and correct location so as to avoid damage or disturbance. Separations from potable water mains shall conform to Washington State Department of Ecology’s “Criteria for Sewage Works Design”.

Separation Between Other Utilities:

Water – in accordance with criteria set forth in DOE guidelines

Storm Sewer – Three (3) foot horizontal clearance

Underground Power, Gas, Telephone and Cable – Three (3) foot horizontal clearance is preferred when utilities are aligned parallel to the water main. In any case where less than
three (3) foot separation occurs, exact measurements to the utility lines shall be provided on the As-Built drawings.

Horizontal distances on construction drawings are measured between centerlines (e.g., centerlines of water fittings, centerlines of sewer manholes, etc.). Actual distances shall be computed at the time of staking.

Pipes Entering Structures – A flexible fitting shall be placed on all lines entering/exiting vaults or other structures, shall be located outside of the structure, and shall be located within five (5) feet of the structure. The flexible fitting shall provide protection from earthquake shaking by providing a point where the difference in vibration rates of the pipe and the structure can be absorbed. For watermains, for example, the fitting shall be a mechanical joint ductile iron sleeve, unless a mechanical joint bell connection occurs within 5 feet of the structure, outside of the structure, in which case the flexible fitting may be omitted.

Repaving shall be in accordance with the requirements of the agency having jurisdiction over the area to be paved. Monuments shall be restored by a Washington State licensed surveyor following completion of the overlay. Monument cases shall conform to King County standards; monument cases of other agencies (such as Snohomish County monument cases) will not be allowed.

A. Alignment

Unless otherwise specified, the location of the water mains, sewer mains, fittings, manholes and other appurtenances shall be staked out by a Washington State licensed surveyor supplied by the Developer/Contractor.

Contractor shall provide survey and layout required to perform the work. In all questions arising as to proper location of lines and grades, the District decision will be final. Cuts to invert of watermain and sewer main shall be shown on staking along with finish grade elevations. Deviations from the alignment shown on the plans must be specifically authorized by the District.

The Contractor’s Washington State licensed surveyor shall place offset wood hubs (in soil) and/or steel pins (in asphalt or concrete) showing finished grade and cut depth to invert periodically (at least every 100 feet) along the pipeline alignment, and before and at all changes in alignment vertically or horizontally. Hubs/pins shall be placed far enough in advance of such alignment changes so that the manufacturers and specified deflections can be met. Hubs/pins shall be placed and marked for fittings and provide the District with a cut sheet containing the location, description, and elevation information for all hubs and pins. The Washington State licensed surveyor shall survey the installed invert elevation at the bell end of each piece of pipe and shall provide the District with a cut sheet of the invert elevations.
B. Trench Excavation

Trench excavation shall be in compliance with OSHA and WISHA regulations and requirements and shall meet the following requirements unless otherwise directed by the District or otherwise shown on the District-approved Plans.

Trenches shall be excavated to the line, depth and grade as approved by the District. Unless otherwise directed by Contract Documents or the District, trench excavation shall provide a minimum cover over the pipe of thirty-six (36) inches for water mains, forty-eight (48) inches for sewer mains, or as required to meet the depth requirements of sanitary sewer manholes or other necessary structures. Trench sides shall be excavated vertically. Trench widths shall be adequate for proper working space and the placement of any required bedding material under and around the pipe. The maximum trench width at the crown of the pipe shall be the outside diameter of the pipe barrel plus twenty-four (24) inches. For eighteen (18) inch diameter or larger pipe, the trench width at the crown of the pipe shall not exceed 1.5 times the inside diameter. If these widths are exceeded, a stronger grade of pipe and/or a higher classification and amount of bedding material shall be furnished, as directed by the District. Excavation for manholes or other structures shall be sufficient to provide a minimum of twelve (12) inches between their outer surfaces and the sides of the excavation.

The trench shall be kept free from water until jointing is complete. Surface water shall be diverted so as not to enter the trench. The Contractor shall maintain sufficient pumping equipment on the job to insure that these provisions are carried out. Gravel required in the bottom of the trench due to action of weather or workers shall be furnished by the Contractor. Boulders, rocks, logs, roots and other obstructions shall be entirely removed or cut out to the width of the trench and to a depth six (6) inches below pipe. Where material is removed from below grade, the trench shall be backfilled to grade with material which meets the District's standards for trench foundation gravel, and thoroughly compacted. Trenching operations shall not proceed more than 100 feet in advance of pipe laying.

If the native trench bottoms will provide a firm base for the subsequent placement of bedding, pipe and backfill, such native trench bottom may be used if the bottom is leveled and smoothed so that the entire length of pipe will rest on a well compacted base.

Trench bottoms shall be over-excavated as necessary to remove all unstable soil and eliminate "boiling" or "quick" conditions to such a depth as to provide a firm base. Over-excavated materials shall be replaced with trench foundation gravel as directed by the District. Trench foundation gravel shall be placed in no more than one foot lifts. When trenching operations cut through concrete or asphalt pavement, the pavement shall be removed to a width of eighteen (18) inches greater than the top width of the trench. The concrete shall be cut on a straight line. Asphalt paving shall be cut ahead of the trenching equipment to prevent excessive tearing up on the surfacing and to eliminate ragged edges.

C. Timbering and Sheeting

The Developer and/or Contractor shall provide and install timbering and sheeting as necessary to protect workers, the work, existing buildings, utilities and other properties. All timbering and sheeting above the pipe shall be removed prior to backfilling. All sheeting below the top of the
pipe shall be cut off and left in place. Removal of timbering shall be accomplished in such a manner that there will be no damage to the work or to other properties. All timbering and sheeting shall be to the Developer's design and shall meet all requirements as specified by OSHA and WISHA.

D. Pipe Laying

Each gravity sewer pipe shall be laid with bells upgrade and the invert of the pipe to the alignment and grade shown on the plans. Concentric joints shall be closed and a smooth invert provided.

Open ends of pipe or fittings shall be temporarily capped or plugged at all times.

A laser alignment tool shall be utilized for alignment and be capable of self-leveling adjustable line and grade with locking features. The tool shall be inserted into the pipe with a Class IIIA < 5.0mW Laser Diode. For gravity sewers, adjustment to the line and grade shall be done by scraping away or filling in and tamping bedding material under the body of the pipe. No wedging or blocking of the pipe for adjustment to line and grade may be done.

Tees, wyes, elbows, valves, cleanouts, and other appurtenances shall be installed as shown in the standard details herein and at such locations as are shown on the plans or as otherwise directed by the District, and shall not be covered until the District has completed inspection and exact location has been recorded on the project field plan drawings by the Contractor.

For gravity sewers, variance from established line and grade shall not be greater than 1/32nd of an inch per inch of pipe diameter, but shall not exceed ½ inch or result in a level or reverse sloping invert. Variation in the invert elevation between adjoining ends of pipe due to non-concentricity of joining surface and pipe interior surfaces shall not exceed 1/64th of an inch per inch of pipe diameter or ½ inch in any event.

For sewers, the furthest downstream manhole shall be plugged in the downstream side and remain plugged throughout the period of construction, until final acceptance of the project by the District, to prevent debris and/or infiltration from entering the District system.

1. Ductile Iron Pipe

Pipe laying shall in general conform to AWWA Standard C600 and the manufacturer's recommendations unless specifically contradicted by these Specifications. Special care shall be taken in handling pipe to avoid damaging ends, coatings and linings. Pipe shall be carried in slings and shall not be rolled or dragged. The pipe shall be examined for defects and damage while suspended before lowering into trench. Any damage shall be repaired before pipe is lowered into trench. All pipe shall be poly-wrapped in accordance with AWWA C600. Special care shall be taken to avoid damaging the polywrap during installation and backfilling.
2. PVC Pipe

PVC pipe shall be bedded by hand with material containing no organic matter and no rocks larger than 3/4". When in the opinion of the District the native material will not meet this requirement, the District may require that bedding material be imported that meets the WSDOT/APWA classification of bedding material, Section 9-03.16. Pipe shall not be dropped or handled roughly and shall be checked for cracks and defects prior to installation. Any cracked or defective pipe shall not be installed.

3. HDPE (Low Pressure Mainline) Sewer Pipe

HDPE pipe shall meet the installation requirements for PVC pipe. Joints shall be flanged or thermal fusion butt-welded and shall meet the requirements in the District’s “Side Sewer Regulations”, latest edition. Tracer wire shall be installed with the low pressure mainline to its termination point. A minimum of three (3) feet and a maximum of six (6) feet of cover shall be provided.

4. Contamination Prevention

All pipe, fittings, and valves shall be carefully cleaned of all dirt and foreign materials as they are placed. The open ends of pipe and fittings shall be plugged with a temporary watertight plug at all times. Groundwater shall be prevented from entering the pipe at all times.

E. Pipe Joints

No joints shall be covered until examined and approved by the District. Joint material shall be installed according to the manufacturer's recommendations.

The pipe shall be properly aligned before the joint is forced home. During insertion of the tongue or spigot the pipe shall be partially supported by hand, sling or crane as required to minimize lateral pressure on the gasket and to maintain concentricity until the gasket is properly positioned. Pipe deflection and straightening shall be avoided once the joint is home, to prevent creep of the joint. Pipe must be constructed upslope.

Pressure shall be applied in making the joint to assure that the joint is home, as defined in the pipe manufacturer's standard instructions for installation. Restraint shall be applied to the line to assure the joints, once home, are held so by tamping fill under and alongside the pipe or by other appropriate means. When pipe laying is not in progress, the last pipe laid shall be plugged and blocked in such a manner as may be required to prevent water and debris from entering the pipe and creep during downtime.

F. Bedding Material Placement

Bedding material shall be placed from a minimum of six (6) inches below the pipe barrel to six (6) inches over the top of the pipe as shown on the standard details herein. Bedding material shall be placed before the pipe is installed and shall be spread smoothly so that the pipe is uniformly supported along the barrel. Subsequent lifts of not more than six (6) inch thickness shall be placed
to six (6) inches over the crown on the pipe and individually compacted to 90% of maximum density.

Removal of shoring or moveable trench shields or boxes shall be accomplished so that the bedding material placement is not disturbed.

In solid rock excavation, all ledge rock, boulders or stones shall be removed to provide a minimum clearance of eight (8) inches under the pipe. All material thus removed shall be replaced with bedding material.

G. Backfilling

No backfilling shall be performed until after the District has inspected the installation of the pipe and approved backfilling.

Native material that meets the requirements of Imported Backfill may be used for trench backfill upon approval by the District. In addition, 100% import backfill will be required for trench backfill during the wet season from October 1 to April 30.

Backfill material shall be moisture-conditioned as necessary to achieve the required compaction as described herein.

Fill and backfill materials to be placed within 6 inches of any structure or pipe shall be free of rocks or unbroken masses of earth materials having a maximum dimension larger than 3 inches. Backfilling shall be performed carefully so that no damage is done to the pipe or to its alignment. The District may direct the contractor to use special backfill techniques when it deems necessary.

Fill, backfill materials shall be selected or processed clean, fine earth, rock, or sand, free from grass, roots, brush, or other vegetation and organic materials. In areas such as existing paving, or in areas to be paved, where the District determines that minor settlement would be detrimental and the native excavated material is not suitable for compaction as backfill, the trench shall be backfilled with Imported Backfill material.

Materials not defined as unsuitable in Part Two – Material Standards are defined as suitable materials and may be used in fills, backfilling, and embankment construction subject to the indicated limitations. Suitable materials may be obtained from on-site excavations, may be processed on-site materials, or may be imported. If imported materials are required to meet the quantity requirements for the project, imported materials shall conform to the suitable material standards herein. Suitable materials are defined in Part Two – Material Standards.

All trenches shall be fully backfilled at the end of each day or, in lieu thereof, shall be covered by heavy steel plates adequately braced and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of each day at the District’s discretion. Backfilling operations shall not follow more than 100 feet from pipe laying operations. The above requirements for backfilling or use of steel plate will be waived in cases where the trench is located further than 100 feet from any traveled roadway or occupied structure. In such cases, however, barricades and warning lights meeting applicable safety requirements shall be provided.
and maintained. All street crossings shall be backfilled with 1 1/4” crushed rock or as otherwise required by the District, or Local Agency (City/King County).

The pipe zone is defined as that portion of the vertical trench cross-section lying between a plane below the bottom surface of the pipe and a plane at a point above the top surface of the pipe as identified on the standard trench section detail. The bedding is defined as that portion of pipe zone backfill material between the trench subgrade and the bottom of the pipe.

Backfill material shall be placed and compacted around and under the pipelines by hand tools, unless otherwise approved by the District, to a height of six (6) inches above the top of the pipe.

The pipe zone shall be backfilled with suitable backfill material as described herein. Care shall be exercised to prevent damage to the pipeline coating, cathodic bonds, and the pipe itself during the installation and backfill operations. If a moveable trench shield is used during backfill operations the shield shall be lifted to a location above each layer of backfill material prior to compaction of the layer. The pipe or backfill shall not be displaced while the shield is being moved.

Backfill material around another utility crossing the water or sewer trench, such as gas, power, and fiber optic, shall comply with the backfill material requirements of that utility.

After the pipe zone backfills have been placed, backfilling of the trench zone may proceed. The trench zone is defined as that portion of the vertical trench cross-section lying as indicated between a plane above the top surface of the pipe and a plane at a point 18 inches below the finished surface grade, or if the trench is under pavement, 18 inches below the roadway subgrade.

Final backfill is all backfill in the trench cross-sectional area within 18 inches of finished grade, or if the trench is under pavement, all backfill within 18 inches of the roadway subgrade.

In addition, all backfill in right-of-way shall meet King County Road Standards, latest edition or appropriate governing authority’s requirements.

The remaining backfill material shall be placed and compacted in layers not more than twelve (12) inches thick (two feet loose thickness), except that under roadways all backfill material shall be placed in layers not more than six (6) inches thick and mechanically compacted to the density of the existing subgrade, unless state or county requirements are more stringent. All backfill shall be compacted to 95 percent of maximum density (modified Proctor), unless otherwise directed by the District.

Where compaction densities are specified, measurements of density shall be by the modified AASHTO method. The District may require that an independent laboratory or King County Laboratory be employed to perform in-place density tests as proof of compaction which meets these Specifications. Compaction of native material as trench backfill shall be tested and certified by an independent laboratory. All costs shall be borne by the Developer. At its discretion, the District may request supply samples for testing of any material used in the work.

All test trenches and excavations including excavation, trench support, and groundwater removal for the field soils testing operations shall be provided as required by the District. The trenches
and excavations shall be provided at the locations and to the depths required by the District. Lawn areas destroyed by test trenching and excavation shall be regraded and re-landscaped with sod or hydro seeding as directed by the District.

Compaction testing shall be performed at a frequency of every five feet of depth and every 50 feet or with any changes in soils conditions, equipment, or operator personnel, or as directed by the District.

Regardless of the approval of the District as to manner of compaction, testing, acceptance by the District or otherwise, the Contractor/Developer shall repair any settlement of trenches and excavations that may occur within one year after completion and acceptance of the work by the District.

All pavement trench repair shall be provided in accordance with WSDOT/APWA 5-04.3(5)E and joints, surface smoothness and other related pavement construction shall be provided as specified in WSDOT/APWA 5.04, or as directed by the District.

H. Grade Lines

The contractor shall maintain the correct grades of sewer pipes. All bench marks, reference points and stakes shall be preserved and, in case of destruction of any of them, the resulting expense of restoration shall be borne by the Developer. Laser beam equipment for grade and alignment control shall be required.

I. Boring and Casing

In situations where the pipeline is to be bored, the pipeline shall be placed inside a casing. The casing pipe shall be smooth steel, bare pipe, 0.375 inch minimum wall thickness, and comply with ASTM A139, Grade C, with a minimum steel yield of 36,000 psi. To support the pipe inside the casing, pipe slides, casing spacers or 4” x 4” treated timbers with stainless steel straps shall be used to maintain vertical and horizontal alignment. After installation of the pipe in the casing is complete, the casing void shall be filled with sand or grout and the ends of the casing shall be grouted.

J. Pipe in Fills

Special treatment may be required at the discretion of the District for pipe in fills. This treatment may consist of compacting the backfill in 6-inch layers, careful choice of backfill materials, use of ductile iron pipe in short lengths, or such other reasonable methods or combinations as may be necessary in the opinion of the District.

K. Highway Crossings

This item applies only to rigid surface pavements. The Developer may use any method which provides satisfactory results and is acceptable to the governmental agency having control of the road and to the District, provided that the Developer restores the roadway to its original condition. Normally, highway crossings require the placing of a steel casing by jacking, tunneling or boring
and laying the pipeline within this casing. In case of tunneling, subsequent low pressure grouting through the pavement may be required.

L. Valve Installation

Before installation, valves shall be cleaned of all foreign material as hereinbefore specified for installation of pipe. Such blocking as the District may deem necessary shall be provided.

M. Valve Box Installation

The valve box shall be set centered on the valve operating nut. Valve boxes shall be set flush in pavement. In gravel roads the valve box shall be set in a three (3) foot diameter circular pad of two (2) inch thick asphalt, flush with the gravel surface. Installation of pavers or slip cans to adjust valve boxes to finished grade is not allowed.

N. Valve Marker Posts

Valve marker posts shall be set where required by the District for all valves outside of paved roads, except auxiliary valves for hydrants and Type I blowoffs. The marker shall be set on a line through the valve. The marker shall generally be set on the property line unless the District decides another location is safer or more conspicuous.

O. Concrete Blocking

Concrete blocking with specified material shall be cast in place and have a minimum of 1/4 square foot bearing against the fitting and bearing area against undisturbed soil as shown on the District's Standard Details. Additional bearing area may be required by the District. Blocking shall bear against fittings only and shall be clear of joints so as to permit taking up or dismantling joints. All fire hydrants, bends, tees and valves shall be blocked. All sewer force main bends and valves shall be blocked. The Developer/Contractor shall install blocking which is adequate to withstand full test pressure as well as to continuously stand operating pressures under all conditions of service.

P. Air and Vacuum Release Valve Installation

Location of the air release valves as shown on the Plans is approximate. The installation shall be set at the high point of the line.

Q. Access Roads

Access roads shall be used only where the use of public or private roads to which the District has access is infeasible or unavailable. Use of access roads to water and sewer facilities must be approved by the District. The road surfacing shall be appropriate to the neighborhood (such as gravel, grass-crete, paving, cobblestones, etc.). At a minimum, access roads shall be twelve (12) feet wide designed for H-20 loading, with a minimum of two-and-a-half (2-1/2) inches crushed surfacing base course and one-and-a-half (1-1/2) inches crushed surfacing top course, as defined in WSDOT/APWA Section 9-03.9(3), over a District-approved subgrade compacted to 95 percent relative compaction, unless otherwise approved by the District.
Turnarounds shall be provided at all dead ends, either a hammerhead type with forty-five (45) foot long legs and forty (43) foot inside radii, or circular with a diameter of eighty-five (85) feet. The maximum road grade for gravel access roads shall be 7 percent (7%). If the road grade is greater than seven percent, the access road surfacing shall be paved with asphalt concrete pavement.

R. Painting

1. Exposed parts above ground shall be painted as follows:
   a) Fire hydrants shall be painted with two coats of semi-gloss quick set enamel. The color shall be Safety Yellow.
   b) Hydrant posts, type I blowoff assemblies, water air/vacuum assemblies for water mains and water valve markers shall be painted with two coats of semi-gloss quick set enamel. The color shall be Safety Yellow.
   c) Distance to valves shall be marked with raised Cole numbers on the valve marker, blowoff stem, air vacuum assembly stem or Hydrant. Apply numbers with waterproof Liquid Nail.
   d) Sewer air/vacuum release valve vents shall be painted with two coats of semi-gloss quick set enamel. The color shall be Safety Green.

