

# Rapid Valley Sanitary District - Water Service Attachment B

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## Design and Construction Standards For Water and Wastewater Piping and Appurtenances

### PART 1 - GENERAL

#### 1.1 Description

- A. This document applies to all underground potable water and wastewater systems and appurtenances installed within the jurisdictional boundaries of the Rapid Valley Sanitary District - Water Service (RVSD).

#### 1.2 Design Criteria and Standards Specified Elsewhere

- A. City of Rapid City, South Dakota, Infrastructure Design Criteria Manual, 2012 Edition or current edition shall apply unless Rapid Valley Sanitary District standards issued in this document are more restrictive.
- B. Recommended Design Criteria Manual for Wastewater Collection and Treatment Facilities, South Dakota Department of Water and Natural Resources, current edition.
- C. Recommended Standards for Water Works, "Ten States Standards", current edition.
- D. National Standard Plumbing Code Illustrated, current edition.
- E. American Water Works Association, Applicable Manuals of Water Supply Practices, current editions.
- F. Uniform Fire Code, current edition.
- G. Handbook of PVC Pipe Design, Unibell, current edition.
- H. Gravity Sanitary Sewer Design and Construction, ASCE Manuals and Reports on Engineering Practice – No. 60 or current edition.
- I. Recommended Standards for Wastewater Facilities, "Ten States Standards", current edition.
- J. Rapid Valley Sanitary District – Water Service Sewer Use Ordinance, current edition.
- K. Rapid Valley Sanitary District – Water Service Water Use Ordinance, current edition.

#### 1.3 Enforcement and Authority

- A. The General Manager of RVSD has the authority to interpret and enforce criteria, standards and construction requirements. Conflicts between specifications, design criteria manuals, codes and standards shall be resolved by the General Manager.
- B. Administrative Rules of South Dakota, ARSD 74.53.05 and 74.53.04.
- C. This document is approved by the RVSD Board of Trustees and is included as an attachment to the current Water Use and Sewer Use Ordinances.

- D. The General Manager, District staff, and their designated Engineer will provide review and enforcement of the requirements.

#### 1.4 Specifications and Details

- A. City of Rapid City Standard Specifications for Public Works Construction, 2012 or current edition. These specifications shall apply unless Rapid Valley Sanitary District standards issued in this document are more restrictive. Changes, additions and/or clarifications are listed in Part 2 and Part 3 of this document.
- B. City of Rapid City Standard Plates. Specifically Sections 8, 9, and 11.

#### 1.5 Review and Plan Submittal

- A. Two sets (2) of construction plans and associated documentation for proposed water and wastewater piping and improvements shall be submitted to the General Manager of RVSD for review by the Engineer and staff. Plan submittals shall be made directly by the developer to RVSD and shall not be made from other agencies.
- B. As-built drawings including plan and profiles shall be prepared by the developer and submitted to RVSD for review upon completion of the construction. The as-built plan drawings shall also be submitted in Autocad electronic format. The electronic drawings shall include lot layouts, right-of-way, easements, water and sewer mains and services and associated appurtenances.
- C. Plans will be reviewed and returned within ten (10) working days of submittal. Review comments will be made by the District Engineer and staff. Plans shall be resubmitted for review and comment after modification. Comments made on the original submittal shall be returned with the new plan submittal.
- D. The submittals shall include complete construction plans, profiles, details, detailed specifications, general notes, reports and other information concerning the work. The submittals shall be prepared by a Registered Professional Engineer in the State of South Dakota. Such documents shall be complete, clear, neat, legible, detailed and in a form acceptable to RVSD and other local, city, county, state or federal review agencies.
- E. The report shall include a water and/or sewer planning report for the ultimate development to be served. The report shall cover the proposed full-build out of the proposed development and it shall also review how the surrounding areas will be affected. The reports shall also include wastewater design flows, pipe capacities, existing conditions, hydraulic network, available fire flows at peak day demands, projected water usage, system pressures and other information required.
- F. RVSD will approve the proposed water and sewer plans after all requirements of the development have been fulfilled.
- G. RVSD review and approval applies only to water and sewer facilities. The project must be reviewed and approved by all appropriate local, county and state governing agencies prior to any construction.
- H. The Rapid Valley Volunteer Fire Department will also review all water projects and will make review comments available to RVSD. This review will add 3 working days to the review process for a total review duration of 13 working days.
- I. Plans shall be submitted to the South Dakota Environment and Natural Resources by the Developer for review and approval prior to construction

