Perry Park
Water & Sanitation District

STANDARDS AND SPECIFICATIONS

INDEX

Effective May 19, 2021, Resolution 21-038

Perry Park
Water & Sanitation District

DIVISION 100

GENERAL STANDARDS AND SPECIFICATIONS

Part I – General

1.01 Scope

A. Definitions:

The meaning of the following terms used herein shall be as follows:

1. Board: "Board" and "Board of Directors" mean the Board of Directors of the District.

2. Constructor: "Constructor" means the landowner, developer, sub-divider or agency paying for the construction of lines and other facilities.

3. Contractor: "Contractor" means any person, firm or corporation authorized by the District to perform work and to furnish materials within the District.

4. Developer: "Developer" means any person or entity who owns land and/or is subdividing land, for resale and/or is seeking land served by the District, whether or not such land is included within the District's boundaries.

5. District: "District" means the Perry Park Water and Sanitation District, with principal place of business at 5676 W. Red Rock Drive, Larkspur, Colorado 80118.

6. District Engineer: "District Engineer" means that person or firm that has been authorized by the District to perform engineering services for the District.

B. The Perry Park Water and Sanitation District has the responsibility for oversite of construction, operation and maintenance of the water distribution, wastewater collection, and District treatment systems within the District. It is necessary that the District review and approve plans and specifications and issue permits for proposed extensions of or changes to the water distribution system and/or wastewater collection system prior to any construction. These standards and specifications have been compiled to ensure that plans and specifications are reviewed and approved by the District, that uniformity exists in construction of the water and wastewater systems, and that approved as-construction (as-built) drawings are furnished for operation and maintenance of completed facilities.

C. Construction of main line extensions and/or facilities as specified within Divisions 100, 200, or 300 of these Standards and Specifications may not be initiated without having first executed District main line extension agreements as described in the District's Standards and Specifications.

D. Design and construction of water distribution and wastewater collection main lines and service lines within the District shall meet or exceed the minimum requirements as set forth herein.

1.02 Pre-Construction Approval Requirements

A. Service feasibility studies are required by the District for all new applications for service which require a main line extension. A feasibility study can be requested by a landowner or Developer. The feasibility study shall be prepared at the expense of the requestor (either the landowner or the Developer). An initial deposit, determined on a case by case basis by the District, is required for all feasibility studies. Reference Feasibility Study Guidelines available from the District for more information. The Board of Directors is required to approve the feasibility study prior to moving into design phase.

B. All design calculations, plans and specifications for proposed wastewater or water systems and recorded plat of area shall be submitted to the District for review and approval. The District will provide submitted documents to the District's Engineer for review. If there are errors or comments to the submitted documents, District Engineer will return comments. The process will repeat until no comments remain by either District or District Engineer. When the submitted documents are acceptable to District and District Engineer, documents will be recommended to the Board of Directors for final approval. All associated review fees are the responsibility of the Developer.

C. After the Board approval, three (3) hard copy sets and one electronic (PDF) set of plans and specifications incorporating all corrections and/or suggested revisions shall be submitted to the District. The Developer's/Constructor's Registered Professional Engineer shall submit the required sets to the County Public Works Department for approval of work to be performed in County right-of-away.

D. No construction will be permitted until all required approvals and permits are obtained and all associated fees have been paid. Provide District with copies of approvals from County and any other required approval entities.

1.03 Plans and Specifications

A. Three (3) complete hard copy sets and one electronic (PDF) set of plans and specifications covering proposed construction shall be submitted to the District for approval.

B. Plans shall consist of a general plan or layout of the adjacent areas, which might be affected, showing either spot ground elevations or contour lines sufficiently to correctly show the existing surface topography, together with plan-profile drawings covering individual water distribution and wastewater collection main lines. Plans shall be drawn at a scale of not less than 1" = 50. Plans shall be prepared on 24" X 36" or 22" X 34" size sheets. Detail or supplement drawings to accompany plans shall be drawn on 11" X 17" size sheets. Plans shall show the size, location, and elevation of existing water distribution and wastewater collection main lines and facilities to which the proposed construction will connect. Elevations shall be as established by the USGS datum. The location of other existing utilities which might be affected by the proposed

construction shall be shown. The existing and final surface grades shall be clearly indicated.

1. Profile drawings shall be submitted to show location of required air vents and blow-offs. Profile plans of water distribution and wastewater collection lines shall be drawn at a scale of not less than 1" =50' horizontal and 1" =5' vertical.