2. Piping and Appurtenances within Structures:
   a) Water Facilities: One (1) rust resistor prime coat and two (2) coats of semi-gloss quick set enamel. The color shall be Safety Blue.
   b) Sewer Facilities: One (1) rust resistor prime coat and two (2) coats of semi-gloss quick set enamel. The color shall be Safety Green.

3. Vaults:
   The exterior of vaults below grade shall be painted with two (2) coats of black bitumastic solution.

4. Meter Box Location stripes:
   Meter Box Location stripes (3 in. x 12 in.) shall be painted with two coats of semi-gloss, quick set enamel. The color shall be Safety Yellow.

5. Sewer Air/Vacuum Release Valve Vents:
   Two coats of semi-gloss quick set enamel. The color shall be Safety Green.
S. Raising Structures to Grade

The Developer/Contractor shall notify the District prior to raising any water or sewer system structures to grade. All water or sewer system structures (i.e. valves, manholes, clean-outs, monuments, etc) shall be raised within 48 hours of installation of ATB or Asphalt Concrete overlay unless directed by the District to raise said structures sooner.

3.2 WATER SYSTEMS

All water mains shall have a minimum cover of 36 inches below finished grade. Where utility conflicts occur, water mains shall be lowered to clear, except that water mains may not be installed under sewer facilities.

Where more than one fitting occurs in close proximity to each other (i.e., a tee and a valve), the fittings shall be flanged together.

A. Fire Hydrant Installation

Hydrant installation shall generally conform to AWWA Standard C600 unless specifically contradicted by the detail for Fire Hydrant Assembly included in the District’s Standard Details. In addition, the fire hydrant run shall be installed with District approved restrained joints. The concrete guard posts as shown on the Standard Detail shall be installed where required by the District. Pumper nozzle shall face the road after installation is completed, unless otherwise specified. Hydrants shall be covered with a bag until operational.

No fences, rockeries, trees, or guardrails shall be installed between the fire hydrant and the main. A minimum of five (5) feet clear zone shall be provided between the fire hydrant and any rockery or structure.

B. Water Service Connections

Connections shall be installed with double strap type pipe saddle that uses stainless steel straps.

Installation shall be as shown in the District Standard Details. Splices or couplings in service lines will not be acceptable.

Draining the water system to install the meter setters will not be allowed. Water services shall be installed so that filings/shavings are removed

C. Meter Box Installations

Meter boxes shall be installed only in unimproved or landscaped areas not subjected to driving or parking. In unimproved or landscaped areas, meter boxes shall be set two (2) inches above the finished grade, including landscaping or mulch. Meter boxes shall be centered over the meter setter(s).

The area surrounding meter boxes shall be backfilled with backfill material conforming to Part 2.1 F (Native Backfill Material) or 2.1 G (Import Backfill Material). Maximum size particle shall be 2 inches. Sand or pea gravel shall NOT be used.
If paved or concrete areas are installed around meter boxes after the meter box is installed, the water service shall be abandoned at the main and a new water service shall be installed perpendicular to the main so that the new meter box is located in an unimproved area not subject to traffic.

Meter boxes may be located in or near driveways or paved areas only with written District approval, or as required by the District. Such meter boxes shall be traffic-bearing boxes as specified on the Standard Details. Meter boxes shall be set flush with concrete or asphalt surfaces (roadway, sidewalk, driveways, driving or parking surfaces, etc.).

When the meter box is installed in concrete paving, a 5/8-inch expansion joint shall be provided around the box with a eighteen (18) inch gap between the expansion joint and meter box on all sides.

Install a water meter marker post at the meter box location until landscaping is completed.

A twelve (12) inch by three (3) inch stripe shall be painted on the ATB or finished asphalt, perpendicular to the edge of the asphalt, to mark the location of each meter box. The color of the stripe shall be as per section 3-1.R(4) "Painting".

No fences, rockeries, trees, or guardrails shall be installed between the meter box and the main.

D. Backflow Prevention (Cross Connection Control)

Where the possibility of contamination of the water supply exists, the District will require that certain services be equipped with a backflow prevention assembly that is approved by DOH. The determination as to the need of a backflow prevention assembly shall be solely determined by the District.

Pursuant to Washington State Regulation WAC 246-290-490 and current District Resolution regulating the District’s Cross Connection Program, the District shall receive a Backflow Prevention Assembly Test Report performed by a certified Washington State Tester, prior to acceptance of the system by the District.

Any transfer of water from a District water main to a vehicle or container must have District inspection and approval as to the method and equipment.

Any use of District water for construction purposes must be from a hydrant or other District-approved source with appropriate, District-approved cross connection control. District personnel will inspect the installation for conformance with District requirements.

E. Connections To Existing Water Mains

District standard testing connections shall be installed on new water main construction. Direct connection to the District’s existing system shall not be made until the new water main is tested and accepted by the District. Following receipt of satisfactory purity tests, schedule with District (1 week minimum notice) for water main shutdowns. Following completion of new water system construction, testing, and acceptance by the District, remove testing connection and install
segment of ductile iron pipe, length to suit, with two long-pattern sleeves or as directed on the District-approved drawings. Installation and connection to the existing water system shall be with 100% District inspection.

Connections to the end of an existing water main line shall be made with a main line valve, sized the same as the main line size, and new main construction connected to the new valve. Exceptions shall be considered where there is an existing valve in close proximity to the new connection.

Tapping of existing DI pipelines where required by the District, shall be made under pressure with tapping sleeve and valve assembly. Joints shall be tested using normal test pressure prior to start of tapping existing main. District shall determine where tapping under pressure is required. Romac FTS 420, or JCM 412 fusion-bonded, epoxy coated, steel tapping sleeves with Type 316 stainless steel fasteners or approved equal shall be required.

Where cut-ins are to be made in existing pipes, the work shall be conducted at a time specified by District and in such a manner as to minimize the interruption of service. Necessary pipe, fittings and gate valves shall be assembled at the site ready for installation prior to the shutting off of water in the existing main. Once the water has been cut off, the work shall be prosecuted vigorously and shall not be halted until the line is restored to service.

Unless specifically provided for elsewhere in these Specifications, the Developer shall have the responsibility of giving at least 5 business days notice to the District of intention to disrupt service and shall give at least 72 hours notice to the affected water users. Water service shutdowns shall not be scheduled on Mondays or Fridays.

F. Operation of District Valves

Developer/Contractor shall not operate any valves, including fire hydrant valves, in any part of the District's water system, except in the presence of the District. **Developer and/or Developer's Contractor shall be fined for tampering with the District's water system if valves are operated without the District being present.** Developer shall notify the District 48 hours in advance of need to operate system.

3.3 SEWER SYSTEMS

A. Manholes

Precast manhole base sections shall be placed on a well-compacted bedding course of bedding material. The depth of the bedding shall be four (4) inches thick or greater, extending a minimum of twelve (12) inches beyond the outside perimeter of the base section. The balance of any remaining excavated area shall be filled with imported backfill material and well-tamped to the level of the top of the bedding before the manhole is set in place. The bedding shall be well-tamped and made smooth and level to assure uniform contact and support of the precast elements.

All lift holes (inside and outside) and the inside face of rubber gasket joints between precast sections shall be thoroughly wetted and then filled with grout, smoothed and all joints pointed.
Precast sections shall be placed and aligned to provide vertical sides and vertical alignment of ladder rungs. Eccentric cone shall be positioned to allow vertical access to the ladder. The completed manhole shall be rigid, true to dimension and watertight.

Manholes eight (8) feet and less in depth shall have cones a maximum of two (2) feet in height.

Manholes twenty (20) feet or greater in depth shall conform to the Deep Manhole detail on the Standard Details.

Manholes set in paved streets or other paved areas shall be set flush with finished grade of the paving and when required, the manhole frame shall be tilted to conform to the grade on the paved surface.

Manholes set in gravel shoulders or other non-paved improved areas shall be set flush with the finished grade and in an asphalt apron six (6) feet in outside diameter. The asphalt apron shall be tapered per the Standard District Details. The manhole frame shall be tilted to conform to the grade of the finished surface.

Manholes not set in paved or improved areas shall be set at a finished grade six (6) inches to twelve (12) inches higher than the surrounding terrain to prevent surface water infiltration into the system, unless plans specify otherwise. Manholes shall be surrounded by an asphalt apron as shown on the Standard Details.

Manholes installed in wet areas shall have additional measures added to ensure no water infiltration. Consult with District for requirements.

Manhole channels shall be made to conform to the sewer grade and shall be brought together with well-rounded junctions. Channel sides shall be carried up vertically to the top of the largest pipe's diameter and rounded to the shelf at the largest pipe's crown elevation. The concrete shelf shall be smoothly finished with slopes to drain.

The openings through which pipes come into the manhole shall be completely and thoroughly grouted. A watertight joint (Kor-n-Seal boot or approved equal) shall be provided where the pipe passes through the manhole wall.

B. 6-Inch Side Sewer from Main to Property Line

The strength class of side sewer pipe shall be the same as the sewer pipe to which it connects and these specifications shall be applicable to side sewer work.

The slope of side sewers shall not exceed one (1) foot vertical to one (1) foot horizontal when using SDR 35 D3034 PVC, nor be less than 2 percent. If ductile iron or C900 piping is used along with the corresponding change in mainline material, then slope is allowed a maximum of two (2) foot vertical to one (1) foot horizontal nor be less than two percent. When change in slope between connecting pipes exceeds two (2) inches per foot, standard 1/8 bends shall be used. All side sewers shall be plugged and plugs blocked.
The end of all side sewers at the property lines shall be marked with a vertical twelve (12) foot long, 2"x4" board, the bottom of which shall be located at the invert of the elevations of the side sewer and top of which shall be painted white and extend above the ground. The board shall be wrapped from one end to the other with a 12 AWG insulated wire. The wire shall be securely wrapped around the end of the side sewer. The word "SEWER" shall be stenciled in two (2) inch high black letters on the upper end of the board. Depth to invert shall be clearly shown on the board. For inverts that are deeper than 12 feet, the boards shall be extended to at least 4 feet above finish grade and the corresponding measurements to invert shall also be clearly shown.

C. Connection to the Existing Sewer System

Extensions to the District’s sewer system shall be isolated from the existing system with a plug installed at the existing manhole in the presence of District personnel and maintained by the Developer until the sewer extension is accepted by the District. **Developer and/or Developer's Contractor shall be fined for tampering with the District's sewer system if the plug is removed or a connection is made without the District being present.** Developer shall notify the District 48 hours in advance of need to install or remove plug or connect to the system. No connections shall be made to the existing sewer system without the presence of the District. Written application for connection shall be made to the District, and the connection shall be made at a time agreed upon with the District.

1. Connections to existing manholes shall be made as follows:

   a) If the manhole is "live", the manhole channel shall be tightly covered to prevent debris from entering the sewer line prior to breaking into the manhole wall. Immediately after the connection is made, the new pipe shall be plugged and blocked in such a manner that no water shall enter into the existing manhole. The plug shall not be removed without permission of the District. Additional upstream plugs may be required by District.

   b) If the existing manhole is not "live", a plug shall be installed in the downstream or discharge pipe of the existing manhole in addition to the above. Where new connections to existing manholes require an outside drop, two plugs for each drop shall be installed and blocked.

   c) The existing manhole shall be rechanneled

2. Connections to existing sewer main shall be made as follows:

   a) The existing line shall be cut and removed from the manhole excavation. A new manhole shall be installed in place of the removed existing line. The manhole shall be precast, minimum 48-inch diameter. The manhole shall be placed with a full stick of pipe centered through the manhole and coupled to both ends of the existing sewer line. The new sewer line inside the manhole shall be cut out and the manhole channeled. Sewage must be bypassed during channelling.
3. Connections of side sewers to an existing sewer line shall be made as follows:

   a) The connection to an existing sewer main shall be made with a cut in tee with slip couplings. If the connection is made to the existing sewer pipe while in operation, the existing sewer pipe shall be cut with a saw or approved equal to give a smooth beveled edge of the proper size and the lip shall be filed smooth. Each connection shall be bedded with a minimum of six (6) inches of bedding material. Unsuitable foundation material shall be over-excavated and replaced with bedding material.

   b) Alternatively, the connection shall be made with Romac “SST” Stainless Steel Tapping Sleeve (with stainless steel flange), with Protecto 401 FLxMJ adapter and gasket sized for appropriate side sewer pipe material; or an Insert-a-Tee. Romac side sewer saddle, Model CB, is NOT allowed.

D. Side Sewers (Gravity or Pressure)

Gravity or pressure (grinder pump) side sewers shall be installed and tested in accordance with the Sammamish Plateau Water and Sewer District “Side Sewer Regulations”, latest edition.

E. Use of Ductile Iron Pipe for Sewers

The contractor shall furnish repair kits and shall repair the PROTECTO 401 ceramic epoxy lining damaged during installation, welding and/or field cutting operations.

F. Lift Stations

Lift stations shall be installed per District-approved plans and specifications. Lift stations shall be tested with representatives of the District, Developer, Contractor and all sub-contractors involved with the lift station present. Developer/Contractor shall furnish the District with three (3) copies of the Operation and Maintenance Manuals for the Lift Station in labeled binders.

3.4 TESTING FOR WATER AND SEWER PIPELINES

A. Hydrostatic Tests For Ductile Iron Water and Sewer Mains

Ductile iron water and sewer main installations shall be subjected to a hydrostatic pressure test of 250 PSI for a minimum of 15 minutes, before leakage measurement starts. Location of the test pump shall be approved by the District. It shall then be held at this pressure, without pumping, and any leaks or imperfections developing under said pressure shall be remedied by the Contractor before final acceptance of the work. Leakage shall be measured by approved means in the presence of the District. The Contractor shall provide all necessary equipment to allow the District’s inspectors to use their gauges and equipment and shall perform all work connected with the tests. Tests shall be made after corporation stops and service lines are installed, and the trench is backfilled and compacted. All valves within the section being tested shall be open, if possible. No more than 1,500 feet of 8-inch main can be tested at one time. Butterfly valves shall be tested at 150 psi above the static water pressure, with a maximum pressure of 250 psi unless otherwise noted.
Allowable leakage in gallons per fifteen minutes per 1,000 feet of pipe:

- 2” - 0.06 gallons
- 4” - 0.12 gallons
- 6” - 0.18 gallons
- 8” - 0.24 gallons
- 10” - 0.30 gallons
- 12” - 0.36 gallons
- 14” - 0.42 gallons
- 16” - 0.48 gallons
- 18” - 0.54 gallons
- 20” - 0.59 gallons
- 24” - 0.71 gallons

B. Hydrostatic Tests For HDPE Water and Sewer Mains

HDPE water and sewer main installations shall be subjected to a hydrostatic pressure test of 1.5 times the rated operating pressure of the pipe. Location of the test pump shall be approved by the District. To establish equilibrium, the pipe shall be raised to the test pressure and allowed to stand without makeup pressure for 2 to 3 hours to allow for expansion of the pipe, unless otherwise approved or directed by the District. After equilibrium is established, the test section shall be pressurized to 1.5 times the rated operating pressure of the pipe. The pump shall be turned off and the final test pressure shall be held for 1, 2, or 3 hours as determined by the District at the time of testing. The amount of “make up” water shall be measured in the presence of the District Inspector, utilizing a District-approved method. The allowable amounts of make up water for expansion during the leak test are as listed below (US Gallons / 100-feet of pipe):

<table>
<thead>
<tr>
<th>Nominal Pipe Size (inches)</th>
<th>1 – Hour Test</th>
<th>2 – Hour Test</th>
<th>3 – Hour Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0.10</td>
<td>0.15</td>
<td>0.25</td>
</tr>
<tr>
<td>4</td>
<td>0.13</td>
<td>0.25</td>
<td>0.40</td>
</tr>
<tr>
<td>6</td>
<td>0.30</td>
<td>0.60</td>
<td>0.90</td>
</tr>
<tr>
<td>8</td>
<td>0.50</td>
<td>1.00</td>
<td>1.50</td>
</tr>
<tr>
<td>10</td>
<td>0.80</td>
<td>1.30</td>
<td>2.10</td>
</tr>
<tr>
<td>11</td>
<td>1.00</td>
<td>2.00</td>
<td>3.00</td>
</tr>
<tr>
<td>12</td>
<td>1.10</td>
<td>2.30</td>
<td>3.40</td>
</tr>
<tr>
<td>14</td>
<td>1.40</td>
<td>2.80</td>
<td>4.20</td>
</tr>
<tr>
<td>16</td>
<td>1.70</td>
<td>3.30</td>
<td>5.00</td>
</tr>
<tr>
<td>18</td>
<td>2.00</td>
<td>4.30</td>
<td>6.50</td>
</tr>
<tr>
<td>20</td>
<td>2.80</td>
<td>5.50</td>
<td>8.00</td>
</tr>
<tr>
<td>22</td>
<td>3.50</td>
<td>7.00</td>
<td>10.50</td>
</tr>
<tr>
<td>24</td>
<td>4.50</td>
<td>8.90</td>
<td>13.30</td>
</tr>
<tr>
<td>28</td>
<td>5.50</td>
<td>11.10</td>
<td>16.80</td>
</tr>
<tr>
<td>32</td>
<td>7.00</td>
<td>14.30</td>
<td>21.50</td>
</tr>
<tr>
<td>36</td>
<td>9.00</td>
<td>18.00</td>
<td>27.00</td>
</tr>
<tr>
<td>42</td>
<td>12.00</td>
<td>23.10</td>
<td>35.30</td>
</tr>
<tr>
<td>48</td>
<td>15.00</td>
<td>27.00</td>
<td>43.00</td>
</tr>
</tbody>
</table>
Under no circumstances shall the total time under the test exceed eight (8) hours at 1.5 times the pressure rating. If the test is not completed due to leakage, equipment failure, etc., the test section shall be allowed to “relax” for eight (8) hours prior to the next test.

Any leaks or imperfections developing under said pressure shall be remedied by the Contractor before final acceptance of the work. The Contractor shall provide all necessary equipment to allow the District’s inspectors to use their gauges and equipment and shall perform all work connected with the tests. Tests shall be made after corporation stops and service lines are installed. All valves within the section being tested shall be open, if possible.

C. Sterilization and Flushing Of Water Mains

Flushing of the water mains is to clean and sterilize the mains. Cleaning includes the flushing at a velocity and volume that will remove rocks and debris from the main.

Sterilization of water mains shall be accomplished by the Contractor in accordance with the requirements of the State Department of Health (DOH) and in a manner satisfactory to the District. During pipe installation the Contractor shall install chlorine granules per manufacturer’s specifications to achieve a chlorine concentration of not less than 50 PPM. When a chlorine concentration of not less than 50 PPM has been established throughout the line, the valves shall be closed and the line left undisturbed for 24 hours. The line shall then be thoroughly flushed and water samples taken for approval by the local health agency.

If the main fails to pass purity tests the following procedure shall be followed. The section to be sterilized shall be thoroughly flushed at maximum flow prior to chlorination. Flushing shall be done in the presence of the District. Sections will ordinarily be sterilized between adjacent gate valves unless, in the opinion of the District, a longer section may be satisfactorily handled. Chlorine shall be applied by solution feed at one end of the section with a valve or hydrant at the opposite end opened sufficiently to permit a flow through during chlorine application. The chlorine solution shall be fed into the pipeline already mixed by an automatically proportioning applicator so as to provide a steady application rate of not less than 60 ppm chlorine. Hydrants along the chlorinated section shall be opened during application until the presence of chlorine has definitely been detected. When a chlorine concentration of not less than 50 ppm has been established throughout the line, the valves shall be closed and the line left undisturbed for 24 hours. The line shall then be thoroughly flushed and water samples taken for approval by the local health agency. Chlorination shall be repeated until water samples test satisfactory. The Contractor shall exercise special care in flushing to avoid damage to surrounding property.