## 1.6 Construction

- A. Construction of the proposed water and sewer facilities must be constructed by a Contractor holding a current City of Rapid City Water and Sewer Installer's License.
- B. RVSD personnel shall be given access to the work at all times to make inspections of the work.
- C. RVSD will not accept facilities not in conformance with specified standards.
- D. Construction may not proceed until RVSD approves the final plans.
- E. Locations: Water and sewer facilities shall be located within the street, alley or right-of-ways unless topography dictates otherwise. Easements are required where the water and sewer facilities will be located outside of the right-of-ways.
- F. All water and sewer appurtenances such as manholes, cleanouts, valves and fire hydrants shall be accessible by motorized vehicle.
- G. The project will be accepted into the RVSD system upon the following:
  - 1. Construction is complete and facilities can be placed into service for their intended use.
  - 2. All testing has been completed and the required results have been achieved.
  - 3. As-built plans and electronic files are provided to RVSD.
  - 4. Facilities are in conformance with plans, specifications and RVSD standards.

## 1.7 Quality Control

- A. Source Quality Control: Materials shall be clearly marked with size, class, type, test pressure and manufacturer's name.
- B. Regulatory Agencies: Pipe for potable water service shall bear the National Sanitation Foundation Seal. AWWA and ASTM standards shall be followed where applicable.

## 1.8 Product Submittals

- A. Shop Drawings and Product Data:
  - 1. Dimensional data for all pipe, fittings and appurtenances.
  - 2. Material description and conformance with standards.
  - 3. Affidavit certifying compliance with applicable standards and specifications.
  - 4. Other items required to review product conformance with standard specifications.

## PART 2 - WASTEWATER PIPING AND APPURTENANCES

### 2.1 Sewer Mains and Services

- A. Minimum sewer main size is 8" which shall have a minimum slope of .6%. If larger diameter pipe is required or is shown in the RVSD Master Plan, the Developer/Contractor will incur the cost of up-sizing. Pipe material shall be ASTM D-3034, SDR-35 or SDR-26 gasket sewer pipe. All sewer mains will have access downstream by means of a manhole at all connection points to city trunk sewers.

- B. All new sewer service lines shall have a fabricated pipe wye on the sewer main, GPK gasketed sewer fitting or equal (8"x4" is GPK No. 107-0084). Direct sewer taps are not allowed on new sewer mains.
- C. Sewer services shall be installed to the property line and marked with a 10' x 3/4" rebar at the end of each service. Sewer services shall be installed to a maximum depth of 8' at the property line or at the proper depth to provide service to the proposed lot.
- D. Tracer wire is required on all sewer mains and sewer service lines. Tracer wire shall be brought to the surface at cleanouts and manholes.
- E. External or internal chimney seals are required on all manholes.
- F. Minimum sewer main cover depth from the top of the pipe to finished grade shall not be less than 4.0 ft. Provide insulation per the standard detail in cases where minimum cover cannot be provided. Insulation may be required between storm sewer and sanitary sewers.
- G. Minimum sewer service cover depth from the top of the pipe to the finished grade shall not be less than 3.5 ft.
- H. Sewer minimum slopes, 8"=.6/100ft, 10"=.42/100ft, 12"=.33/100ft, 14"=.21/100ft, 16"=.21/100ft, 18"=.18/100ft.