C. Specifications covering the materials and requirements of construction shall be submitted with the plans when presented for approval. Specifications covering the materials, their suitability for local conditions, including soil characteristics, topography, system loads, etc., and requirements of construction shall be submitted with the plans when presented for approval to the District. In lieu of a separate specification manual, materials and construction requirements may be included on the plans dependent upon the extent and complexity of the proposed water or wastewater main line and/or facility construction.

D. Upon completion of construction of water distribution, wastewater collection, and/or treatment facilities, as-constructed (as-built) drawings shall be submitted to the District's Engineer for review and approval prior to submitting three (3) original signed copies and one electronic (PDF) copy. These drawings are to be prepared by or under the supervision of a Registered Professional Engineer and each copy is to contain an original signature of the responsible engineer. Drawings shall show exact location of all main lines and appurtenances. In addition, all as-constructed (as-built) drawings shall include the following information:

1. Distance between water or wastewater main line and other utilities
2. Street names and widths
3. All mains and sizes
4. Materials of main lines
5. Distances from property lines
6. Block and lot numbers
7. House numbers
8. Measurements from main line to stub-out end. Ends of stub-outs must be tied into permanent reference points and elevations shown.
9. Size of water or wastewater taps
10. Orientation of north
11. The scales must be the same scale as those required for construction drawings (1" = 50')

12. Original signature and license number of certifying registered Professional Engineer.

13. Fire hydrant locations

14. Valve locations

15. Distance between fittings

16. All dead ends accurately reference to permanent reference points

17. All tapping sleeves, taps, and/or saddles shall be shown and type indicated

18. All couplings shall indicate type

19. Location of all bends (including vertical bends)

20. All invert and top of pipe and manhole ring elevations

21. Distances between manholes

F. Guarantee/Warranty

1. The developer of land within the District shall require his engineer to insert into the specifications on construction of water and/or wastewater main lines and facilities the following paragraph:

"All water and wastewater main lines and facilities shall be guaranteed to the Perry Park Water and Sanitation District for one year against faulty workmanship and material, supported by a bond acceptable to the District. The guarantee shall include the prompt repair or reimbursement for all labor, materials, workmanship, backfill and other items directly related to correction of defects in said main lines and facilities."

2. Evidence of the guarantee shall be furnished to the District prior to beginning of construction.

1.04 Construction

A. No person other than an agent or a contractor of the District shall uncover, make any connection with, or open into, use, alter, or disturb any District water or sewer system component or appurtenance, without a written permit from the District. No work shall commence until a permit is issued by the Perry Park Water and Sanitation District to the Contractor. The Contractor or Constructor shall obtain all other permits at no expense to the District.

B. A preconstruction meeting is required with the District, District Engineer, and District's construction agent at least 7 days prior to commencement of construction. The District, all other utilities, and affected agencies shall be notified at least 48 hours (exclusive of holidays and weekends) prior to commencement of planned construction and before restarting whenever construction is interrupted for any reason.

C. Submittals shall be provided to the District for approval prior to product installation.

D. All District water and sewer system infrastructure will be field located prior to construction. Connection locations to existing infrastructure is required to be potholed prior to excavation near the existing infrastructure.

E. The District shall be notified 48 hours prior to inspections, testing and connections.

F. All permits will expire in twelve months. Constructor must complete work for which permits have been issued within this period or apply to the District for a new permit.

G. The Contractor shall maintain access to the site and facilitate inspections by District's representative/agent.

H. The District's representative/agent shall have the authority to halt construction when, in his opinion, these specifications or standard construction practices are not being followed. Whenever any portion of these Specifications is violated, the District, by written notice, shall order further construction to cease until all deficiencies are corrected, at no cost to the District.

I. All water distribution and wastewater collection main lines and facilities shall be installed in public right-of-way or easements. All water main lines and facilities located, constructed, or placed within such rights-of-way or easements to be attached to the District's main lines and facilities shall become the property of the District upon completion, testing and final acceptance in writing by the District. Water or wastewater main lines and facilities shall not be approved/accepted by the District until Constructor installing the same shall convey and transfer title to such mains and facilities (including land or rights-of-way or easements to use said land for the construction, use, maintenance, repair, replacement and enlargement of said mains and facilities) by a conveyance in such form as shall meet the approval of the District's attorney. The cost of furnishing satisfactory title to all land, easements and/or rights-of-way shall be borne by the Constructor conveying same.