The Contractor shall be responsible for disposal of treated water flushed from mains and shall neutralize the wastewater for protection of aquatic life in the receiving water before disposal into any natural drainage channel.

D. Cleaning And Jetting Of Sewer Mains

Prior to sewer pipe testing, all pipes and manholes shall be completely cleaned by jetting and vectoring. All debris from the jetting shall be removed at the first manhole where presence of
the debris is noted. In event that cemented or wedged debris or damaged pipe cannot be dislodged by jetting, the obstruction shall be removed and/or repaired. No debris or jetting water shall be permitted to enter the existing sewer system.

E. Testing Of Non-Pressure Sewer Pipe

Testing, which includes CCTV Inspection, of all non-pressure sewer pipe shall be conducted on a manhole-to-manhole basis. Testing for District’s approval shall only be allowed after all other nearby utilities have been installed and their trenches backfilled and compacted, all manholes have been channeled, and all manholes and sewer mains have been cleaned as discussed above in Subsection D.

All wyes, tees and ends of side sewer stubs shall be plugged with gasketed caps or plugs, or an alternate acceptable to the District and securely fastened to withstand the internal test pressure. Such plugs or caps shall be readily removable.

If any section of the sewer system is found to have deficiencies or fails to pass a test, the Contractor shall locate and repair any and all deficiencies or substandard work. After all repairs are made, the Contractor shall retest the full run of sewer main, manhole-to-manhole, at the District's sole discretion. All work, testing and retesting, under this section shall be completed at the Developer’s or Contractor's expense.

Final Approval of the sewer system is conditional on successful completion of all tests and Inspections.

1. **Pressure Testing:** All runs of non-pressure sewer pipe shall be air tested at 4 psi. The procedures set forth in this section shall be employed in conducting the testing. All facilities and personnel for conducting the testing under the observation of the District shall be furnished by the Developer and/or Contractor. All equipment and personnel to conduct the test shall be subject to the approval of the District. Although air testing may be performed for the convenience of the contractor prior to backfilling, no pipe shall be accepted until air tests have been performed after backfilling and compacting. The installed pipe shall be tested with low pressure air as set forth in WSDOT/APWA 7-17.3(2)F.. All test gauges shall be brought to the surface and allow District personnel to verify the testing without entering the manhole structure.

2. **Deflection Testing:** All sanitary sewers constructed of flexible pipe shall be deflection-tested not less than 30 days after the trench backfill and compaction has been completed. The test shall be conducted by pulling a solid-pointed mandrel with a diameter equal to 95% of the pipe diameter through the completed pipeline.

3. **Infiltration Testing:** The District may require an infiltration test if it appears that there is excessive infiltration after air tests are completed. The District shall also be the sole judge of whether or not this test is required. The maximum allowable limit for infiltration shall be as per WSDOT/APWA 7-17.3(2)C. Failure to pass the infiltration test shall be cause for rejection.
4. **Television/CCTV Inspection**: The District shall require all runs of sewer pipe to be inspected by the use of a television camera not less than 30 days after the trench backfill and compaction has been completed. The costs of making all inspections and re-inspections, shall be borne by the Developer or Contractor.

a. **CCTV Equipment**:

1) Television inspection equipment shall have an accurate footage counter that will display on the monitor and record the camera distance from the centerline of the starting manhole.

2) The camera shall be of the remotely operated pan and tilt type. The rotating camera and light head configuration shall have the capability of panning 360° with pan and tilt capability of providing a full view of the pipe to ensure complete inspection of the mainline pipe and service laterals.

3) The camera, television monitor, and other components shall be color. To ensure peak picture quality throughout all conditions encountered, the color camera shall be equipped with the necessary circuitry to allow for the remote adjustment of the optical focus iris from the power control unit at the viewing station. A variable intensity control of the camera lights shall also be located at the viewing station.

4) Lighting and camera quality shall be suitable to allow a clear, in-focus picture for the entire inside periphery of pipelines extending at least ten (10) feet in front of the camera. In High Density Polyethylene (HDPE) or ductile iron poly-lined pipe, lighting should be sufficient enough to provide a clear view at least two (2) feet in front of the camera. The replay of the recorded video information shall be free of electrical interference and shall provide a clear stable image.

5) Camera quality shall be suitable to provide a full 360° view of the pipe during the inspection.

6) The travel speed of the camera shall be variable but uniform and shall not exceed 30 feet per minute. Any means of propelling the camera through the sewer line which would produce non-uniform or jerky movement of the camera, will not be acceptable.

7) The television system shall be capable of performing line segment inspection in increments of 400 feet with one setup.

8) The District’s 1-1/2” target, or the contractor’s District-approved target, shall be used

b. **CCTV Procedure**:

1) Just prior to performing the video inspection procedure, dyed water must be introduced into the nearest upstream manhole until observed at the nearest downstream manhole. This will insure that any pipe segments with bellies are easily
identified during CCTV inspection. Introduction of the dyed water shall be recorded.

2) All fog shall be evacuated from the pipeline and the pipeline kept clear of any fog during the CCTV inspection process.

3) Perform the inspection on all mainline sections from manhole to manhole.

4) Should access to a particular sewer segment be difficult, and where adjacent segments require television inspection, the CCTV Contractor may be allowed to complete the inspection of multiple sewer line segments with one setup. When multiple sewer line segments are inspected utilizing one setup, the CCTV Contractor shall zero the footage counter at each subsequent sewer manhole to establish a uniform starting point for each line segment televised.

5) The interior of the pipe shall be carefully inspected to determine the location and extent of all deficiencies. Pipe conditions that result in a question of proper installation procedures shall be noted so that these conditions can be reviewed and, if necessary, corrected before actual acceptance of the sewer system.

6) At all service connections, the camera shall be stopped and the pan and tilt features shall be used to obtain a clear picture. At each service lateral, the camera shall be panned to view up each lateral or point of connection. Make note of any deficiencies through the use of Data Collection Software.

7) Prior to the beginning of each CCTV inspection, manhole identification numbers, as indicated on the record drawings, will be displayed in the title and shall become a part of the video record.

8) As directed by District, the Developer’s Engineer or their representative, the camera shall be stopped to view and analyze conditions that appear unusual or uncommon. The CCTV inspection technician shall, at all times, be able to move the camera through the lines in either direction without the loss of quality in the video presentation.

c. The television-inspection format shall be provided on DVD in a MPEG file type that is able to be viewed using Windows Media Player, with separate MPEG files individually designated between each sewer run between manholes and listed on an index or menu. The file names shall reflect the manhole numbers on the plan for each sewer run between manholes. The associated television-inspection reports and the original DVDs shall be provided to the District immediately upon completion of the television-inspection. If contractor wants a copy, the contractor shall obtain one at same time as the original is completed. Provide the District with two copies of the written report for each sewer run between manholes.
F. Hydrostatic Tests For Pressure Sewer Pipe

After the trench is backfilled and compacted, all pressure sewer pipe shall be subjected to a hydrostatic pressure test in accordance with the test for the applicable pipe material, as specified previously in this section. All facilities and personnel for conducting the testing under the observation of the District shall be furnished by the Developer/Contractor and shall be subject to the approval of the District.

G. Testing For Low Pressure Mainline Sewers And Grinder Pump Systems

Testing shall conform to the requirements in the District’s “Side Sewer Regulations”, latest edition.

3.5 ABANDONMENT OF WATER AND SEWER FACILITIES

A. Abandonment of Water Mains

Water mains and valves to be abandoned shall be abandoned in accordance with the procedures listed below, so as to minimize the risk of leaking from abandoned valves and to minimize obstructions within the right-of-way. If an active water main that has an abandoned valve attached to it will be abandoned in the foreseeable future, as determined solely by the District, the abandoned valve can remain and its valve can and valve box shall be raised to finished grade, in accordance with A.1 below. However, if the valve is a double disc valve or if it is leaking, it must be removed in accordance with A.2 below. If an active water main that has an abandoned valve attached to it will NOT be abandoned in the foreseeable future, as determined solely by the District, the abandoned valve must be removed and the tee plugged or blind-flanged, in accordance with A.2 below.

1. For Abandoned Water Valve to Remain:
   a. Turn valve to the closed position.
   b. Remove valve box and valve can.
   c. Inspect valve for longevity of leaking from packing, etc.
   d. If valve is not leaking, cut out section of main from old valve.
   e. Install MJ plug or blind flange on valve.
   f. Plug old pipe with concrete. If pressure build-up from ground water entering the abandoned pipe is likely to occur (especially on hillsides), install a blocked MJ cap.
   g. Re-install the valve box and valve can, and install 6” grout in valve can to indicate a plugged valve.
   h. Backfill and compact.

2. For Abandoned Water Valve to Be Removed:
   a. Schedule a water main shutdown.
   b. Turn valve to the closed position.
   c. Remove valve box and valve can.
d. Cut out section of main from old valve.

e. Remove valve, and install blind flange or MJ plug on tee.

f. Plug old pipe with concrete. If pressure build-up from ground water entering the abandoned pipe is likely to occur (especially on hillsides), install a blocked MJ cap.

g. Backfill and compact.

B. Abandonment of Fire Hydrants

Fire hydrants to be abandoned shall be abandoned in accordance with the procedures listed below, so as to minimize the risk of leaking from abandoned valves and to minimize obstructions within the right-of-way. If an active water main that has an abandoned hydrant foot valve attached to it will be abandoned in the foreseeable future, as determined solely by the District, the abandoned foot valve can remain and its valve can and valve box shall be raised to finished grade, in accordance with B.1 below. However, if the valve is a double disc valve or if it is leaking, it must be removed in accordance with B.2 below. If an active water main that has an abandoned foot valve attached to it will NOT be abandoned in the foreseeable future, as determined solely by the District, the abandoned foot valve must be removed and the tee plugged or blind-flanged, in accordance with B.2 below.

1. For Abandoned Foot Valve to Remain:
   a. Turn 6-inch valve to the closed position.
   b. Remove valve box, valve can, and fire hydrant.
   c. If valve is not leaking, remove entire 6-inch pipe to hydrant, or cut out at least a 1-foot section of main from old valve.
   d. Install MJ plug or blind flange on valve.
   e. If hydrant run is not removed, plug both ends of hydrant run pipe with concrete.
   f. Re-install the valve box and valve can, and install 6” grout in valve can to indicate a plugged valve.
   g. Backfill and compact.
   h. If the existing hydrant is to be relocated due to some conflict, a new hydrant will be installed. The existing hydrant shall be delivered to the District’s offices.

2. For Abandoned Foot Valve to Be Removed:
   a. Schedule a water main shutdown.
   b. Turn valve to the closed position.
   c. Remove valve box, valve can, and fire hydrant.
   d. Remove entire 6-inch pipe to hydrant, or cut out at least a 1-foot section of main from old valve.
   e. Remove valve, and install blind flange or MJ plug on tee.
   f. If hydrant run is not removed, plug both ends of hydrant run pipe with concrete.
C. Abandonment of Water Services

Water services must be abandoned at the water main in accordance with the following procedure:
1. Excavate to corporation stop and saddle.
2. If saddle is a single strap or is not stainless steel or the stainless steel strap/saddle/corporation stop is in poor condition, schedule a water main shutdown, then replace the saddle with a stainless steel repair band.
3. If the saddle is a stainless steel double strap in good condition, it can remain in place. Shut off the corporation stop and plug the abandoned service line. Polybag all exposed components of the abandoned saddle.
4. Install a brass plug on the corporation stop.
5. On the setter side, cut the service line away from the setter, plug the line, remove the setter and dispose of properly (return to District and place in recycle bin).
6. Arrange with the District’s Customer Service Department for disposition of the water meter and documentation of the last meter reading.
7. Backfill and compact.

D. Abandonment of Manholes or Vaults

Manholes, vaults, and similar underground structures must be abandoned in accordance with the following procedure:
1. Remove frame and cover or vault lid and hatch(es).
2. Remove manhole cone and sections or vault sections as necessary so that remaining structure is at least 4 feet below finished grade.
3. Plug all pipe penetrations with grout.
4. Fill remaining structure with pea gravel to within 3.5 feet of the top of the remaining structure.
5. Fill the next 3.5 feet (to the top of the remaining structure) with CDF.
6. Backfill and compact the top 4 feet with suitable native material or import backfill to finished grade.

E. Abandonment of Pressure Sewers (Force Mains, Low Pressure Force Mains, and Grinder Pump Lines)

All pressure sewer lines, including force mains, low pressure force mains, and grinder pump lines, must be abandoned in accordance with the following procedure:
1. Force mains, low pressure force mains, and grinder pump lines that are to be abandoned should be flushed in a sanitary way to eliminate a septic condition, if possible.
2. Mains shall be physically disconnected from District’s system and plug all forcemains larger than 2 inches in diameter with grout. Plug or cap all pipe ends 2 inches or smaller.

3. If pressure build-up from groundwater entering the abandoned force main or low pressure force main is likely to occur (especially on hillsides), install a blocked cap or plug on pipe 4 inches or larger, and install a watertight connection (e.g., pack joint) for pipe smaller than 4 inches.

4. Possible pressure grouting of abandoned main may be required on a case-by-case basis.

F. Abandonment of Gravity Side Sewers

All gravity side sewer lines must be abandoned in accordance with the following procedure:

1. Side sewer shall be physically disconnected from District’s system.
2. A plug shall be installed in the side sewer tee at the sewer main.
3. A cap shall be installed on both ends of the side sewer.
PART FOUR - DISTRICT STANDARD DETAILS AND NOTES

The following details are also shown on the District Standard Details Drawings (22” x 34” format).

WATER DETAILS
**WATER SERVICE NOTES AND METER BOX REQUIREMENTS**

**1" SERVICE LINE**

1. ALL PIPE AND FITTINGS TO BE ASSEMBLED WITH TEFOLON TAPE AND PIPE DOPE UNLESS OTHERWISE NOTED.

2. SERVICE LINES SHALL BE INSTALLED PERPENDICULAR TO THE WATER MAIN.

3. THE SERVICE LINE SHALL BE INSTALLED TO ALLOW FOR THE FAR SIDE OF THE METER BOX TO BE INSTALLED ON THE R/O/W AND CENTERED ON THE PROPERTY LINE OR EASEMENT LINE, UNLESS OTHERWISE DIRECTED BY THE DISTRICT.

4. THE METER BOX SHALL BE INSTALLED WITH THE FAR SIDE OF THE METER BOX (BACK SIDE) ON THE R/O/W, PROPERTY LINE OR EASEMENT LINE, IN LANDSCAPED (NON–TRAFFIC, NON–CRUSHED SURFACING TOP COARSE, NON–CONCRETE) AREAS.

5. BACKFILL AROUND METER BOXES AND SETTERS SHALL BE WITH IMPORTED BACKFILL, OR WITH NATIVE MATERIAL THAT MEETS THE REQUIREMENTS FOR IMPORTED BACKFILL, EXCEPT THAT 100% SHALL PASS 2" SQUARE. PEA GRAVEL OR SAND ARE NOT ALLOWED.

6. PROVIDE AT LEAST 18–INCHES CLEARANCE FROM ALL OTHER UTILITIES, BUSHES, AND OBSTRUCTIONS. PROVIDE AT LEAST 5–FEET FROM ALL TREES, AND STRUCTURES. NO FENCES OR ROCKERIES SHALL BE PLACED BETWEEN THE METER BOX AND THE MAIN.

7. METER BOXES LOCATED WITHIN 2 FEET OF DRIVEWAYS, PAVED AREAS, OR AREAS WHERE THE BOX CAN BE SUBJECT TO VEHICULAR TRAFFIC, SHALL BE A TRAFFIC BEARING METER BOX AS NOTED BELOW. LOCATING A METER BOX IN AN AREA SUBJECT TO VEHICULAR TRAFFIC REQUIRES WRITTEN DISTRICT APPROVAL DURING DESIGN. METER BOXES THAT BECOME LOCATED IN TRAFFIC AREAS DURING OR AFTER CONSTRUCTION WITHOUT DISTRICT WRITTEN APPROVAL DURING DESIGN SHALL BE ABANDONED AT THE MAIN AND A NEW SERVICE SHALL BE INSTALLED TO A LANDSCAPED (NON–TRAFFIC) AREA.

8. WHERE TRAFFIC BEARING METER BOXES ARE USED WITHIN A CONCRETE SURFACE, A 5/8 INCH EXPANSION JOINT SHALL BE PROVIDED AROUND THE BOX WITH AN EIGHTEEN (18) INCH GAP BETWEEN THE EXPANSION JOINT AND METER BOX ON ALL SIDES.

9. APPROVED METER BOXES SHALL BE AS FOLLOWS:
   A) APPROVED METER BOXES FOR SINGLE SERVICES IN NON–TRAFFIC AREAS: CARSON 1220–12
   B) FOR SINGLE SERVICE IN TRAFFIC AREAS: FOOTTIE B10 W/ALUMINUM LID.

10. MAINTAIN AND LEAVE SERVICE MARKER IN PLACE UNTIL LANDSCAPING IS DONE.

11. ANY DEVIATION FROM THESE ABOVE STANDARDS SHALL REQUIRE A WRITTEN VARIANCE REQUEST TO THE DISTRICT FOR REVIEW AND CONSIDERATION.

**REV. 10/27/17**

**WATER SERVICE NOTES AND METER BOX REQUIREMENTS**

**REV. 10/19/17**

**NOTES**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>FORD PART NO</th>
<th>MUELLER PART NO</th>
<th>A.Y. MCDONALD</th>
<th>OTHER PART NO</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1&quot; SADDLE I.P.T.</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>ROMAC 2025</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>1&quot; CORPSTOP (MIPxMIP)</td>
<td>TB500-4</td>
<td>D2956</td>
<td>313151</td>
<td>N/A</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>1&quot; HOPE PIPE</td>
<td>DRCOPEX 5100 ULTRA LINE SDR7 200 PSI IPS OR PW EAGLE</td>
<td>N/A</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1&quot; FITxCOMPRESSION ADAPTOR</td>
<td>C16-44P</td>
<td>H15454.10</td>
<td>4754-33</td>
<td>N/A</td>
<td>2</td>
</tr>
</tbody>
</table>

* QUICK JOINT ACCEPTABLE, GRIP JOINT NOT ACCEPTABLE
SEE WATER SERVICE NOTES AND METER BOX REQUIREMENTS
METER BOX LOCATION STRIPE
(1 PER METER BOX)

2" X 4" STUD SERVICE MARKER PAINT WHITE
AND STENCIL "WATER" W/2" BLACK
LETTERING (LEAVE IN PLACE UNTIL
LANDSCAPING IS DONE)

METER(s) TO BE PURCHASED FROM
DISTRICT. METER(s) INSTALLED BY
DISTRICT AFTER JOB "FINALLED"
UNLESS OTHERWISE NOTED

METER BOX LOCATION STRIPE (SEE DETAILS ABOVE)
TWO COATS OF SAFETY YELLOW TO MARK LOCATION
OF EACH METER BOX AT TIME OF INSTALLATION
(12-INCH X 3-INCH STRIP PERPENDICULAR TO THE
EDGE OF THE ASPHALT). SPRAY APPLICATION IS
NOT ACCEPTABLE, ONLY BRUSH OR ROLL ON

TRACER WIRE
INSULATED 12 GAUGE WIRE (SOLID CORE) WITH
STRIPPED WIRE ENDS TIED TO CORPORATION
STOP, AND WRAPPED AROUND SERVICE LINE AND
EXTENDED 12" INTO METER BOX, WITH AT LEAST
6 INCHES THROUGH THE EARS OF AN ANGLE
STOP ON A SETTER.