## 2.2 Sewer Testing and Inspection

### A. General:

1. A visual inspection and televising inspection test shall be performed by RVSD or an approved Contractor for all sewer mains and manholes as a condition of acceptance by RVSD. All tests shall be performed after backfill is complete but prior to any surface restoration. In addition, all new sewer main shall undergo a hydrostatic or air pressure test per standard specifications.
2. Prior to pressure testing newly installed sewer pipe, RVSD or an approved Contractor shall jet and remove all accumulated construction debris, rock, sand, gravel, silt, and other foreign matter from the sewer with an appropriately sized cleaning ball or jetting machine.

### B. Closed Circuit Television (CCTV) Inspection.

1. The Contractor shall arrange and pay for internal CCTV inspection of the completed sewer mains.
2. The CCTV inspection shall be performed by RVSD or an approved contractor.
3. A-USB flash drive of completed inspections shall be delivered to RVSD.
4. USB flash drive shall be properly labeled with on screen measurements or voice recorded measurements.

## PART 3 - WATER PIPING AND APPURTENANCES

### 3.1 Water Mains, Fittings, and Appurtenances

- A. Fittings shall be fusion bonded epoxy ductile iron AWWA C-153, Class 350 mechanical joints with retainer glands or approved joint restraining devices shall be used where joint restraint is required by the plans or in this specification. Mechanical joint restraints are required at all fittings and pipe bells within the restraining length.

- B. All ductile iron fittings and joint restraining devices shall be encased in 8 mil polyethylene per the Standard Specifications.
- C. All metallic water fittings/services in contact with potable water shall be “No Lead” brass alloy and “NL” shall be cast or permanently stamped on the fitting or valve. Fittings and valves shall comply with the USA Safe Drinking Water Act, and US EPA.
- D. All pipe couplings shall be restrained mechanical joint sleeves with restraints allowing 5 degree deflection.
- E. The existing mains must remain in-service until the new water main is complete, disinfected, and pressure tested.
  
- F. Water mains shall be PVC AWWA C-900 or C-905, DR 18, Class 150. Minimum main size is 8”. If larger diameter is required for fire flow purposes or is shown in the RVSD Master Plan the Developer/Contractor will incur the cost of up-sizing.
- G. All main valves shall be mechanical joint non-rising stem resilient seat gate valves. Butterfly valves are not allowed.
- H. Fire hydrants shall be American Darling model B-84, American Flow Control, AVK or Mueller.
- I. Ductile iron fittings shall be mechanical joint and fusion-bonded epoxy coated. Use of American-made products is recommended.
- J. Fittings shall be mechanically restrained at all vertical bends, all fittings on lowerings, reducers, tees and valves. Restraints are not required on horizontal bends of 45 degrees or less where properly thrust blocked. Acceptable joint restraining devices shall be EBBA, Uni-Flange , Romac Field Flange or Alpha Fittings. Concrete thrust blocks are required at all other areas not mechanically restrained.
- K. Pipe joints for PVC water main shall be push-on bell and spigot. Where water main pipe joints are located closer than the restraining length to a restrained valve or fitting, the bell joint shall be restrained with a bell restraint fitting. The designer shall provide restraining length designs.
- L. Bolts for mechanical joints shall be NSS “Cor-Ten Blue” corrosion resistant type or stainless with a minimum of 304 rating. (Type 304 stainless will be used if soil test is moderate-to-severe for being corrosive)
- M. Tapping sleeves shall be stainless steel construction with a 150 psi rating. The branch end shall be flanged and stainless-steel bolts and nuts shall be provided. A flange by mechanical joint valve shall be installed on the tapping sleeve.
- N. All main valves shall be mechanical joint resilient seat gate valves. Butterfly valves are not allowed.
- O. Testing and disinfection per standard specifications. The Contractor is responsible for all testing, tapping, disinfection and water sampling.
- P. Tracer wire is required on all water main and locator boxes will be placed at all fire hydrant locations. The Contractor shall coordinate all tracer wire splice locations with RVSD staff.
- Q. Water mains shall be bedded with limestone crusher fines or type 2 bedding is recommended if ground water is present.