J. As-Built drawings shall be submitted within sixty days after completion of construction.

1. Maintain at site a set of clear, dry, legible set of plans showing in red the information required in this section. Record information as construction progresses.

2. Make available to the District's representative/agent during on-site visits these "Marked-up" plans.

1.05 Contractor Guarantee and Warranty

A. Evidence of the guarantee by bond acceptable to District shall be furnished to the District prior to final acceptance and shall not be approved until received.

B. Warranty. The Main Installer warrants that for a period of one year and the Service Line Installer warrants that for a period of one year, the water and/or sewer main and

service line installations shall be free from defects in materials or workmanship, and be fit for the purpose for which they were constructed.

C. Repairs. The Service Line Installer shall be responsible for promptly completing all repairs and maintenance of its water and/or sewer service line installations required on account of defective, damaged, flawed, unsuitable, nonconforming workmanship or materials.

If at any time prior to the expiration of the one year warranty period, the Perry Park Water and Sanitation District notifies the Service Line Installer of any defects or deficiencies with the water and/or sewer service line installations that are not deemed an emergency by the Perry Park Water and Sanitation District, the Service Line Installer shall repair or cause to be repaired any such defects or deficiencies within 48 hours of the Perry Park Water and Sanitation District's notification. In the event the Service Line Installer fails to make such repairs within such 48 hour period or, if such repairs cannot reasonably be accomplished within such 48 hour period and the Service Line Installer has not begun diligent efforts to make such repairs within such 48 hour period, the Perry Park Water and Sanitation District may, at its option, proceed to repair or cause the repair of the defects at the Service Line Installer's cost and expense, and recover from the Service Line Installer all damages caused thereby, including (without limitation) the cost of any and all incidental construction, administrative, legal or engineering expenses incurred by the District to complete such work. The Perry Park Water and Sanitation District's right to correct defects and deficiencies shall not give rise to a duty on the part of the Perry Park Water and Sanitation District to make such corrections for the benefit of the Service Line Installer or other persons or entities.

D. Emergency Repairs. In the event of emergency repairs which, in the opinion of the Perry Park Water and Sanitation District, must be made immediately in order to avoid or mitigate serious damage or loss or to maintain a reasonable level of water or sanitary sewer service, the Perry Park Water and Sanitation District may make such emergency repairs without prior notice to Service Line Installer and at Service Line Installer's cost and expense, but the Perry Park Water and Sanitation District shall give the Service Line Installer notice thereof as soon as reasonably possible to the Service Line Installer's contact information as included on the Service Line Installer List and Tap Application & Permit. If the Service Line Installer fails to respond or otherwise communicate with the Perry Park Water and Sanitation District within two (2) hours of the Perry Park Water and Sanitation District giving notice of an emergency event, the Perry Park Water and Sanitation District may, at its discretion, suspend or revoke the Service Line Installer's status as an Approved Service Line Installer.

1.06 Traffic Regulations

A. Conform to "Manual on Uniform Traffic Control Devices", U.S. Department of Transportation, or applicable statutory requirements of authority having jurisdiction.

B. At least one (1) lane on roads shall be kept open at all times. Traffic lanes must be reopened during non-working hours, except where approved by the County.

C. Private driveways shall not be blocked overnight.

D. Notify the Larkspur Fire Protection District, Sherriff's Department, Public or School Bus Service, and other emergency or public services that may be affected by impedance of traffic due to construction activities. Notify adjacent property owners, Douglas County Public Works and others as may be required.

1.07 Final Project Acceptance Requirements

A. Prior to project acceptance by the District, the following shall be provided to and approved by the District.

1. As-Constructed Drawings (As-Builts)

2. Guarantee/Maintenance Bond

3. Written acknowledgement of acceptance of warranty requirements

4. Shop Drawings – Submittals

5. Test Results

6. Permits

7. Operation and Maintenance Data

8. Written approval, acceptance and conveyance by applicable regulatory agencies, holders of applicable permits and property owners where easements have been obtained.

9. Installation of permanent reference marks (e.g. painted posts with painted reference distances) for all valves, manholes, and other buried operable/accessible facilities.

10. Others that may be required by the District.

END OF SECTION

Perry Park
Water & Sanitation District

WATER DISTRIBUTION SYSTEM

Division 200

INDEX

Effective May 19, 2021, Resolution 21-038

Perry Park
Water & Sanitation District

DIVISION 200

SECTION 201

MINIMUM DESIGN STANDARDS FOR WATER DISTRIBUTION SYSTEMS

Part I – General

1.01 Scope

A. All water distribution system construction within the Perry Park Water and Sanitation District shall be accomplished in accordance with the requirements of these Specifications.