SEE 1" SERVICE LINE DETAIL 36" MINIMUM
COVER AND PERPENDICULAR TO THE MAIN

METER SETTER PROFILE VIEW

SINGLE 3/4" METER SETTER

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>FORD PART NO</th>
<th>MUELLER PART NO</th>
<th>A.Y. MCDONALD</th>
<th>OTHER PART NO</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NOT REQUIRED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>3/4&quot; METER SETTER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>1&quot; x 7-1/2&quot; IDLER W/ WASHERS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>3/4&quot; PVC PLUG</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>3/4&quot; BRASS 90° STREET ELL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>3/4&quot; MIP x 1&quot; IPS PAC JOINT W/ STIFFENER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>3/4&quot; x 3&quot; BRASS NIPPLE (OPTIONAL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>3/4&quot; BRASS 45° BEND OR ELL (OPTIONAL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

SINGLE 1" METER SETTER

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>FORD PART NO</th>
<th>MUELLER PART NO</th>
<th>A.Y. MCDONALD</th>
<th>OTHER PART NO</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NOT REQUIRED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>1&quot; METER SETTER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>1-1/4&quot; x 11&quot; IDLER W/ WASHERS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>1&quot; PVC PLUG</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>1&quot; BRASS 90° STREET ELL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>1&quot; MIP x 1&quot; IPS PAC JOINT W/ STIFFENER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>1&quot; x 3&quot; BRASS NIPPLE (OPTIONAL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>1&quot; BRASS 45° BEND OR ELL (OPTIONAL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

3/4" AND 1" METER SETTER

REV. 10/27/17
**NOTES**

1. ALL PIPE AND FITTINGS TO BE ASSEMBLED WITH TEFLON TAPE AND PIPE Dope UNLESS OTHERWISE NOTED.
2. METER BOXES LOCATED WITHIN 2 FEET OF DRIVEWAYS, PAVED AREAS, OR AREAS WHERE THE BOX CAN BE SUBJECT TO VEHICULAR TRAFFIC OR AT THE DIRECTION OF THE DISTRICT, SHALL BE A FOGITE TYPE 2 METER BOX WITH A STEEL REINFORCED LID.
3. WHERE TRAFFIC Bearing METER BOXES ARE USED WITHIN A CONCRETE SURFACE, A 5/8 INCH EXPANSION JOINT SHALL BE PROVIDED AROUND THE BOX WITH AN EIGHTEEN (18) INCH GAP BETWEEN THE EXPANSION JOINT AND METER BOX ON ALL SIDES.
4. METER BOXES TO BE INSTALLED IN NON TRAFFIC AREAS. ALTERNATIVE LOCATIONS REQUIRE WRITTEN DISTRICT APPROVAL.
5. METER BOXES SHALL BE INSTALLED WITH THE FAR SIDE OF THE BOX (BACK SIDE) ON THE R/O/W, PROPERTY OR EASEMENT LINE, UNLESS OTHERWISE DIRECTED BY THE DISTRICT. SERVICES SHALL BE INSTALLED PERPENDICULAR TO THE WATER MAIN.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QTY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>2&quot; ROMAC SADDLE IPT, STYLE #202S, DOUBLE STRAP</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>2&quot; CORPORATION STOP MIP X MIP, W/ NUT ON TOP (FORD# FB500, MUELLER# B2996, A.Y. MCDONALD# 3131B)</td>
</tr>
<tr>
<td>C</td>
<td>2</td>
<td>2&quot; BRASS STREET ELBOW (SWING JOINT)</td>
</tr>
<tr>
<td>D</td>
<td>1</td>
<td>2&quot; (RSGV) GATE VALVE X FIPT W/SQUARE OPERATING NUT W/ CAST IRON VALVE BOX AND LONG SKIRT LID</td>
</tr>
<tr>
<td>E</td>
<td>1</td>
<td>2&quot; PACK JOINT W/STAINLESS STEEL STIFFENER X MIP (FORD# CB6-77, MUELLER# E15929)</td>
</tr>
<tr>
<td>F</td>
<td></td>
<td>DISCOPLEX 500 ULTRA LINE OR PW EAGLE, 2&quot; PVC POLY PIPE SRK-7 200 PSI</td>
</tr>
<tr>
<td>G</td>
<td>2</td>
<td>2&quot; 90° BRASS STREET ELBOW</td>
</tr>
<tr>
<td>H</td>
<td>1</td>
<td>2&quot; METER SETTER, FORD NO. V8H 87-128-11-77 (ONLY) W/ BRASS STREET 90</td>
</tr>
<tr>
<td>I</td>
<td>1</td>
<td>2&quot; TULER SCH. 80 (UN-17&quot;) W/ WASHERS</td>
</tr>
<tr>
<td>J</td>
<td>1</td>
<td>2&quot; PVC PLUG, SCHEDULE 40/80</td>
</tr>
<tr>
<td>K</td>
<td></td>
<td>METER BOX - CARSON JUMBO #1730 W/PSI METER READING LID AND INSPECTION PLATE (MARKED FOR WATER) FOR NON TRAFFIC AREAS. WITH WRITTEN DISTRICT APPROVAL FOGITE TYPE 2 (MARKED FOR WATER) W/ STEEL REIN. LID FOR TRAFFIC AREAS</td>
</tr>
<tr>
<td>L</td>
<td>1</td>
<td>1-1/2&quot; X 1&quot; BRASS NIPPLE</td>
</tr>
<tr>
<td>M</td>
<td>1</td>
<td>1-1/2&quot; X 2&quot; BELL REDUCER</td>
</tr>
<tr>
<td>N</td>
<td>2</td>
<td>1-1/2&quot; 90° BRASS STREET ELBOW</td>
</tr>
<tr>
<td>O</td>
<td>1</td>
<td>1-1/2&quot; METER SETTER, FORD NO. V8H 86-128-11-66 W/ BRASS STREET 90 OR V8H 76-128</td>
</tr>
<tr>
<td>P</td>
<td>1</td>
<td>1-1/2&quot; TULER SCH. 80 (UN-17&quot;) W/ WASHERS</td>
</tr>
<tr>
<td>Q</td>
<td>1</td>
<td>1-1/2&quot; PLUG, SCHEDULE 40/80</td>
</tr>
</tbody>
</table>

**REV. 10/19/17**
NOTES
1. SEE 3" AND 4" METER NOTES AND MATERIALS FOR ADDITIONAL CONSTRUCTION REQUIREMENTS.
2. DISTRICT SUPPLIED METER IS A 3" OR 4" WITH TRPL REGISTER (TOUCH PAD MOUNTED IN VAULT LID).
**WATER MAIN TRENCH SECTION**

**NOTES**

1. VAULT COVER SHALL MATCH EXISTING GRADE OR 6" ABOVE IN UNIMPROVED AREAS.

2. PAINT SCHEDULE:
   - EXTERIOR OF VAULT – BELOW GRADE TWO COATS OF BLACK BITUMASTIC SOLUTION (VAULT SHOULD BE DRIED WITH NO MOISTURE PRESENT PRIOR TO APPLICATION OF COATINGS)
   - PAINT INTERIOR PIPING (NON BRASS) – ONE (1) COAT RUST RESISTOR PRIMER TWO (2) COATS SAFETY BLUE SEMI GLOSS PAINT

3. IF POSITIVE DRAINAGE FROM VAULT CANNOT BE ACHIEVED A SUMP PUMP SYSTEM WILL BE REQUIRED WITH DISTRICT APPROVAL. POWER SHALL BE SUPPLIED AND MAINTAINED BY THE DEVELOPMENT.

4. FLEXIBLE FITTING WHEN ENTERING AND EXITING VAULT WITHIN 5 FEET OF VAULT. IF (MJ) BELL CONNECTION IS WITHIN 5 FEET OF THE VAULT, FITTING MAY BE OMITTED (2 PLACES TYPICAL).

5. CORE DRILL 1–3/4" HOLE IN ONE OF THE HATCHES NEAR CENTER FOR INSTALLATION OF A ANTENNAE MOUNT, WHEN NOT IN TRAFFIC AREA.

6. USE 2" THREADED BRASS AND UNION AS NEEDED.

---

**3" AND 4" METER NOTES AND MATERIALS**

- 3" METER (ONLY)
  - A. 3" GALV
  - B. 3" BLIND FLG TAPPED 2" (2 PLACES TYP)
  - C. 3" IEE (FLG)
  - D. 4" x 3" REDUCER (FLxFL)
  - E. 4" FCA (TYP)
  - F. 3" GATE VALVE (FLG) W/HAND WHEEL OPERATOR (TYP)
  - G. 3" ADJUSTABLE PIPE SADDLE SUPPORT GRINNELL #264

- 4" METER (ONLY)
  - H. 4" DI
  - I. 4" BLIND FLANGE TAPPED 2" (2 PLACES TYP)
  - J. 4" IEE (FLG) (TYP)
  - K. 4" FCA (TYP)
  - L. 4" GATE VALVE (FLG) W/HAND WHEEL OPERATOR (TYP)
  - M. 4" ADJUSTABLE PIPE SADDLE SUPPORT GRINNELL #264
NOTES
1. ALL PIPE AND FITTINGS TO BE GALVANIZED EXCEPT WERE NOTED AND ASSEMBLED WITH TEFLOM TAPE AND PIPE Dope.
2. LOCATION OF THE AIR AND VACUUM RELIEF ASSEMBLY AS SHOWN ON THE PLANS IS APPROXIMATE.
3. INSTALLATION OF THE VALVE SHALL BE AT THE HIGH POINT OF THE LINE.
4. PAINT CANE ASSEMBLY WITH TWO (2) COATS OF SAFETY YELLOW AND APPLY COLE LETTERS TO CANE ASSEMBLY WITH FOOTAGE TO VALVE ON SIDE FACING ROADWAY IN 1.5" COLE NUMBERS. APPLY WITH WATER PROOF LIQUID NAILS.
5. PROVIDE 5-FOOT OF CLEARANCE FROM TREES, AND STRUCTURES, 18-INCHES FROM BUSHES.

<table>
<thead>
<tr>
<th>MK</th>
<th>QTY</th>
<th>ITEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>2&quot; ROMAC SADDLE I.P.T., DOUBLE STRAP STYLE 202S</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>2&quot; CORPORATION STOP MIP X MIP, WITH NUT ON SIDE (NOT UNDER VALVE)</td>
</tr>
<tr>
<td>C</td>
<td>4</td>
<td>1&quot; OR 2&quot; BRASS STREET ELBOW, BRASS SWING JOINT W/ COUPLING OR 90° BEND</td>
</tr>
<tr>
<td>D</td>
<td>1</td>
<td>2&quot; X 1&quot; BRASS BUSHING</td>
</tr>
<tr>
<td>E</td>
<td>1</td>
<td>2&quot; GATE VALVE (SIP X SIP) W/2&quot; SQUARE OPERATING NUT AND CAST IRON VALVE BOX AND LONG SKIRT LIP</td>
</tr>
<tr>
<td>F</td>
<td>-</td>
<td>1&quot; OR 2&quot; THREADED BRASS PIPE (LENGTH TO SUIT) ON FIRM SUBGRADE</td>
</tr>
<tr>
<td>G</td>
<td>2</td>
<td>1&quot; OR 2&quot; GALVANIZED UNION</td>
</tr>
<tr>
<td>H</td>
<td>1</td>
<td>1 OR 2&quot; BRASS NIPPLE</td>
</tr>
<tr>
<td>I</td>
<td>1</td>
<td>1&quot; OR 2&quot; APCO AIR AND VACUUM RELIEF VALVE (#143-C FOR 1&quot; AND #145-C FOR 2&quot;) OR DISTRICT APPROVED EQUAL (REPLACE IRON ACCESS PLUG WITH BRASS PLUG)</td>
</tr>
<tr>
<td>J</td>
<td>-</td>
<td>2&quot; GALVANIZED SCH. 40 PIPE (LENGTH TO SUIT)</td>
</tr>
<tr>
<td>K</td>
<td>1</td>
<td>1&quot; OR 2&quot; GALVANIZED STREET 90° ELBOW</td>
</tr>
<tr>
<td>L</td>
<td>1</td>
<td>2&quot; TEE</td>
</tr>
<tr>
<td>M</td>
<td>1</td>
<td>2&quot; RETURN BEND, SCH. 40 GALVANIZED</td>
</tr>
<tr>
<td>N</td>
<td>1</td>
<td>BEEHIVE STRAINER GREENBURG P-24-06, MALE FOR 2&quot; PIPE</td>
</tr>
<tr>
<td>O</td>
<td>2</td>
<td>FOOTITE TYPE II CONCRETE BOX WITH STEEL LID, REINFORCED FOUR SIDES OR DISTRICT APPROVED EQUAL MARKED &quot;A.V.&quot;</td>
</tr>
<tr>
<td>P</td>
<td>1</td>
<td>2&quot; X 1&quot; GALVANIZED BELL REDUCER (NOT REQUIRED WITH A 2&quot; ASSEMBLY)</td>
</tr>
<tr>
<td>Q</td>
<td>2</td>
<td>1&quot; OR 2 GALVANIZED NIPPLE (ONLY ONE REQUIRED WITH 2&quot;)</td>
</tr>
</tbody>
</table>

* DENOTES ITEMS NOT REQUIRED WITH A 2" ASSEMBLY

1" AND 2" AIR AND VACUUM RELIEF VALVE ASSEMBLY REV. 10/20/17
**TYPE I AND II BLOW-OFF ASSEMBLY**

1. **NOTE**
   
   1. All pipe and fittings to be galvanized except where notes and all assembled with Teflon tape and pipe dope.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>TYPE I QTY</th>
<th>TYPE II QTY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>1</td>
<td>CAP w/ 2&quot; IPS TAP</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>1</td>
<td>2&quot; x 6&quot; BRASS NIPPLE</td>
</tr>
<tr>
<td>C</td>
<td>1</td>
<td>1</td>
<td>2&quot; 90&quot; BRASS BEND</td>
</tr>
<tr>
<td>D</td>
<td>=</td>
<td>=</td>
<td>2&quot; BRASS PIPE (LENGTH TO SUIT)</td>
</tr>
<tr>
<td>E</td>
<td>1</td>
<td>1</td>
<td>2&quot; GATE VALVE W/SQUARE OPERATING NUT</td>
</tr>
<tr>
<td>F</td>
<td>=</td>
<td>=</td>
<td>TYPE I REQUIRES CAST IRON VALVE BOX W/ DEEP SKIRT LID, TYPE II WITH 6&quot; PVC PIPE ONLY</td>
</tr>
<tr>
<td>G</td>
<td>1</td>
<td>0</td>
<td>2&quot; x 2&quot; TEE</td>
</tr>
<tr>
<td>H</td>
<td>1</td>
<td>0</td>
<td>2&quot; x 1/2&quot; BUSHING</td>
</tr>
<tr>
<td>I</td>
<td>1</td>
<td>0</td>
<td>AUTOMATIC DRAIN VALVE - WATERMATIC 910</td>
</tr>
<tr>
<td>J</td>
<td>1</td>
<td>1</td>
<td>2&quot; MIP X 2 1/2&quot; NST FIRE HOSE ADAPTOR W/CAP</td>
</tr>
<tr>
<td>K</td>
<td>0</td>
<td>1</td>
<td>TYPE I (MIP) - TYPE II (FIP) W/ 2&quot; COUPLER</td>
</tr>
<tr>
<td>L</td>
<td>0</td>
<td>1</td>
<td>5&quot; PVC (LENGTH TO SUIT)</td>
</tr>
<tr>
<td>M</td>
<td>=</td>
<td>=</td>
<td>FOOTITE TYPE 2 METER BOX W/ 3/8&quot; SOLID STEEL TRAFFIC COVER (REINFORCED ON FOUR SIDES) AND H-20 LOADING MARKED &quot;B.G.&quot;</td>
</tr>
<tr>
<td>N</td>
<td>0</td>
<td>1</td>
<td>FABRIC OR PLASTIC BARRIER</td>
</tr>
<tr>
<td>O</td>
<td>1</td>
<td>1</td>
<td>VALVE MARKER POST</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2&quot; 90° GALV. BEND</td>
</tr>
</tbody>
</table>

**REV. 10/20/17**
NOTES
1. FIRE HYDRANT BOLLARDS SHALL NOT BE INSTALLED WITHIN RIGHT-OF-WAY UNLESS OTHERWISE DIRECTED BY THE DISTRICT.
2. FIRE HYDRANT BOLLARDS SHALL BE INSTALLED WITHIN COMMERCIAL DEVELOPMENTS UNLESS OTHERWISE DIRECTED BY THE DISTRICT.
3. THE NUMBER OF BOLLARDS AND PLACEMENT OF BOLLARDS SHALL BE SUFFICIENT TO PROTECT THE FIRE HYDRANT FROM VEHICLE TRAFFIC AND AS DIRECTED BY THE DISTRICT.
4. "BLUE DOT" (STIMISONITE RAISED PAVEMENT MARKER - 88AB) REQUIRED 6" OFF CENTERLINE (OR 4" OFF ANY OTHER MARKER) OF ROAD PERPENDICULAR TO FIRE HYDRANT.
5. FIRE HYDRANT AND BOLLARDS SHALL BE PAINTED WITH (2) COATS OF SAFETY YELLOW SEMI GLOSS.
6. DISTANCE FROM CENTER OF HYDRANT TO ISOLATION VALVE CAP SHALL BE SHOWN ON BONNET OF HYDRANT IN FEET (TO THE CLOSEST FOOT) USING COLE NUMBERS AND APPLIED WITH WATERPROOF LIQUID NAILS.

APPROVED FIRE HYDRANTS:
- DRESSER M&H 129-S
- MUELLER A423 (SUPER CENTURION 250)
- CLOW MEDALLION
- AMERICAN DARLING B-62-B
- AVK SERIES 2780
- U.S. PIPE SENTINEL 250

PLASTIC BARRIER REQUIRED BETWEEN HYDRANT AND WASHED ROCK 1 CU. YD. TO ABOVE WEEP HOLES OF HYDRANT MINIMUM 7/8" DRAIN ROCK.

FIRE HYDRANT ASSEMBLY

DEADMAN ASSEMBLY MAY BE REQUIRED ON RUNS OVER 20' OR CHANGE IN GRADE

OPTIONAL HYDRANT INSTALLATION MAY BE REQUIRED AS INSPECTOR DEEMS NECESSARY

PUMPER CONNECTION TO FACE ROADWAY W/ STORZ FITTING. SEE MATERIAL STANDARDS.

HYDRANT EXTENSION IF REQUIRED - 100% DISTRICT INSPECTION REQUIRED. FOLLOW SPECIFIC MANUFACTURER’S INSTRUCTIONS.

"BLUE DOT" STIMISONITE #88AB

SIDEWALK OR DRIVING SURFACE

STANDARD APWA TWO-PIECE CAST IRON VALVE BOX, LENGTH TO FIT

DUCTILE IRON TEE W/ 6" FLANGE SIDE OUTLET

6" GATE VALVE FLANGE X MECHANICAL JOINT

6" DUCTILE IRON PIPE, CL. 52 LENGTH TO FIT WITH RESTRAINED JOINTS

CONCRETE BLOCKS 8" X 4" X 17"

CONCRETE BLOCKING

FIRE HYDRANT LOCATION IN CUT OR FILL

NOTE
1. 5' MIN CLEARANCE AROUND FIRE HYDRANT

FIRE HYDRANT BOLLARDS INSTALLATION

MINIMUM AREA OF GROUND SURFACE AND CLEAR ZONE

GUARD POST 9" ROUND REINFORCED CONCRETE 6'-0" LG. EQUAL TO UTILITY VAULT CO TO BE INSTALLED WHERE DIRECTED

ELEVATION

FIRE HYDRANT ASSEMBLY

REV. 11/6/17
NOTES
1. THE COMPLETED PATCH SHALL BE FLUSH WITH THE SURROUNDING FINAL GRADE, SHALL NOT BE MORE THAN 1/8" FLUSH WITH THE SURROUND PAVEMENT, AND SHALL BE SMOOTH FOR TRAFFIC.