### 3.2 Water Service Lines

**Polyethylene Water Service Lines:**

- A. Minimum service line size is 1".
- B. Tapping saddles and corporation stops are required. Tapping and all materials are the responsibility of the Contractor. RVSD shall observe all water main taps. The Contractor shall contact and schedule the proposed tap with RVSD 2 working days prior to anticipated tap.
- C. Tapping saddles shall be solid band 304 stainless steel construction with stainless steel nuts and bolts. Tapered Buna-N ASTM D-2000 rubber gasketed (Ford FS303 or equal).
- D. One inch (1") through two inch (2") diameter shall be iron pipe size (IPS) poly SIDR 7, 250 psi minimum rating; with stiffener inserts at each curb stop, fittings, and corporation stop. Tubing shall meet the requirements of AWWA C901, NSF Standards 14 and 61, and shall have the material designation of PE3608 by the Plastic Pipe Institute.
- E. Compression type connections with inserts are required. (No yellow brass allowed. Red brass only).
- F. No service line splices on any section of the line.
- G. Piping over 2" and less than 4" shall be PVC service line pipe and shall comply with ASTM D-2241, 200 psi minimum rating, SDR 21. 4" and larger shall be C-900 PVC per specifications.
- H. Tracer wire shall be installed at each service line and exposed at the curb box. A ¼" hole will be drilled in the lid of the curb box and tracer wire ran through. Do not cut the tracer wire when continuing to house. On new construction of service lines to the house a tracer wire is required from the curb box to the water meter or valve inside the house with a tracer wire exposed at the curb box lid through the ¼" hole or holes that are drilled in the curb box lid.
- I. Curb stops with boxes shall be placed on each new service line at the property line or as shown on the plans.
- J. Curb boxes shall be placed behind the sidewalk and marked with a steel fence post. All curb boxes shall be adjustable and installed to finish grade. Finished grade is defined as the top of finished and graded topsoil. All curb boxes will be wrapped in 8mil plastic.
- K. Curb boxes shall be Minneapolis pattern No. 5622 (1-1/2") or Buffalo style 100E curb box with bushings added to curb stop.
- L. Water services shall be bedded with fines according to bedding specifications for crusher fines with a minimum 3" below the pipe and 3" above the pipe.
- M. Select soil material is required for a minimum of 18" above the pipe and shall include no rocks 2" or larger in nominal diameter.

3.3 Design Standards for RVSD Water Systems:

**See City of Rapid City Infrastructure Design Criteria Manual**

Minimum Parameters

- 1. Distribution System Minimum Working Pressure at Peak Day

RVSD Selected  
Standards  
40 psi

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|---|---|
| 2. Normal Distribution System Work Pressure       | 50-80 psi   |
| 3. Distribution System Maximum Working Pressure   | 125 psi   |
| 4. Residential Maximum Working Pressure (in home) | 80 psi  |
| 5. Minimum Working Pressure at Peak Hour Demand   | 20 psi  |
| 6. Water Main Size                                | 8" minimum  |
| 8. Distribution System Valving                    | Valve cluster on all sides of pipe intersections, street intersections with an 800' maximum spacing. 450' max. and all intersections and high points. |
| 9. Fire Hydrant Spacing                           |   |
| 10. Pipe Cover                                    | 6' minimum  |
| 11. Pipe looping                                  | Required.   |

### 3.4 Water Main and Water Service Bedding Specifications

Bedding Spec for Crusher  
Fines

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SIEVES	% Passing
3/8"	100
#4	90-100
#8	50-90
#40	15-40
#200	10-25

Liquid Limit Max- 25

Plasticity Index- 0-3

\*\*\*\* END OF SECTION \*\*\*\*