B. All construction activities shall comply with local and state codes and regulations.

C. All permitting, submittals, notifications, inspections, guarantees, bonds, drawings, specifications, and traffic regulations shall conform to Section 100 of these specifications.

Part 2 – Design

2.01 General

A. Water distribution system main line design shall conform to the requirements of the State of Colorado "Design Criteria for Potable Water Systems," latest revision, by the Colorado Department of Public Health and Environment, or as specified herein, whichever is the more stringent.

2.02 Design Flow

A. All water main lines including those not designed to provide fire protection, shall be sized by a hydraulic analysis based on flow demands and pressure requirements prepared by the District's Engineer.

B. The normal design working pressure in the distribution system shall not be less than 35 psi. The system shall be designed to maintain a minimum pressure of 20 psi at the ground level at all points in the distribution system under all conditions of flow.

C. Fire flow requirements shall be 1000 gallons per minutes (gpm) for two hours in single – family residential areas.

D. The need for pressure reducing valves on a main line shall be determined on a case by case basis by the District. Individual service connections will require pressure reducing valves prior to the meter.

E. Future flows shall be considered in the hydraulic analysis and in determining water main line size.

2.03 Water Distribution Main Lines

A. No primary main line shall be less than 8".

B. Fire hydrants shall be fed by a minimum 6" fire hydrant service lateral from an 8" or larger main line.

C. 8" dead-end mainlines shall not exceed 400 feet of pipe.

D. Water distribution main and water service lines shall be provided with a minimum depth of cover of 6 feet below existing or planned finished grade whichever provides for the greater final depth.

E. Materials for water distribution main line construction shall conform to Section 202, Part 2 of these Standards. Used materials will not be accepted.

F. Water distribution main lines shall be located at least 10 feet horizontally, measured from outside of pipe to outside of pipe, from any existing or proposed sewer, storm or wastewater, when installed parallel.

G. When the water main line crosses a wastewater main line, the water main line must be laid above the wastewater main line, with a clearance of at least 18". When this is not practical, the wastewater main line shall be concrete encased 10 feet each side of the water main line.

H. Surface water crossings present special problems which shall be reviewed with the District Engineer before final plans are prepared or approved.

I. There shall be no connection between the distribution system and any pipes, pumps, hydrants, or tanks whereby unsafe water or other contaminating materials may be discharged or drawn into the District's system. No individual wells shall be connected to a customer that is also connected to the District's system.

J. Service lines must be installed prior to pressure testing.

K. All hydrants, plugs, caps, tees and bends dzeflecting 11 ¼ degrees or more shall be installed with a concrete thrust block bearing against undisturbed soil.

L. All water main bends, caps, plugs, and tees shall be installed with mechanical restraints in addition to thrust blocks.

M. The need for blow off or drain valves at low points and air vacuum release valves at high points will be reviewed on a case by case basis. In no case will a dead end main line be accepted without a blowoff or hydrant for flushing out the distal end.

N. All water main lines shall be generally located on the higher side of the street near the roadway shoulder or in the easement along the property line.

O. Fire Hydrants

1. Fire hydrants shall be spaced and located as follows:

   a. At each intersection.

   b. When on a divided roadway, a hydrant shall be placed on each side of the roadway.

   c. In residential areas, fire hydrant spacing shall be no greater than 500 feet along the right-of-way

   d. Fire hydrant locations may be subject to review by the Larkspur Fire Protection District.

   e. Where main lines are installed outside of developer's area and these outside areas are presently not developed, then tees, plugs, and thrust blocks shall be installed at the spacing indicated above to accommodate future fire hydrant installation.

2. Fire hydrants must be fed by a minimum 6" supply line.

3. All fire hydrant assemblies that include bends, plugs, and/or tees shall be installed with mechanical restraints in addition to thrust blocks.

4. Fire hydrants shall conform to the material specifications in Section 202, Part 2 of these standards. Used materials will not be accepted.

5. Fire hydrant laterals shall be provided with a minimum depth of cover of 6 feet below existing or planned finished grade whichever provides for the greater final depth.

6. All hydrant installations must be on dedicated easements or public rights-of-way and are to be owned and maintained by the Perry Park Water and Sanitation District.

P. Valves

1. Valves shall generally be spaced such that no single break shall require more than 600 feet, one block length, or two fire hydrants, whichever is less, to be out of service during repairs except for major transmission mains where

longer spacing will be allowed. All distribution mains connecting to larger supply mains must include valves at the connection.