2. WHEN RAISING THE VALVE BOX TO FINISHED GRADE, EXCAVATE CASTING TO A DEPTH NECESSARY TO VERIFY CASTING OVERLAPPIES SOIL PIPE BY 3". ADD SOIL PIPE AS NEEDED. VALVE BOX SHALL BE CENTERED OVER THE VALVE NUT.

3. SLIP CANS ARE NOT ALLOWED WHEN RAISING VALVE BOXES TO GRADE.

VALVE BOX PAVEMENT PATCH DETAIL AND PAVED AREAS

NOTES
1. VALVE CANS SHALL BE RAISED TO GRADE AFTER PLACEMENT OF THE ASPHALT'S FINAL LIFT AND WITHIN 48 HOURS UNLESS OTHERWISE APPROVED BY THE DISTRICT.

2. NEATLY REMOVE ASPHALT AROUND EXISTING VALVE CASTING.

3. EXCAVATE VALVE CASTING TO A DEPTH NECESSARY TO RAISE CASTING AND VERIFY CASTING OVERLAPPIES SOIL PIPE BY 3". ADD SOIL PIPE AS NEEDED. VALVE BOX SHALL BE CENTERED OVER THE VALVE NUT.

4. SLIP CANS ARE NOT ALLOWED.

5. BACKFILL WITH CSTC COMPACTED TO 95% (MODIFIED PROCTOR).

6. INSTALL 1/2" HMA IN 2-INCH LIFTS, TO A COMPACTED DEPTH EQUAL TO THE EXISTING PAVEMENT OR A MINIMUM OF 4", WHICHERSOEVER IS GREATER. TACK ALL EDGES AND SEAL FINISH JOINTS WITH TAR AND SAND.

7. THE COMPLETED PATCH SHALL BE FLUSH WITH THE SURROUNDING PAVEMENT, SHALL NOT VARY FROM BEING FLUSH BY MORE THAN 1/8", AND SHALL BE SMOOTH FOR TRAFFIC.
**HILL HOLDER**

**PLAN**
- 2" x 6" HORIZONTAL PLANK
- 2" x 6" VERTICAL MEMBERS DRIVEN INTO UNDISTURBED SOIL
- 2" x 6" SUPPORT BRACE
- 7/8" WASHED GRAVEL
- 4" PVC PERFORATED DRAIN
- MIN. OF 3 TREATED 2" x 6" TIMBERS TO RETAIN BACKFILL

**PROFILE**
- BOTTOM OF TRENCH

**PIPE ANCHOR**

**PLAN**
- TRENCH
- 12" MIN DEPENDING ON SOIL CONDITIONS
- UNDISTURBED SOIL

**ELEVATION**
- BOX 6" MAIN
- 12" MIN
- #6 REBAR
- 1" PVC WEEP HOLE
CONCRETE BLOCKING

THRUST BLOCK TABLE
MIN BEARING AREA AGAINST UNDISTURBED SOIL (SF)

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>A(Ft²)</th>
<th>B(Ft²)</th>
<th>C(Ft²)</th>
<th>D(Ft²)</th>
<th>E(Ft²)</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>NONE</td>
</tr>
<tr>
<td>6&quot;</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>NONE</td>
</tr>
<tr>
<td>8&quot;</td>
<td>7</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>10&quot;</td>
<td>11</td>
<td>10</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>12&quot;</td>
<td>16</td>
<td>14</td>
<td>9</td>
<td>5</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>14&quot;</td>
<td>22</td>
<td>19</td>
<td>12</td>
<td>6</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>16&quot;</td>
<td>29</td>
<td>25</td>
<td>16</td>
<td>8</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>18&quot;</td>
<td>36</td>
<td>31</td>
<td>20</td>
<td>10</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>20&quot;</td>
<td>45</td>
<td>39</td>
<td>24</td>
<td>13</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>22&quot;</td>
<td>54</td>
<td>47</td>
<td>29</td>
<td>15</td>
<td>8</td>
<td>29</td>
</tr>
<tr>
<td>24&quot;</td>
<td>64</td>
<td>56</td>
<td>35</td>
<td>18</td>
<td>9</td>
<td>35</td>
</tr>
<tr>
<td>28&quot;</td>
<td>87</td>
<td>76</td>
<td>48</td>
<td>24</td>
<td>12</td>
<td>48</td>
</tr>
<tr>
<td>30&quot;</td>
<td>101</td>
<td>87</td>
<td>55</td>
<td>28</td>
<td>14</td>
<td>55</td>
</tr>
<tr>
<td>36&quot;</td>
<td>145</td>
<td>125</td>
<td>78</td>
<td>40</td>
<td>20</td>
<td>78</td>
</tr>
<tr>
<td>42&quot;</td>
<td>197</td>
<td>171</td>
<td>107</td>
<td>55</td>
<td>27</td>
<td>107</td>
</tr>
<tr>
<td>48&quot;</td>
<td>257</td>
<td>223</td>
<td>140</td>
<td>71</td>
<td>36</td>
<td>140</td>
</tr>
</tbody>
</table>

NOTES
1. BEARING AREA OF CONCRETE THRUST-BLOCK BASED ON 200 PSI PRESSURE AND SAFE SOIL BEARING LOAD OF 2,000 POUNDS PER SQUARE FOOT.

2. AREAS MUST BE ADJUSTED FOR OTHER PIPE SIZES, PRESSURES AND SOIL CONDITIONS.

3. CONCRETE BLOCKING SHALL BE CAST-IN-PLACE AND HAVE A MINIMUM OF 1/4 SQUARE FOOT BEARING AGAINST THE FITTING.

4. BLOCK SHALL BEAR AGAINST FITTINGS ONLY AND SHALL BE CLEAR OF JOINTS TO PERMIT TAKING UP OR DISMANTLING OF JOINT.

5. CONTRACTOR SHALL INSTALL BLOCKING ADEQUATE TO WITHSTAND FULL TEST PRESSURE AS WELL AS TO CONTINUOUSLY WITHSTAND OPERATION PRESSURE UNDER ALL CONDITIONS OF SERVICE.

CONCRETE BLOCKING

REV. 10/20/17

WD-11 Technical Specifications
Part 4 - Standard Details
GALVANIZED SHACKLE ROD (TYP) PER PIPE SIZE (LENGTH TO SUIT) SEE TIE ROD ATTACHMENT THIS SHEET

6" MIN OVER AND UNDER WATER MAIN

6" MIN

ELEVATION

BLOW-OFF ASSEMBLY PER PLAN OR OTHER FITTINGS AS REQUIRED

UNDISTURBED SOIL

RODS THROUGH RESTRAINED FOLLOWER

BELL OF PIPE WATER MAIN TRENCH

18" MIN

DEADMAN

CAST OF LUGS

TIE BOLT

<table>
<thead>
<tr>
<th>SIZE</th>
<th>PRESSURE PSI</th>
<th>FORCE IN POUNDS</th>
<th>NUMBER OF TIE RODS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3&quot;</td>
<td>300</td>
<td>2,120</td>
<td>3/8&quot;</td>
</tr>
<tr>
<td>4&quot;</td>
<td>300</td>
<td>3,780</td>
<td>3/8&quot;</td>
</tr>
<tr>
<td>6&quot;</td>
<td>300</td>
<td>8,500</td>
<td>5/8&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>300</td>
<td>15,100</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>10&quot;</td>
<td>275</td>
<td>21,620</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>12&quot;</td>
<td>250</td>
<td>33,930</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>14&quot;</td>
<td>250</td>
<td>46,200</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>16&quot;</td>
<td>225</td>
<td>45,250</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>18&quot;</td>
<td>200</td>
<td>50,900</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>20&quot;</td>
<td>200</td>
<td>62,840</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>24&quot;</td>
<td>200</td>
<td>90,480</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
<td>200</td>
<td>141,370</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>36&quot;</td>
<td>200</td>
<td>203,580</td>
<td>3/4&quot;</td>
</tr>
</tbody>
</table>

TIE ROD ATTACHMENTS

REV. 10/18/17

SAMMAMISH PLATEAU WATER AND SEWER DISTRICT

WD-12

Technical Specifications
Part 4 - Standard Details
DOUBLE CHECK VALVES TO MATCH PIPE DIAMETER APPROVED IN WASHINGTON STATE AND TESTED WHENEVER INSTALLED OR MOVED. PROVIDE CERTIFICATION TO DISTRICT.

GALVANIZED PIPE OR FIRE HOSE

DISTANCE VARIES

EXISTING WATER MAIN HYDRANT OR BLOW-OFF

MIN 2" FOR 8–12" MAINS, AND 4" FOR MAINS > 12"

NEW WATER MAIN

NOTES

1. FOR BELOW GROUND INSTALLATION, USE TYPE II BLOW-OFF ASSEMBLY, MODIFIED AS REQUIRED BY DISTRICT. INSTALL IN AREA NOT SUBJECT TO FLOODING.

2. ALL FILLING AND FLUSHING SHALL BE METERED BY DISTRICT. PROVIDE SPACE FOR INSTALLATION OF METER.

3. ALL NEW MAINS SHALL BE KEPT SEPARATE FROM THE DISTRICT’S EXISTING SYSTEM UNTIL THE NEW MAINS ARE TESTED AND ACCEPTED. FINAL CONNECTION REQUIRES 100% INSPECTION BY DISTRICT.

4. PROTECT ABOVE GROUND INSTALLATION FROM DAMAGE AND FREEZING.
### Technical Specifications
#### Part 4 - Standard Details

**VALVE OPERATING NUT EXTENSION**

**REV. 10/24/17**

**NOTE**
Extensions are required when the valve nut is more than 36" below finished grade. Extensions are to be a minimum of one (1) foot long. Only one extension to be used per valve. Valve extension to be within 18" to 24" of finished grade.

**NOTE**
All extensions are to be made of steel sized as noted, and painted with two coats of carbon elastic (ATCO #222) as specified by Preservative Paint Co. or an approved equal.

![Diagram of valve operating nut extension]

**VALVE MARKER POST**

**REV. 10/24/17**

**NOTES**
1. Valve marker post shall be a footite valve marker or approved equal.
2. The post shall be set at right angles to the roadway from the valve and shall be situated in a safe and reasonably conspicuous location.
3. For more than one valve, the number of valves shall be noted near the top of the post with the distance to the center of the valve (or cluster) marked below.
4. Paint valve marker with (2) coats alkyd industrial enamel safety yellow and apply number of valves and distance (to the closest foot) to the line valve caps in cole numbers applied with waterproof liquid nails.
ECLIPSE NO. B8
WATER SAMPLING STATION (PAINTED GREEN)

12" M/N

STANDARD VALVE BOX

3/4" RUBBER GASKET

Backfill around and under service tap with compacted 5/8" crushed rock

Angle between 0°-45° max

Tracer wire – insulated 12 gauge wire (solid core) to be stripped, and wire ends tied to corporation stop and meter stop, wrapped around service line.

### Item Description

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Ford Part No</th>
<th>Mueller Part No</th>
<th>A.Y. McDonald</th>
<th>Other Part No</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1&quot; Saddle I.P.T.</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>ROMAC 2025</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>1&quot; Corpstop (MIPxMIP)</td>
<td>TB500-4</td>
<td>B2396</td>
<td>N/A</td>
<td>N/A</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>1&quot; Hoop Pipe</td>
<td>DRISCOPEX 5100 ULTRA LINE SDR7 200 PSI IPS OR FW EAGLE</td>
<td>N/A</td>
<td>N/A</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1&quot; FIPxCompression Adaptor w/ Stainless Steel Stiffener</td>
<td>C16-44P*</td>
<td>H15454.10</td>
<td>4754-33</td>
<td>N/A</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>1&quot; Pach Joint x 1&quot; MIP</td>
<td>INSERT-72</td>
<td>505142</td>
<td>6136</td>
<td>N/A</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>1&quot; FIP x 3/4 FIP Reducer</td>
<td>C11-43</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>3/4&quot; Ball Corp MIP x MIP</td>
<td>TB500-3</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>3/4&quot; Coupling</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>3/4&quot; Brass Nipple</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>3/4&quot; 90° Brass Street Ell</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>1</td>
</tr>
</tbody>
</table>

*Quick joint acceptable, grip joint not acceptable

### Notes

1. All pipe and fittings to be assembled with Teflon tape and pipe dope unless otherwise noted.
2. Service lines shall be installed perpendicular to the water main.
3. The service line shall be installed to allow for the far side of the sample station to be installed in the R/O/W or easement line, unless otherwise directed by the district.

WATER SAMPLING STATION
SEWER DETAILS
NOTES
1. BACKFILLING AND MECHANICAL COMPACTION SHALL BE PERFORMED CAREFULLY SO THAT NO DAMAGE IS DONE TO THE PIPE OR TO ITS ALIGNMENT. THE DISTRICT MAY DIRECT THE CONTRACTOR TO USE SPECIAL BACKFILL TECHNIQUES WHEN THE DISTRICT DEEMS IT NECESSARY. COMPACTION IS TO MEET KING COUNTY REQUIREMENTS.

2. MANHOLES SET IN PAVED STREETS OR OTHER PAVED AREAS SHALL BE SET TO FINISHED GRADE OF THE PAVING, AND WHEN REQUIRED THE MANHOLE FRAME SHALL BE TILTED TO CONFORM TO THE GRADE OF THE PAVED SURFACE. REMOVE ASPHALT FROM COVER AFTER PAVING.

3. ASPHALT PATCH WILL BE REQUIRED ON ALL MANHOLES INSTALLED ON THE SHOULDER OF THE ROADWAY. (SEE SANITARY MANHOLE ASPHALT PATCH DETAIL).

4. IF MANHOLE IS INSTALLED ON UNIMPROVED GROUND SET MANHOLE TOP 6" ABOVE GRADE WITH LOCKING COVER FRAME (OLYMPIC FOUNDRY #MH 30 D/T) AND ASPHALT PATCH (SEE MANHOLE ASPHALT COLLAR DETAIL).

5. BASE SECTION OPENINGS TO RECEIVE PIPE SHALL BE CIRCULAR CORE-DRILLED OR KNOCK-OUTS. KOR-N-SEAL CONNECTOR REQUIRED.

6. HORIZONTAL DISTANCE BETWEEN MANHOLES SCALED FROM WORKSHEETS AND ROADWAY PLAN AND PROFILES. ACTUAL DISTANCES TO THE COMPUTED AT TIME OF STAKING.

7. MANHOLES BETWEEN 6-FEET AND 8-FEET DEEP REQUIRE WRITTEN DISTRICT APPROVAL. MANHOLES LESS THAN 6 FEET DEEP ARE NOT ALLOWED.

8. MANHOLES 20' AND GREATER IN DEPTH SHALL BE 60" DIAMETER. FOR PIPE 15" OR GREATER DIAMETER, MANHOLES SHALL BE 72" DIAMETER.
**GENERAL NOTES FOR ASPHALT COLLAR/PATCHES AROUND MANHOLES**

**MANHOLE PAVEMENT PATCH FOR PAVED AREAS**

1. **NOTES**
   1. CONTRACTOR SHALL WARRANTY MANHOLE ADJUSTMENT AREA FREE FROM LEAKS FOR ONE YEAR.
   2. IN PAVED AREAS, MANHOLE FRAMES SHALL BE RAISED TO GRADE AFTER PLACEMENT OF THE ASPHALT’S FINAL LIFT AND WITHIN 48 HOURS UNLESS OTHERWISE APPROVED BY THE DISTRICT.
   3. IN PAVED AREAS, NEATLY REMOVE ASPHALT AROUND EXISTING MANHOLE FRAME.
   4. INSTALL CHANNEL BOARD IN MANHOLE PRIOR TO ANY WORK, AND REMOVE AFTER FINAL ADJUSTMENT.
   5. PRIOR TO ADJUSTMENT, NOTIFY DISTRICT IF THE FINAL MANHOLE NECK WILL EXCEED 28".
   6. IN PAVED AREAS, EXCAVATE AROUND EXISTING MANHOLE FRAME TO A MIN. DEPTH OF 12".
   7. REMOVE FRAME AND COVER, AND INSTALL ADJUSTMENT RINGS, TILTING FRAME AS NECESSARY TO MATCH EXISTING GRADE. ADJUSTMENT BRICKS RECESSED FOR GROUTING, CAN BE UTILIZED. REINSTALL FRAME AND COVER.
   8. IN PAVED AREAS BACKFILL WITH CRUSHED SURFACING TOP COURSE (CSTC) COMPACTED TO 95% (MODIFIED PROCTOR).
   9. IN NON-PAVED AREAS, BACKFILL WITH APPROVED BACKFILL MATERIAL COMPACTED TO 95%.
   10. IN PAVED AREAS, INSTALL 1/2" HMA IN 2-INCH LIFTS, TO A COMPACTED DEPTH EQUAL TO THE EXISTING PAVEMENT OR A MINIMUM OF 4", WHICHEVER IS GREATER. TACK ALL EDGES AND SEAL FINISH JOINTS WITH TAR AND SAND.
   11. IN UN-PAVED AREAS, INSTALL ASPHALT PATCH TO A MINIMUM COMPACTED DEPTH OF 6" AS SHOWN ABOVE.
   12. GROUT MANHOLE NECK. "JETSET” NOT ALLOWED. DO NOT RUN GROUT ONTO MANHOLE FRAME.

**MANHOLE ASPHALT COLLAR FOR NON-PAVED AREAS**

**GENERAL NOTES FOR ASPHALT COLLAR/PATCHES AROUND MANHOLES**
**MANHOLE STEP AND LADDER**

REV. 10/19/17

**NOTES**

1. POLYPROPYLENE PLASTIC STEPS SHALL BE A POLYPROPYLENE PLASTIC STEP INJECTION MOLDED AROUND A 1/2 INCH DIAMETER ASTM A–615, GRADE 60, STEEL REINFORCING BAR. INSTALLATION AS PER THE MANUFACTURER’S SPECIFICATIONS.

2. POLYPROPYLENE PLASTIC LADDER SHALL HAVE A POLYPROPYLENE PLASTIC STEP INJECTION MOLDED AROUND A 1/2 INCH DIAMETER ASTM A–615, GRADE 60, STEEL REINFORCING BAR, AND A POLYPROPYLENE PLASTIC RAIL INJECTION MOLDED AROUND A 9/16 INCH DIAMETER ASTM C–1018, COLD DRAWN BAR. INSTALLATION AS PER THE MANUFACTURER’S SPECIFICATION.

**DROP MANHOLE**

REV. 10/19/17

**NOTES**

1. ALL DUCTILE IRON PIPE AND FITTINGS SHALL BE PROTECTO 401 LINED.

2. DROP MANHOLE SHALL MEET ALL REQUIREMENTS AS STATED IN THE STANDARD MANHOLE DETAIL, MATERIALS AND CONSTRUCTION NOTES.

3. DROP MANHOLES SHALL ONLY BE USED IN STRAIGHT FLOW–THROUGH LOCATIONS (NO 90° TURNS).

4. ALL DUCTILE IRON FITTINGS WITH MEGA–LUGS.

5. VERTICAL BEND MAY BE REQUIRED DUE TO PIPE SLOPE CONDITIONS AT DUCTILE IRON TEE.
NOTES
1. FOR 1-1/4" SERVICE USE 2"x1-1/4" BRASS BUSHING.
2. FOR 2" SERVICE, OMIT BUSHING.

PRESSURE LINE CONNECTION

CONCRETE ENCASEMENT FOR SANITARY SEWERS

NOTES
1. VALVES, VALVE BOXES AND VALVE EXTENSIONS SHALL MEET THE SAME REQUIREMENTS AS SHOWN IN THE STANDARD WATER DETAILS. VALVE BOX COVERS SHALL OLYMPIC FOUNDRY 940 OR EQUAL MARKED "SEWER".
2. VALVE MARKER POSTS SHALL MEET THE SAME REQUIREMENTS AS SHOWN IN THE WATER DETAILS AND BE PAINTED AS SPECIFIED IN THE STANDARD CONSTRUCTION NOTES.
3. ALL D.I. PIPE AND FITTINGS SHALL BE PROTECTOR 401 EPOXY COATED. ALL PIPE AND FITTINGS SHALL BE RESTRRAINED JOINT.
SIDE SEWER DETAILS

1. MAXIMUM DEPTH OF SIDE SEWER AT END IS 10’ UNLESS ADDITIONAL DEPTH IS NEEDED TO PROVIDE GRAVITY SEWER SERVICE.

2. FOR MULTI–FAMILY AND/OR COMMERCIAL PROJECTS, SIDE SEWERS MAY BE EXTENDED, AT THE DISTRICT’S DISCRETION, FROM THE EDGE OF THE ROAD OR PROPERTY LINE TO WITHIN 3 FEET OF THE BUILDING FOUNDATION.

SINGLE SIDE SEWER

1. MAXIMUM DEPTH OF SIDE SEWER AT END IS 10’ UNLESS ADDITIONAL DEPTH IS NEEDED TO PROVIDE GRAVITY SEWER SERVICE.

2. POSITION WYE IN DIRECTION OF FLOW.

DOUBLE SIDE SEWER

1. CONNECTION OF NEW SIDE SEWER TO EXISTING MAIN MAY USE EITHER:
   - CUT IN TEE W/ PVC SLIP COUPLINGS.
   - ROMAC SST STAINLESS STEEL TAPPING SLEEVE W/ FL X MJ ADAPTER AND GASKET Sized FOR D3034 PVC SIDE SEWER.
   ROMAC SIDE SEWER SADDLE, MODEL CB, IS NOT ALLOWED.

2. UNLESS OTHERWISE SHOWN ON PLAN, MINIMUM COVER FOR SIDE SEWERS (WHICHEREVER IS LOWER):
   - 18” – PRIVATE PROPERTY
   - 3’ – AT PROPERTY LINE
   - 2”–6” IF CROSSING A DITCH IN PUBLIC RIGHT OF WAY LOWER THAN THE LOWEST HOUSE ELEVATION

SIDE SEWER DETAILS
NOTES
1. * FOR PIPE DEEPER THAN 18', PIPE BEDDING SHALL EXTEND 18" ABOVE CROWN OF PIPE
2. NOT TO SCALE

SANITARY SEWER TRENCH SECTION

NOTES
1. LOCATE TEST BOX OVER CENTERLINE OF FORCEMAIN.
2. PROVIDE TEST BOX AT 500' INTERVALS AND AT BENDS.
3. PROVIDE 12" WIRE LOOP INSIDE VALVE BOX (TYP).
4. INLINE CONNECTORS ON WIRE ARE NOT ALLOWED.
CONSTRUCTION NOTES

1. VAULT SHALL BE UTILITY VAULT GREASE INTERCEPTOR (1000 GALLON MINIMUM). VAULT SIZING CALCULATIONS SHALL BE SUBMITTED FOR REVIEW AND APPROVAL TO THE DISTRICT PRIOR TO APPROVAL OF CONSTRUCTION, LOCATED 50–FT MAX, FROM POINT OF ENTRY.

2. THE EXTERIOR OF VAULTS BELOW GRADE SHALL BE PAINTED WITH TWO (2) COATS OF BLACK BITUMASTIC SOLUTION. NO MOISTURE SHALL BE PRESENT DURING APPLICATION OF COATINGS.

3. NO MORE THAN 1–FOOT OF RISER RINGS FROM FINISHED GRADE. ADDITIONAL SECTIONS SHALL BE PROVIDED AS NECESSARY.

4. CLEAN OUTS PROVIDED 2–FOOT MAXIMUM AWAY FROM TYPE 1 CATCH BASIN.

5. MINIMUM OF 6–INCHES OF PEA GRAVEL BELOW STRUCTURES. EXTEND 12–INCHES BEYOND EDGES OF STRUCTURES.

6. ALL PIPING SHOWN IS 6" # PVC PER DISTRICT STANDARDS.

INSPECTION REQUIREMENTS

1. CONSTRUCTION WILL BE INSPECTED IN ACCORDANCE WITH THE DISTRICT’S SIDE SEWER STANDARDS. DOUBLE INSPECTION SHALL BE REQUIRED.

2. LEAK TESTING: VAULT MUST BE FILLED WITH WATER TO TEST FOR LEAKS. VAULT AND TYPE 1 CATCH BASIN MUST HOLD WATER FOR 10–MINUTES.

3. ALL PIPING PENETRATIONS MUST BE INSPECTED. ALL PENETRATIONS MUST BE PROVIDED WITH A KOR–N–SEAL ADAPTER, UNLESS OTHERWISE DIRECTED BY THE DISTRICT.

4. TRENCHES SHALL BE LEFT OPEN SO ALL STRUCTURES, PIPING, AND BEDDING CAN BE INSPECTED AND THE SIDE SEWER AS–BUILT DRAWING PROVIDED BY THE CONTRACTOR CAN BE CONFIRMED BY THE INSPECTOR.

5. INSPECTION IS REQUIRED AT THE EXISTING SIDE SEWER STUB OF WHERE THE FINAL CONNECTION WILL OCCUR.
NOTES
1. PRIOR TO CUTTING THE EXISTING SEWER MAIN, THE CONTRACTOR SHALL HAVE EXACT MEASUREMENTS OF THE EXISTING PIPE INVERTS AND LENGTH MEASUREMENTS FOR INSTALLATION OF THE NEW MANHOLE AND NEW SEWER MAIN.

2. THE CONTRACTOR’S EXCAVATION SHALL BE ADEQUATE TO INSTALL THE SADDLE MANHOLE PRIOR TO CUTTING THE EXISTING SEWER MAIN.

3. THE CONTRACTOR SHALL BYPASS PUMP THE SEWER FLOW DURING THIS INSTALLATION.

4. THE CONTRACTOR SHALL HAVE A VACTOR TRUCK AVAILABLE FOR THIS CONSTRUCTION WORK.

5. SEE DISTRICT STANDARD MANHOLE DETAIL FOR OTHER SPECIFIC INSTALLATION REQUIREMENTS.

6. FOR A 72-INCH MANHOLE USE ROMAC DUCTILE IRON (DI) / PVC COUPLING TO CONNECT NEW PIPE TO EXISTING PIPE. USE 15-FOOT PIPE SEGMENT THROUGH MANHOLE.
NOTES
1. VALVES, VALVE BOXES AND VALVE EXTENSIONS SHALL MEET THE SAME REQUIREMENTS AS SHOWN IN THE STANDARD WATER DETAILS. VALVE BOX COVERS SHALL BE OLYMPIC FOUNDRY 940 OR EQUAL MARKED "SEWER".

2. VALVE MARKER POSTS SHALL MEET THE SAME REQUIREMENTS AS SHOWN IN THE WATER DETAILS AND BE PAINTED AS SPECIFIED IN THE STANDARD CONSTRUCTION NOTES.

3. ALL D.I. PIPE AND FITTINGS SHALL BE PROTECTOR 401 EPOXY COATED. ALL PIPE AND FITTINGS SHALL BE RESTRAINED JOINT.
Vactor Truck Minimum Hammerhead Turnaround

- Edge of pavement or surfacing

- \( R = 43' \)
- \( \leq 83.8' \)
- \( L = 57.1' \)

Vactor Truck Minimum Circular Turnaround

- Edge of pavement or surfacing

- 85'

REV. 10/19/17
RECESSED SOCKET

INSTALL SOCKET W/ TOP OF PLUG FLUSH W/ FINISHED GRADE

CONCRETE SIDEWALK

DAVIT SOCKET

DRAIN ROCK

1' 6"

DAVIT SOCKET INSTALLATION SECTION

1/4" ALUM CAP SHOP WELD (TYP)

2 1/2" ID SCH 40 ALUM PIPE

1/2" x 1/2" ALUM FB

1/2" x 1/2" ALUM FB

1/4" ALUM CAP SHOP WELD (TYP)

2 1/2" ID SCH 40 ALUM PIPE

1/2" x 1/2" ALUM FB

1/2" x 1/2" ALUM FB

DAVIT SPINDLE

REV. 10/19/17
CROSS CONNECTION DETAILS
**PROCEDURAL REQUIREMENTS**

1. ALL ASSEMBLIES MUST BE ON THE WASHINGTON STATE DEPARTMENT OF HEALTH APPROVED BACKFLOW ASSEMBLY LIST.

2. ALL ASSEMBLIES ARE REQUIRED TO BE TESTED BY A WASHINGTON STATE CERTIFIED TESTER UPON INSTALLATION AND ANNUALLY. IN ADDITION, ASSEMBLIES MUST BE TESTED AFTER REPAIRS, RELOCATION, REINSTALLATION AND AFTER A BACKFLOW INCIDENT. NOTE THAT AIR GAPS INSTALLED IN LIEU OF A REDUCED PRESSURE BACKFLOW ASSEMBLY ALSO REQUIRE ANNUAL INSPECTION. TEST REPORTS MUST BE SUBMITTED IMMEDIATELY TO THE DISTRICT.

3. CONTACT DISTRICT FOR INSPECTION OF ALL NEWLY INSTALLED ASSEMBLIES.

4. A CATALOG CUT PRODUCT SUBMITTAL SHALL BE PROVIDED TO THE DISTRICT PRIOR TO INSTALLATION FOR VERIFICATION OF ASSEMBLY APPROVAL STATUS.

5. WHEN INSTALLING AN ASSEMBLY INSIDE A BUILDING, ENSURE ASSEMBLY IS LOCATED WHERE OCCASIONAL SPITTING FROM THE RELIEF VALVE PORT, A FOULED CHECK, OR WATER FLUSHED OUT DURING THE ANNUAL TEST WILL NOT BE OBJECTIONABLE. PROPER DRAINAGE MUST BE PROVIDED. DISTRICT WRITTEN APPROVAL MUST BE RECEIVED FOR INSIDE INSTALLATIONS.

6. ALL RBPA ASSEMBLIES SHALL BE PROTECTED FROM FREEZING, FLOODING AND MECHANICAL DAMAGE DUE TO WATER HAMMER AND EXCESSIVE PRESSURE BUILD UP.

**INSTALLATION REQUIREMENTS**

1. CONTACT DISTRICT TO ENSURE YOU ARE INSTALLING THE CORRECT ASSEMBLY FOR THE DEGREE OF HAZARD.

2. ASSEMBLY MUST BE INSTALLED AS A UNIT, INCLUDING TWO SHUT OFF VALVES, RELIEF PORT, TWO CHECK VALVES, AND FOUR TEST COCKS. ALL ASSEMBLIES ARE REQUIRED TO BE AS A UNIT IN THE CONFIGURATION THEY WERE APPROVED BY DOH AND USC.

3. THOROUGHLY FLUSH THE WATER LINE PRIOR TO INSTALLING ASSEMBLIES.

4. ASSEMBLIES MUST BE INSTALLED A MINIMUM OF 12-INCHES FROM THE BOTTOM OF THE RELIEF PORT TO FINISHED GRADE, AND NO HIGHER THAN 5- FEET FROM THE FLOOR TO CENTERLINE OF ASSEMBLY. AN ASSEMBLY INSTALLED MORE THAN 5- FEET ABOVE FLOOR OR GROUND LEVEL MUST HAVE A PERMANENT PLATFORM UNDER IT FOR THE TESTER OR MAINTENANCE PERSON TO STAND ON. THE PLATFORM MUST COMPLY WITH ALL CURRENT AND APPLICABLE SAFETY STANDARDS AND CODES IN EFFECT. ALL ASSEMBLIES MUST BE INSTALLED HORIZONTALLY, UNLESS THEY HAVE WASHINGTON STATE APPROVAL TO BE INSTALLED VERTICALLY. IF INSTALLED IN A VERTICAL CONFIGURATIONS, IT MUST BE A MINIMUM OF 12-INCHES FROM FLOOR, AND NO HIGHER THAN 5- FEET FROM THE FLOOR TO CENTER OF THE #2 SHUT OFF VALVE. ALL ASSEMBLIES MUST MAINTAIN A SUFFICIENT CLEARANCE FROM ANY WALL TO ENSURE ACCESSIBILITY OF MAINTENANCE AND TESTING. SIZES 2-1/2 INCHES AND LARGER IN DIAMETER MAY REQUIRE ADDITIONAL SPACE ON ONE SIDE OF THE ASSEMBLY. ASSEMBLIES 2-1/2 INCHES AND LARGER IN DIAMETER SHALL HAVE SUPPORT BLOCK TO PREVENT FLANGE DAMAGE.

5. REDUCED PRESSURE BACKFLOW ASSEMBLIES SHALL NOT BE INSTALLED BELOW GROUND AT ANYTIME.

6. ASSEMBLIES MUST MEET THE ABOVE REQUIREMENTS TO ENSURE ACCESSIBILITY FOR TESTING, MAINTENANCE AND APPROVAL OF THE DISTRICT. VARIANCE OF ANY INSTALLATION MUST HAVE PRIOR WRITTEN APPROVAL OF THE DISTRICT.

**AIR GAP REQUIREMENTS**

1. AIR GAP MUST BE TWICE THE INLET DIAMETER OF THE INLET PIPE, MINIMUM OF 1-INCH FOR 1/2” PIPE OR SMALLER.

2. THE AIR GAP MUST PROVIDE A PHYSICAL SEPARATION FROM THE BOTTOM OF THE INLET PIPING TO THE TOP OF THE OVERFLOW RIM OF THE RECEIVING VESSEL.

3. IF INLET PIPING IS CUT DIAGONALLY TO DECREASE SPLASHING, THE AIR GAP SEPARATION IS MEASURED FROM THE BOTTOM OF THE CUT TO THE RECEIVING VESSEL.

4. IF AIR GAP IS LOCATED NEAR SIDEWALLS, THE SEPARATION INCREASES TO THREE TIMES THE INLET DIAMETER OF THE INLET PIPING, MINIMUM OF 1-1/2 INCHES.

**STANDARD RBPA NOTES & INSTALLATION REQUIREMENTS**

REV. 6/9/17
RPBA INSTALLATION NOTES
1. MUST BE ON THE LATEST DEPT. OF HEALTH APPROVED LIST OF BACKFLOW PREVENTION ASSEMBLIES.
2. MUST BE INSTALLED ABOVE FINISHED GRADE, MIN. 12 INCHES TO BOTTOM OF RELIEF PORT.
3. WHEN INSTALLED INSIDE A BUILDING, A FLOOR DRAIN SIZED TO ACCEPT MAXIMUM DISCHARGE FROM THE RELIEF ASSEMBLY IS REQUIRED.
4. FREEZE PROTECTION MUST BE PROVIDED.
5. RISERS AND ALL PIPE IN BOX TO BE BRASS, COPPER, OR PVC.
6. DO NOT INSTALL IN AN AREA SUBJECT TO FLOODING. ASSEMBLIES MUST BE INSTALLED ABOVE GROUND.
7. A DISTRICT CROSS CONNECTION SPECIALIST SHALL INSPECT INSTALLATION OF DEVICE AND RECEIVE TEST REPORTS PRIOR TO ESTABLISHMENT OF WATER SERVICE OR APPROVAL. TEST REPORTS MUST BE SIGNED BY A CERTIFIED BACKFLOW ASSEMBLY TESTER AND IMMEDIATELY SENT TO THE DISTRICT.
8. SOME CLEARANCES (I.E. SIDE AND TOP) MAY NOT BE REQUIRED FOR DEVICES WITH A FULLY REMOVABLE ENCLOSURE.
9. SUPPORTS MUST BE INSTALLED FOR SIZES LARGER THAN 2-1/2".

REDUCED PRESSURE BACKFLOW ASSEMBLY (RPBA) INSTALLATION
**DOUBLE CHECK VALVE ASSEMBLY (DCVA) INSTALLATION**

1. **MUST BE ON THE LATEST DEPT. OF HEALTH APPROVED LIST OF BACKFLOW PREVENTION ASSEMBLIES.**

2. **MAY BE INSTALLED BELOW GROUND IN AN APPROVED VAULT.**

3. **FREEZE PROTECTION IS THE RESPONSIBILITY OF THE OWNER.**

4. **RISERS AND ALL PIPE IN BOX TO BE BRASS, COPPER, OR PVC.**

5. **THE DCVA SHALL NOT BE INSTALLED WHERE IT MAY BECOME SUBMERGED.**

6. **A DISTRICT CROSS CONNECTION SPECIALIST SHALL INSPECT INSTALLATION OF DEVICE AND RECEIVE TEST REPORTS PRIOR TO ESTABLISHMENT OF WATER SERVICE OR APPROVAL. TEST REPORTS MUST BE SIGNED BY A CERTIFIED BACKFLOW ASSEMBLY TESTER AND IMMEDIATELY SENT TO THE DISTRICT.**

7. **FOR 2–1/2” TO 3–1/2” DCVA’S, USE A UTILITY VAULT 506–LA WITH LOCKING STEEL DOOR NO. 55–332P.**


9. **FOR 1–INCH AND SMALLER DCVA USE CARSON INDUSTRIES “1220–12” OR EQUAL (21–1/2”X15”) FOR 1 1/4–INCH TO 2–INCH DCVA USE CARSON INDUSTRIES “JUMBO BOX 1730–12” OR EQUAL (33–1/2”X20–1/2”).**

---

**FOREMAN’S INSTRUCTIONS:**

- **THE BOX SHALL BE INSTALLED 1–FOOT BEHIND THE METER BOX OR AS OTHERWISE APPROVED BY THE DISTRICT.**

- **FILL CENTER AREA WITH MIN 12” DEEP DRAIN MATERIAL.**

**REV. 10/19/17**
FOR AREAS SUBJECT TO VEHICULAR TRAFFIC, USE PRECAST CONCRETE VAULT 3'-8"x2'-8"x3'-6" UTILITY VAULT CO. MODEL 233-LA WITH NO. 23-233P DIAMOND PLATE COVER OR EQUAL. FOR NON-TRAFFIC AREAS USE CARSON PLASTIC VAULT NO. 1730 OR EQUAL 1'-6"x2'-1"x3'-2".

DOMESTIC SERVICE AND FIRE SPRINKLER (SIZE AS REQUIRED)

WATERMETER

PROPERTY LINE

WATER METER SEEN DISTRICT STANDARD INSTALLATION DETAILS

PROPERTY LINE

DOH APPROVED BACKFLOW PREVENTION DEVICE

DOH APPROVED DOUBLE CHECK BACKFLOW PREVENTOR ASSEMBLY. PLUG ALL TEST COCKS WITH PVC PLUGS.

BALL VALVE AT EACH END OF BACKFLOW PREVENTOR (TYP)

BALL VALVE AT EACH END OF BACKFLOW PREVENTOR (TYP)

NOTE
1. NO FENCING, GATES OR OTHER OBSTACLES SHALL BE LOCATED AS TO RESTRICT ACCESS TO METER SERVICE.
2. SEE DISTRICT STANDARDS FOR WATER SERVICE METER BOX REQUIREMENTS.

RISER ROOM WALLS

FLOW

RISER ROOM WALLS

FLOW

3" MIN

UNION (TYP)

DOH APPROVED BACKFLOW PREVENTOR DEVICE

DOH APPROVED DOUBLE CHECK BACKFLOW PREVENTOR ASSEMBLY. PLUG ALL TEST COCKS WITH PVC PLUGS.

FLOW

FLOOR

ALTERNATE/ADDITIONAL DCVA IN RISER ROOM

STANDARD FIRE SPRINKLER DCVA CONNECTION

REV. 10/19/17
GENERAL DCDA NOTES

1. ALL CONSTRUCTION SHALL CONFORM TO THE APPROPRIATE FEDERAL, STATE, COUNTY OR DISTRICT REQUIREMENTS.

2. ALL DCDA’s SHALL BE APPROVED FOR INSTALLATION WITHIN THE STATE OF WASHINGTON BY THE WASHINGTON STATE DEPARTMENT OF HEALTH. THE CONTRACTOR SHALL PROVIDE THE DISTRICT WITH SPECIFICATIONS AND SHOP DRAWINGS OF THE APPROVED DCDA PRIOR TO CONSTRUCTION.

3. THE SUPPLY LINE FOR THE DCDA SHALL BE DUCTILE IRON, A MINIMUM OF 4” DIA. AND MEET THE MATERIAL AND CONSTRUCTION REQUIREMENTS OF THE DISTRICT FOR WATER MAIN CONSTRUCTION.

4. THE CONTRACTOR SHALL INSTALL AT THE WATER MAIN A TEE AND 4” MINIMUM SIZED GATE VALVE ON ALL DCDA SYSTEMS. WET TAPS ARE ONLY ALLOWED ON EXISTING WATER MAINS.

5. A FLEXIBLE FITTING (MJ SLEEVE) SHALL BE INSTALLED WHEN ENTERING THE VAULT. THIS FITTING MAY BE OMITTED IF AN MJ BELL CONNECTION IS WITHIN 5 FEET OF THE VAULT.

6. THE CONTRACTOR SHALL LEVEL THE UTILITY VAULTS AND ADJUST THE COVER TO MATCH THE EXISTING GRADE OR 6” ABOVE GRADE IN UNIMPROVED AREAS.

7. THE CONTRACTOR SHALL INSTALL A LADDER—UP AS SHOWN IN THE DETAILS. SUBMIT PRODUCT INFORMATION FOR DISTRICT REVIEW.

8. ALL VAULTS SHALL BE INSTALLED WITH A 4” ZURN FLOOR DRAIN MODEL 551 W/ GRATING ON A 4” PVC DRAIN PIPE. THE DRAIN SHALL BE RUN TO DAYLIGHT OR A STORM DRAIN SYSTEM WITH A MINIMUM OF 4” SCHEDULE 80 PVC STORM PIPE. IF POSITIVE DRAINAGE FROM THE VAULT CANNOT BE ACHIEVED A SUMP PUMP SYSTEM WILL BE REQUIRED. SUMP PUMP SHALL BE ZOELLER "MIGHTY–MATE" AUTOMATIC SUBMERSIBLE PUMP. WRITTEN DISTRICT APPROVAL IS REQUIRED FOR SUMP PUMP SYSTEM. VAULT SHALL BE CONSTRUCTED SO BACKFLOW ASSEMBLY DOES NOT BECOME SUBMERGED.


10. IF REQUIRED, THE POST INDICATOR VALVE IS TO BE INSTALLED AT THE LOCATION APPROVED BY THE FIRE MARSHAL AND AS SHOWN ON THE FIRE MARSHAL APPROVED DRAWINGS.

11. ALL TEST COCKS INSTALLED WITH THE DCDA SHALL HAVE THE APPROPRIATE PLUGS INSTALLED.


13. BACKFLOW ASSEMBLY TYPE AND INSTALLATION REQUIREMENTS MAY VARY AND WILL BE AT THE DISTRICT’S DISCRETION BASED UPON WASHINGTON STATE DEPARTMENT OF HEALTH DRINKING WATER REGULATIONS RELATING TO CROSS CONNECTION WAC 246–290–010. THE DISTRICT REQUIREMENTS MAY BE EQUAL TO OR MORE STRINGENT THAN THE ABOVE CITED CODE.

PAINT SCHEDULE

EXTERIOR OF VAULT BELOW GRADE TWO COATS OF BLACK BITUMASTIC SOLUTION VAULT SHOULD BE DRIED WITH NO MOISTURE PRESENT PRIOR TO APPLICATION OF COATINGS.

PAINT INTERIOR PIPING AND VALVES ONLY, BACKFLOW ASSEMBLY SHALL NOT BE PAINTED.

1 – COAT RUST RESISTOR PRIMER RED #1013
2 – COATS SAFETY BLUE
NOTE
1. FOR LOCATION OF FIRE DEPARTMENT CONNECTION (FDC) AND POST INDICATOR VALVE (PIV), IF APPLICABLE, SEE FIRE MARSHAL APPROVED DRAWINGS.
2. DISTRICT OPERATIONS AND MAINTENANCE RESPONSIBILITY OF THE WATERMAIN ENDS AT THE FACE OF THE VAULT.

2-1/2" DOUBLE CHECK DETECTOR ASSEMBLY

REV. 10/19/17
**Technical Specifications**

**Part 4 - Standard Details**

**SAMMAMISH PLATEAU WATER AND SEWER DISTRICT**

---

**PLAN REVIEW AND INSPECTION BY FIRE MARSHAL**

**8"-8"**

2" PVC CONDUIT FOR ALARM CONNECTION

GALVANIZED STEEL LADDER W/ LADDER-UP LU-2

FLEXIBLE FITTING AS NECESSARY (TYP) (SEE NOTES)

WATER MAIN

Ductile Iron Water Main (Size to Match DCOA)

1-6" MIN


Washington State Department of Health Approved Double Check Detector Assembly

---

**NOTE**

1. FOR LOCATION OF FIRE DEPARTMENT CONNECTION (FDC) AND POST INDICATOR VALVE (PIV), IF APPLICABLE, SEE FIRE MARSHAL APPROVED DRAWINGS.

2. DISTRICT OPERATIONS AND MAINTENANCE RESPONSIBILITY OF THE WATERMAIN ENDS AT THE FACE OF THE VAULT.

---

**ELEVATION**

**NOT TO SCALE**

12" PEAS GRAVEL

GROUT PIPE PENETRATIONS INSIDE AND OUTSIDE OF VAULT (TYP)

PIPE SADDLE SUPPORT GRINNELL #264 (TYP)

8" ADJUSTABLE SADDLE PIPE SUPPORT GRINNELL #264 (TYP)

---

**4" AND LARGER DOUBLE CHECK DETECTOR ASSEMBLY**

**REV. 10/19/17**

CCD-7

Technical Specifications

Part 4 - Standard Details
GRINDER PUMP PLANS
ATTACH CONTROL PANEL TO SIDE OF THE HOUSE, OR IF ALLOWED BY THE DISTRICT A 4x4 PRESSURE TREATED POST SET 3-FT INTO CONCRETE.

LIGHT MUST BE VISIBLE FROM 180°

PUMP CONTROL PANEL SHALL BE VISIBLE FROM TANK. SEE TYPICAL CIRCUIT DIAGRAM FOR POWER SUPPLY.

EXPLOSIVE GAS SEAL-OFF FITTING

SINGLE 1-1/4" SCH 40 PVC CONDUIT BETWEEN J-BOX AND CONTROL PANEL

8x6x4 NEMA 4x PVC JUNCTION BOX (J-BOX). CARLON MODEL E987R WITH SCREW ON COVER (OR EQUAL).

RELOCATE J-BOX IF TANK IS GREATER THAN 12 FT FROM CONTROL BOX

MAX. DISTANCE BETWEEN PUMP CONTROL PANEL AND GRINDER TANK IS 12 FT. IF A GREATER DISTANCE IS REQUIRED, RELOCATE J-BOX NEXT TO TANK AND RUN SINGLE 1-1/4" PVC ELECTRICAL CONDUIT TO CONTROL PANEL.

INSTALL TWO 1-1/4" POWER CONDUITS BETWEEN GRINDER TANK AND J-BOX. ONE FOR PUMP CABLE AND THE OTHER FOR THE FLOAT CABLES. INSTALL SWEEPS WHERE NECESSARY, BENDS NOT ALLOWED. DEPTH AS REQUIRED BY CODE.

GRAVITY SIDE SEWER
- ASTM D3034
- 2% MIN SLOPE PER DISTRICT STANDARDS
- CLEANOUT 3 MAX FROM BUILDING PER DISTRICT STANDARDS AND RELATED CODE REQUIREMENTS
- MUST MEET ALL DISTRICT AND CITY REQUIREMENTS

INSTALL INLET CONNECTION USING A NEOPRENE GROMMET PER MANUFACTURER'S INSTRUCTIONS (FIT PIPE SIZE)

FIELD LOCATE AND INSTALL TWO 1-1/4" HUB CONNECTIONS PER MANUFACTURER'S INSTRUCTIONS. USE ONE FOR FLOAT CONTROL WIRES AND THE OTHER FOR THE PUMPS.

INSTALL 1-1/2" AIR PVC VENT W/ 1-1/2" HUB. ALTERNATE LOCATION ACCEPTABLE WITH DISTRICT APPROVAL.

EASTEN SPARE WIRE FOR FUTURE ADJUSTMENTS (12"-18") IN TANK WITH WIRE TIES. WIRE SHALL NOT HAMPER REMOVAL OF PUMPS.

GRINDER TANK W/GAL COVER STEEL
SLOPE EXISTING GRADE AWAY FROM TANK

1-1/4" x 12" BRASS NIPPLE MPT (PUMP DISCHARGE) CONNECT TO GRINDER PUMP CLEANOUT

INSTALL CONCRETE ANCHOR

UNDISTURBED NATIVE MATERIAL

6" MIN PEA GRAVEL BASE

NOTES
1. GRINDER PUMP SYSTEM SHALL BE: SIMPLEX GRINDER SYSTEM MODEL SANN-8 AS MANUFACTURED BY PUMPTECH INC (NO EQUAL).
2. INSTALL IN ACCORDANCE WITH ARTICLE VIII MINIMUM REQUIREMENTS AND INSTALLATION OF SIDE SEWER - PRESSURE, OF THE SIDE SEWER REGULATIONS.
3. VERIFY EXISTING SEWER OUTLET BEFORE INSTALLING GRINDER PUMP TANK.

GRINDER PUMP INSTALLATION
REV. 10/19/17
NOTES
2. THE TANK LOCATION SHALL BE ACCESSIBLE FOR MAINTENANCE AND REPAIR BY DISTRICT PERSONNEL.
3. TANK COVER SHALL BE APPROX 3” ABOVE FINISHED GRADE. FINISH GRADE SHALL BE FREE DRAINING AROUND AND AWAY FROM THE TANK SO THAT SURFACE WATER CANNOT POND AROUND THE STATION.
4. AIR VENT MAY BE INSTALLED IN ALTERNATIVE LOCATION WITH DISTRICT APPROVAL.
5. POSITION GRINDER PUMP TANK TO MINIMIZE NUMBER OF BENDS IN DISCHARGE PRESSURE PIPING. BENDS SHALL BE INSTALLED IN THE GRAVITY SIDE SEWER IF NEEDED.
6. NO PLANTS ARE TO BE LOCATED WITHIN 5–FT OF THE TANK. THE PROPERTY OWNER SHALL MAINTAIN A 5–FT CLEAR ZONE AROUND THE TANK.
7. THE LOCATION OF THE CONTROL PANEL SHALL BE:
   1. ACCESSIBLE FOR EASY MAINTENANCE AND REPAIR
   2. THE ALARM LIGHT MUST BE VISIBLE 180° RADIUS FROM 50–FT
   3. VISABLE FROM THE TANK
   4. THE BOTTOM WITHIN 4.5–FT OF FINISH GRADE.
   5. FENCES, BRUSH, OR ANY OTHER OBJECT SHALL NOT HIDE THE LIGHT OR HINDER IN THE MAINTENANCE AND OR REPAIR OF THE SYSTEM

GRINDER PUMP SITE LAYOUT INSTRUCTIONS

NOTES
1. PUMP AND FLOAT CABLES TO BE EXTENDED INTO AND END AT THE J–BOX USING TWO SEPARATE CONDUITS; ONE FOR THE PUMP AND ONE FOR THE FLOATS. A SINGLE CONDUIT WITH INDIVIDUAL WIRES SHALL THEN EXTENDED FROM THE J–BOX TO PUMP CONTROL PANEL.
2. RUN FROM THE J–BOX TO THE PUMP CONTROL PANEL FOUR #10 AWG THHN WIRE FOR THE PUMP (WHITE, BLACK, RED, GROUND), TWO #14 AWG THHN WIRE WITH INDIVIDUAL COLORS FOR THE PUMP SENSOR AND PROBE, AND THREE SETS OF INDIVIDUAL COLORED #14 WIRE FOR THE FLOATS.
3. AN EXPLOSIVE GAS SEAL–OFF SHALL BE INSTALLED IN THE ELECTRICAL CONDUIT JUST PRIOR TO THE PUMP CONTROL PANEL.
4. INSTALLATION MUST CONFORM TO ALL REQUIREMENTS AND REGULATIONS OF THE NATIONAL ELECTRICAL CODE. AN ELECTRICAL PERMIT AND INSPECTION IS REQUIRED WHETHER THE WORK IS PERFORMED BY THE OWNER OR A CONTRACTOR.
6. THE CONTRACTOR SHALL REFER TO THE MANUFACTURER’S INSTALLATION INSTRUCTIONS FOR THE GRINDER PUMP CONTROL PANEL. THE TYPICAL CIRCUIT DIAGRAM SHOWN ABOVE IS ONLY AN EXAMPLE.

TYPICAL CIRCUIT DIAGRAM
**NOTES**

1. ALL HDPE WELDING SHALL BE MADE USING ELECTRO-FUSION.
2. WHEN BOXES LOCATED IN TRAFFIC AREAS: WHERE BOXES ARE SUBJECTED TO ANY POSSIBLE VEHICLE LOADING, REPLACE THE CARSON BOXES WITH FOGTITE #2 CONCRETE BOXES WITH FOGTITE STEEL TRAFFIC LIDS MARKED "SEWER".

**TRACER WIRE NOTES**

1. ALL HDPE PIPE SHALL BE INSTALLED WITH 12-GAUGE SOLID CORE WIRE, TRACER WIRE. THE WIRE SHALL BE WRAPPED AROUND THE PIPE AS PART OF THE INITIAL INSTALLATION.
2. TRACER WIRE SHALL BE LOOPED THROUGH THE COLLECTION VALVE BOX AS SHOWN IN THE DETAIL.
3. WHERE A CUT-IN CONNECTION IS MADE TO AN EXISTING LOW PRESSURE SEWER, THE TRACER WIRES SHALL BE SPliced TOGETHER USING BUTT CONNECTORS AND SHRINK TUBING PROTECTION.
4. TRACER WIRE SHALL EXTEND FROM THE GRINDER PUMP CLEANOUT TO THE COLLECTION VALVE BOX AS SHOWN IN THE DETAILS.

---

**MATERIAL LIST FOR GRINDER PUMP CLEANOUT AND COLLECTOR VALVE BOX DETAILS**

1. 1-1/4" HDPE PRESSURE PIPE SDR 11 (LENGTH TO SUIT)
2. TWO STACKED CARSON JUMBO BOX (PART #1730)
3. CARSON LID (PART #1730) MARKED "SEWER"
4. 1-1/4" MALE THREADED NIPPLE SCH. 80 PVC, (LENGTH TO SUIT)
5. 1-1/4" X 90° BEND THREADED SCH. 80 PVC
6. 1-1/4" HDPE x 316SS MPT TRANSITION COUPLING, 6-INCH
7. 1-1/4" COMPRESSION COUPLING SCH. 40 PVC
8. 1-1/4" UNION BALL VALVE THREADED SCH. 80 PVC
9. 1-1/4" X 3" NIPPLE THREADED SCH. 80 PVC
10. 1 - 1-1/4" TEE THREADED SCH. 80 PVC
11. 1-1/4" BRASS SWING CHECK VALVE
12. 1-1/4" X 8" NIPPLE THREADED SCH. 80 PVC
13. 1-1/4" CAP THREADED SCH. 80 PVC
14. HDPE SOCKET WELDED COUPLING
15. HDPE SOCKET WELDED REDUCER SDR 11 (SIZE TO SUIT)
16. HDPE SOCKET WELDED TEE SDR 11 (SIZE TO SUIT)

---

**GRINDER PUMP CLEANOUT**

REV. 10/19/17

---

**COLLECTION VALVE BOX**

REV. 10/19/17

---

FROM GRINDER PUMP CLEANOUT TO COLLECTOR VALVE BOX

NOT REQUIRED FOR CONNECTION TO GRAVITY SIDE SEWER

---

COLLECTION MAINLINE LOW PRESSURE SEWER MAIN

MIN 4" OF COVER IN ROAD

COLLECTION VALVE BOX

TRACER WIRE
PRESSURE LINE CONNECTION

NOTES
1. ALL PVC FITTINGS SHALL BE GASKETED.
2. NO COLLECTION VALVE BOX REQUIRED WHEN CONNECTING TO A GRAVITY SIDE SEWER

REV. 10/19/17

GPD-4
Technical Specifications
Part 4 - Standard Details
DISTRICT APPROVAL REQUIRED FOR WORK INSIDE MANHOLES. BREAK OUT EX CHANNEL AND MATCH CROWN WITH EX MAIN. CHANNEL TO BE DIRECTED WITH FLOW OF MANHOLE. IF MANHOLE IS LIVE, INSTALL DROP CONNECTION OUTLET ON SHELF.

NOTE:
1. 12 GAUGE TRACER WIRE SHALL BE COILED AROUND THE FIRST MANHOLE RUNG.
TYPE II LOW PRESSURE CLEANOUT WITH MANHOLE (TRAFFIC AREAS)

1. MATERIAL LIST PROVIDED ON THE DETAIL TITLED LOW PRESSURE CLEANOUT NOTES AND MATERIAL LISTS.

TYPE I LOW PRESSURE CLEANOUT WITH MANHOLE (NON-TRAFFIC AREAS ONLY)
SECTION A-A FOR LOW PRESSURE CLEANOUTS

LOW PRESSURE CLEANOUT NOTES

1. THE PIPING SYSTEM INSTALLED IN A TYPE I AND TYPE II CLEAN OUT IS THE SAME. THE ONLY DIFFERENCE BETWEEN THE TWO TYPES IS A TYPE I REQUIRES A PRE-MAINUFACTURED VAULT, WHILE A TYPE II REQUIRES A FLAT-TOP MANHOLE SECTION.

2. LOW PRESSURE CLEANOUTS SHALL BE INSTALLED AT A MINIMUM OF EVERY 500-FT AND AT THE END, OR TERMINUS, OF THE LOW PRESSURE SEWER MAIN.

3. THE MANHOLE SECTION AND/OR VAULT SHALL BE INSTALLED LEVEL AND SHALL DRAIN TO DAYLIGHT OR STORM SYSTEM. THE COVER AND/OR LID SHALL BE ADJUSTED TO GRADE.

4. WHERE THE CLEAN OUT IS INSTALLED AT THE TERMINUS OF A MAIN, THE PVC PLUG(ITEM 7) SHALL BE INSTALLED INTO THE END OF THE PVC TEE (ITEM 5), ALLOWING FOR FUTURE MAIN EXTENSIONS.

MATERIAL LIST

1. ALL PARTS SHALL BE THREADED PVC, SCHEDULE 80, WITH THE SAME DIAMETER AS THE SEWER MAIN (EXCEPT AS NOTED).

X MATERIALS REQUIRED FOR LOW PRESSURE CLEANOUT X MATERIALS REQUIRED FOR EXTENSION OF SEWER MAINLINE AS PART OF CURRENT OR FUTURE WORK

<table>
<thead>
<tr>
<th>ITEM</th>
<th>ITEM NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HDPE PRESSURE PIPE SDR 11</td>
</tr>
<tr>
<td>2</td>
<td>HDPE x 316SS MPT TRANSITION FITTING, 6-INCH LENGTH (FULL BORE, DIAMETER SHALL BE SAME SIZE AS THE SEWER MAINLINE)</td>
</tr>
<tr>
<td>3</td>
<td>UNION BALL VALVE, PVC</td>
</tr>
<tr>
<td>4</td>
<td>NIPPLE, PVC</td>
</tr>
<tr>
<td>5</td>
<td>TEE, PVC</td>
</tr>
<tr>
<td>6</td>
<td>90° ELBOW, PVC</td>
</tr>
<tr>
<td>7</td>
<td>PLUG, PVC (MIP)</td>
</tr>
<tr>
<td>8</td>
<td>CONCRETE BLOCK - (SIZE TO SUIT)</td>
</tr>
<tr>
<td>9</td>
<td>MIP X 2 1/2&quot; MNST SMVL BRASS HOSE ADAPTOR (PROVIDE REDUCER AS REQUIRED)</td>
</tr>
<tr>
<td>10</td>
<td>2 1/2&quot; FNSY CAP W/CHAIN</td>
</tr>
<tr>
<td>11</td>
<td>ALUMINUM U-BOLTS BOLTED TO SUPPORTS WITH STAINLESS STEEL NUTS</td>
</tr>
<tr>
<td>12</td>
<td>1-1/2&quot; X 3/16&quot; ALUMINUM BAR, BENT AS SHOWN IN TYPE I CLEANOUT DETAIL AND ATTACHED TO CONCRETE WALL WITH STAINLESS STEEL ANCHOR BOLTS</td>
</tr>
<tr>
<td>13</td>
<td>TRACER WIRE, INSULATED 12-GAUGE SOLID CORE WIRE (WRAP TRACER WIRE AROUND ALL PIPES DURING INSTALLATION)</td>
</tr>
<tr>
<td>14</td>
<td>HDPE ELECTRO-FUSION SOCKET WELDED COUPLING</td>
</tr>
</tbody>
</table>

REV. 10/19/17
PART FIVE - DRAWING STANDARDS

5.1 GENERAL

A. Plan Set

1. All plans shall be ink on a reproducible mylar cut sheet, 22”x34” in size. The title block for each sheet shall include:
   a) Name of the project
   b) Owner/developer's name
   c) Address and telephone number
   d) Engineering firm's name, address and telephone number
   e) Date the drawings were prepared
   f) Dates and identification of any revisions to the drawings
   g) Page number of the sheet within the plan set

2. Each set of plans shall include a cover sheet unless the plans are shown completely on one sheet. The cover sheet (or single drawing sheet) shall include:
   a) Name of the project – if the improvements are being constructed as part of a larger development, the name and number of the division being constructed under this agreement and the name of the larger development shall be shown
   b) Plat name or Short Plat Number and the agency (County or City) who has jurisdiction over the development of the project
   c) Section, township, range, and existing King County tax parcel number(s) where the project is located
   d) Vicinity map
   e) List of drawings, including District standards
   f) North arrow and scale designation
   g) Datum used (1988 NAVD or latest District standard required) and benchmark location and elevation shall be surveyed at North American Vertical Datum of 1988 [NAVD 88]. Benchmark must be a known, registered benchmark by King County or the Cities of Sammamish or Issaquah. Assumed or surveyor set benchmarks will not be allowed. Elevations derived from as-built drawings or similar sources shall not be used as the basis for vertical control. The drawings shall be assigned the local projection of Washington State Plane North, NAD 1983 (HARN), US Feet.
   h) Legend of symbols used
   i) Identification of existing and proposed streets
   j) Seal and signature of the Professional Engineer responsible for the plan set
k) Signature box for the District’s General Manager to sign and date the drawings, indicating District approval of the plans

l) Fire district in which the project is located

m) The following disclaimer: “Underground utilities are shown in the approximate location. There is no guarantee that all utility lines are shown, or that the location, size, and material is accurate. The Contractor shall uncover all indicated piping where crossing, interferences, or connections occur prior to trenching or excavation for any pipe or structures, to determine actual locations, size, and material. The Contractor shall make the appropriate provision for protection of said facilities. The Contractor shall notify ONE CALL at 1-800-424-5555 and arrange for field location of existing facilities before construction.”

3. The set of drawings shall include:

   a) Erosion and sedimentation control plans

   b) Water and sewer facilities on separate drawings unless the requirement is waived by the District

   c) Location and general footprint of all buildings, shown with faded lines, with finished floor elevations for all floors

   d) All rockeries, fences, street trees, driveways, mailboxes, and other surface features, shown with faded lines

   e) Existing and finished grading (contour lines), shown with faded lines

   f) Symbols and font sizes conforming to the District drawing standards listed in Table 5.1.

4. Preliminary Plans sent for review may be provided on regular print paper.

B. Overall Drawing(s)

   Where more than one sheet is required to cover all of the construction area, an overall drawing will be required. If the improvements being constructed are in a division of a larger development, the extent of the larger development shall be indicated.

   The overall drawing(s) shall show the proposed location of water lines, valves, fire hydrants, blowoffs, sewer lines, manholes, cleanouts and other appurtenances. If the water and sewer plans are shown separately, separate overall drawings shall be provided for the water and sewer improvements.

   The overall drawing shall be at a standard engineering scale. The overall drawing shall include the entire construction area. An index map shall be included, showing the sheet layout with associated page numbers, on the overall sheet.
<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>EXISTING</th>
<th>PROPOSED</th>
<th>DESCRIPTION (ABBREVIATION)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[</td>
<td>[</td>
<td>CAP/PLUG</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>COUPLING (CPL)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GUARD POST (GP)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>REDUCER (RED)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>THRUST BLOCK (TB)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>WATER METER (WM)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FIRE HYDRANT (FH)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FLANGE/BLIND FL (FL)/(BL FL)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MECHANICAL (MJ)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PUSH-ON/HUB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RESTRAINED JOINT (RJ)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AIR/VACUUM RELEASE VALVE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BLOW-OFF (BO)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BUTTERFLY (BF)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CHECK (CK)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GATE/GENERAL (WV)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PLUG VALVE (PV)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TEE (TEE)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BEND (BND)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CROSS (X)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PRESSURE REDUCING VALVE (PRV)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ZONE VALVE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>WATER MAIN</td>
</tr>
</tbody>
</table>

**SYMBOLS SHOWN ON DRAWINGS SHALL BE AT LEAST THE SIZE SHOWN IN THIS TABLE, REGARDLESS OF DRAWING SCALE.**
<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>EXISTING</th>
<th>PROPOSED</th>
<th>DESCRIPTION (ABBREVIATION)</th>
</tr>
</thead>
<tbody>
<tr>
<td>.</td>
<td>.</td>
<td>SEWER CLEAN OUT (CO)</td>
<td></td>
</tr>
<tr>
<td>O</td>
<td>O</td>
<td>SEWER MANHOLE (SSMH)</td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>□</td>
<td>SEWER COLLECTION VALVE BOX</td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>□</td>
<td>SEWER AIR/VACUUM RELEASE VALVE</td>
<td></td>
</tr>
<tr>
<td>O O O</td>
<td>O O O</td>
<td>GREASE INTERCEPTOR/OIL WATER SEPARATOR</td>
<td></td>
</tr>
<tr>
<td>△</td>
<td>△</td>
<td>GRINDER PUMP</td>
<td></td>
</tr>
<tr>
<td>□ — □</td>
<td>□ — □</td>
<td>SEWER MAIN</td>
<td></td>
</tr>
<tr>
<td>△ — △ △</td>
<td>△ — △ △</td>
<td>SEWER FORCE MAIN</td>
<td></td>
</tr>
</tbody>
</table>

SYMBOLS SHOWN ON DRAWINGS SHALL BE AT LEAST THE SIZE SHOWN IN THIS TABLE, REGARDLESS OF DRAWING SCALE.
C. District Standards Sheets

The latest issue and/or amendment of the District Standard sheets with standard notes and details, at the date of the Pre-Construction Meeting with the District, shall be incorporated in the Plan Set, and the numbering of the sheets shall reflect their inclusion.

D. Shop Drawings

Shop drawings, when required, shall be provided on the standard size and type sheet.

The Shop drawings may be at any scale that will adequately show the detail necessary for fabrication or construction of the piping, equipment, machinery, etc. depicted on the shop drawing.

5.2 WATER SYSTEMS

The water system design shall be a plan view, at a scale that clearly shows the facilities to be constructed (typically, 1”=20’ to 1”=30’). A smaller scale may be used if approved by the District. The design drawing shall show clearly the relationship of the water main to existing and proposed underground utilities as well as its relationship to street paving, curb, gutters and sidewalks. Water facilities drawings shall be separate from sewer facilities drawings unless combined drawings for simple designs are approved by the District.

A profile of the water system is required. The location of air/vacuum release valves shall be shown in profile. All other utility crossings shall be shown on the profile drawing. All new or proposed water improvements shall be depicted by a heavy solid line. All existing water improvements shall be depicted by a thin, dashed or faded line. The proposed sewer improvements shall be shown with faded lines on the water drawings. All existing sewer improvements shall be depicted by a thin, or faded dashed line. When showing existing water and sewer, and/or other existing and proposed underground utilities, care should be taken to clearly identify each line with unique letters or line types. The different lines should be shown in the drawing legend. If the District has approved combined water and sanitary sewer drawings, all new sewer shall be depicted by a heavy dashed line. Use the following nomenclature for identifying single ¾” water meters:

INSTALL 1” SERVICE LINE WITH SINGLE ¾” METER SETTER

For double ¾” water meters, use the following nomenclature:

INSTALL 1” SERVICE LINE WITH DOUBLE ¾” METER SETTER

Callouts for larger meters are similar.

All storm drainage facilities, existing or proposed, shall be shown with faded lines on the water and sewer drawings. In addition, the complete storm drainage improvement drawings shall be submitted for District review with the water and sewer drawings.
All valves, fire hydrants, fittings and other appurtenances shall be called out and fully located by stationing along centerline of street, or base line of easements, etc. The callouts shall indicate the line size and material. Fittings and appurtenances shall have indications of their size, type and connection type (i.e., flange or mechanical joint). Clusters of fittings and/or appurtenances shall be called out together.

Meter sizes and service line sizes shall be called out for all irrigation meters and domestic meters for multi-family/commercial/industrial developments. In single family residential developments, the service line size used for the lots shall be called out as noted above, and any locations where meters in excess of 3/4” are required shall be called out.

All drafted symbols, line work, and notes shall be completely legible on the final paper print. All notes shall be a minimum of 1/10th inch high (7 point font). Fonts shall be a plain, non-serif style, such as Arial. Shading or hatching in areas containing water improvements symbols, lines, or notes shall not be allowed.

Profile drawings are required by the District to show the relationship of the water line to finish grade, other underground utilities, crossings of railroad tracks, streets, rivers and drainage ditches, changes in the vertical alignment of the water line, and/or other places where it would clarify construction.

5.3 SEWER SYSTEMS

The design of the sewer system shall include both a plan and profile view. The Horizontal scale shall be a scale that clearly shows the facilities to be constructed (typically, 1”=20’ to 1”=30’), and the Vertical scale shall be 1”=5’ or 1”=10’. A smaller scale may be used if approved by the District. The design drawing shall show clearly the relationship of the sewer main to existing and proposed underground utilities, especially all storm drainage facilities, as well as its relationship to street paving, curb, gutters and sidewalks. The sewer line locations shall be dimensioned from the street centerline where possible. Sewer facilities drawings shall be separate from water facilities drawings unless combined drawings for simple designs are approved by the District.

All new or proposed sewer improvements shall be depicted by a heavy dashed line. All existing sewer improvements shall be depicted by a thin, dashed or faded line. The proposed water improvements shall be shown with faded lines on the sewer drawings. All existing water improvements shall be depicted by a thin, or faded solid line. When showing existing water and sewer, and/or other existing and proposed underground utilities, care should be taken to clearly identify each line with unique letters or line types. The different lines should be shown in the drawing legend. If the District has approved combined sanitary sewer and water drawings, all new water shall be depicted by a heavy solid line.

All storm drainage facilities, existing or proposed, shall be shown with faded lines on the water and sewer drawings. In addition, the storm drainage improvement drawings shall be submitted for District review with the water and sewer drawings.

All manholes, cleanouts and other appurtenances shall be clearly labeled in both plan and profile and shall be fully located by stationing along centerline of street, or base line of easements, etc. All invert elevations for each manhole shall be shown on both plan and profile views, together with a
designation for the size of pipe, direction entering/leaving the manhole, and IN or OUT. Profiles shall also include the size, length, slope and pipe classification for each run of pipe from manhole to manhole. Fittings and appurtenances shall have indications of their size, type and connection type. All crossings and conflicts with other utilities shall be shown in both plan and profile. The plans shall also indicate all necessary easements and improvements in the area of the sewer construction, or that would be affected by the construction shall also be shown.

If the finished floor elevation of the lowest sewered floor is below the rim elevation of the manhole upstream of where the building’s side sewer connects to the main, a backwater valve is required by the Uniform Plumbing Code. Each drawing plan sheet that contains such a building shall include the following note:

*The Uniform Plumbing Code requires backwater valves on building sewers where the finished floor is below the rim of the upstream manhole. Backwater valves, if they are installed, must be located upstream of the cleanout closest to the building. The District is not responsible for their installation, maintenance, or operation. The side sewer permit for a building with a backwater valve shall include a hold harmless clause which indemnifies the District against any liability, damage, or cost which may accrue from the installation and operation of a backwater valve in the side sewer.

Each building or lot whose finished floor elevation indicates the need for a backwater valve shall have a large asterisk (*) next to the building number or lot number as reference to the note.

All drafted symbols, line work, and notes shall be completely legible on the final paper print. All notes shall be a minimum of 1/10th inch high (7 point font). Fonts shall be a plain, non-serif style, such as Arial. Shading or hatching in areas containing sewer improvements symbols, lines, or notes shall not be allowed. It is preferred to have the plan and profile of each sewer from manhole to manhole shown on the same sheet with the same horizontal scale. When possible, the profiles shall be extended directly below or above the plan view. If including the plan and profile on the same sheet results in excessive fragmentation of the sewer plan view, profiles may be shown together on separate pages, clearly referencing the sheet number containing the plan view. Where profiles are shown on separate pages from the plan view, a horizontal scale of 1”=50’ and a vertical scale of 1”=5’ may be used for the profile.

5.4 AS-BUILT DRAWINGS

A. Project Field Drawings

The Developer/Contractor shall maintain, on the jobsite, project field plans marked to indicate District approved plan revisions made in the field and other details of construction. These changes and details of construction shall be provided to the Engineer of Record to include on the "As-Built" record drawings. All surface features of the water and sewer systems, together with the staked location of watermain bends, shall be field-surveyed by a Washington State licensed Surveyor during construction and the information used to prepare the As-Built drawings. The surveyed locations of all features shall be shown with an “X” on the draft as-built drawings superimposed on the water and sewer plans. (Point-Plot Map at the same scale as the as-built
drawings). The Developer’s Engineer shall also submit to the District an electronic table of the surveyed points including identification number or description of the coordinates using the following projection: Horizontal: Washington State Plane North, North American Datum 1983/91, HARN, US Feet. Vertical Datum: NAVD 88. The Point-Plot Map and the draft as-built drawings shall be submitted electronically in addition to paper copies. The stationing, coordinates, callouts, and position of facilities shall be revised to represent the as-built location. If the original design drawings were prepared in digital format using AutoCAD or other automated drafting/design software, the revisions during construction shall be incorporated onto the as-built record drawings digitally. The drawings shall be on a minimum 4-mil mylar format, clearly marked in the lower right-hand corner as "As-Built". For manually-drafted drawings, if the "As-Built" record drawing is not on the original District Approved plan, a mylar of the original District approved plan shall also be provided. The Developer/Contractor’s project field drawings shall be submitted to the District for review with the As-Built record drawings.

B. Changes in Street Names and/or Lot Lines/Numbers

If, during construction, street names, lot lines, and lot numbers were modified from those shown on the approved design drawings, the as-built drawings shall show the corrections. Street names shall match the names shown on the final plat certificate or similar document.

C. Plats and Short Plats

Plat drawings shall include the new tax lot numbers (10 digits) shown on the final plat certificate or similar document. Each lot may contain only the four (4) digit minor number. Short plat drawings shall include the short plat number.

D. As-Built Submittals

In addition to the as-built mylar drawings, the following shall be provided:

1. Copy of the recorded plat or short plat documents

2. Two (2) sets of full-size prints without District standards, plus one (1) full-size set of prints with District standards (for use at 11-month inspection)

3. One (1) sets of half-size prints (11”x17”)

4. If the design was prepared using computer-aided drafting, provide (an) electronic file(s) containing the As-Built drawings. The electronic as-built drawing files shall be in a form compatible with AutoCAD Version 14 or later with the as-builds being assigned the local projection of Washington State Plane North, North American Datum 1983/91, HARN, US Feet and elevation Datum NAVD 88.

5. A single file containing all scanned images of the as-built drawings in Adobe’s PDF format. PDF images shall be the full size of the original document.
E. Water System As-Built Details

The details of construction for water systems shall include, but not be limited to:

1. Bends - location of bends used, or deletion of bends shown on the plans and not used.

2. Meter boxes - changing the meter box location from one lot corner to another; measurements to meter boxes not located on lot corners from at least two permanent items such as catch basins, hydrants or manholes.

3. Service line locations - route the service line follows, if other than perpendicular to the street, from the main to the meter box. This is especially important in cul-de-sacs or bubbles.

4. Valves - The as-built location of all valves greater than 1 inch shall be shown.

5. Fittings - Any approved changes to the fitting callouts on the design plans should be noted.

6. Other Utilities - Crossings of other utilities and detailed locations of other utilities where they run parallel to the water main and are closer than 3 feet horizontally.

F. Sewer System As-Built Details

The details of construction for sewer systems shall include, but not be limited to, the items indicated below. Items 2 through 6 may be shown in a table on the drawing where the side sewers are shown.

1. Side sewer stubs - exact side sewer stub locations including all of the following measurements on each side sewer:

2. Distance from the downstream manhole to the side sewer tee.

3. Distance from the mainline to the wye (if double side sewer).

4. Distance from the wye to the ends of the six (6) inch stubs.

5. Perpendicular distance from the side property line to the end of the six (6) inch stubs.

6. Depth of the end of the stub below finished grade and invert elevation.

7. Manhole inverts - all inverts to be verified by survey.

8. Manhole locations in unpaved areas - the as-built location of all manholes shall be shown, as determined by surveying described above.
9. Cleanout locations in unpaved areas - the as-built location of all cleanouts shall be shown, as determined by surveying described above.

10. Fittings - any changes to the fitting callouts on the design plans should be noted.

11. Force main bends - location of bends used, or deletion of bends shown on the plans and not used.

12. Other utilities - crossings of other utilities and detailed locations of other utilities where they run parallel to the sewer main and are closer than 3 feet horizontally.

ANY CHANGES TO THE PLANS AS APPROVED SHOULD BE NOTED.