2. Valves generally shall be located at street intersections in line with an extension of a property line.

3. Valves shall conform to Section 202, Part 2 of these Standards.

4. All valves shall be installed with mechanical joint restraints.

Q. Tracer Wire

1. Tracer wire shall be installed on all water main lines and service lines. Tracer wire shall be taped directly to the pipe. Tracer wire shall be continuous between fire hydrants and services. Complete splices as required to maintain continuous connection.

2. Tracer wire test stations shall be installed at all curb stops and at all fire hydrants.

2.04 Water Service Lines

A. Service taps and construction of all service lines shall be done in accordance with the Rules and Regulations of the District and the District approved Site Plan.

B. Minimum service line allowed shall be ¾" diameter.

C. The Contractor shall keep an accurate record of service connections as to location, depth, size, and other pertinent data. Tap locations shall be tied to houses, other existing structures, or lot corners on the As-Built Drawings.

D. Service lines shall be installed using either open cut trench excavation or directionally drilling service line from the lot to the water main. If directional drilling is selected for installation, the Customer is responsible for service line ownership to the main line.

E. Curb stops with box shall be located at property line, and unless otherwise specified, within dedicated easements and where it is reasonably accessible for District personnel. The curb stop box shall be brought to 4-inches above final grade following lot construction and landscaping.

1. For directional drilled service lines, the service line shall be excavated at the property line and a curb stop and meter pit installed per District Standard Details. Extend tracer wire installed with the service line to the surface at the curb stop.

F. One service line is required per each Residential Dwelling. Each service line shall include a corporation stop, curb stop, and a water meter per District Standard Details.

G. Service lines shall generally be installed perpendicular to the property lot line.

H. Service lines shall be installed approximately 15 feet from the property line. Wastewater service lines shall be installed on the low side of the lot and spaced 10 feet from the water service line. Install water service lines on the same side of the lot as the wastewater service line.

2.05 Final Project Acceptance Requirements

A. Before final acceptance of any water main line, the following inspections and tests shall be performed by the developer's Contractor and witnessed by the District and the District Engineer.

1. Hydrostatic Pressure tests

a. Hydrostatic Pressure tests shall be performed by the Contractor and witnessed by the District Engineer. Coordinate with the District at a minimum of 48 hours prior to performing Hydrostatic Pressure tests.

2. Contractor shall complete water line disinfection and coordinate high-chlorination, low-chlorination, and bacteriological samples with the District. The District will complete high- chlorination, low-chlorination, and bacteriological tests. Provide 48 hours notification when scheduling tests with the District.

3. During the final project walkthrough, the Contractor shall provide equipment and staff to confirm that all valves (main line, curb stops, and fire hydrants) and service connections are operational. Valve box and curb stop box cover accessibility and alignment shall be checked during final walkthrough.

B. Water service lines shall be inspected by District personnel before backfilling. If a water service line is installed utilizing directional drilling method, the water service line requires hydrostatic pressure testing be performed by the Contractor and witnessed by a representative from the District. Coordinate with the District at a minimum of 48 hours prior to performing Hydrostatic Pressure tests.

Part 3 – EXECUTION (NOT USED)

END OF SECTION

Perry Park
Water & Sanitation District

DIVISION 200

SECTION 202

SPECIFICATIONS FOR WATER DISTRIBUTION SYSTEMS

Part I – General

1.01 Scope

A. All water distribution main line and water service line construction within the Perry Park Water and Sanitation District shall be accomplished in accordance with the requirements of this specification.

B. All construction activities shall comply with local and state codes and regulations.

C. All permitting, submittals, notifications, inspections, guarantees, bonds, drawings, specifications, and traffic regulations shall conform to Section 100 of these specifications.

Part 2 – Products

2.01 General

A. The materials used in this work shall be all new and shall conform to the requirements for class, kind, size and material as specified below.

B. Pipe shall be clearly marked with type, class, and manufacturer. Markings shall be legible and permanent under normal conditions of handling and storage.

C. The contractor will submit project submittals and shop drawings which must be accepted by the Developer's/Constructor's Registered Professional Engineer and forwarded to the District's Engineer for approval.

D. When required by the District, the contractor shall furnish certification by the manufacturer that materials comply with the applicable specifications.

2.02 Water Main Lines

A. Ductile Iron Pipe:

1. Ductile iron pipe shall be manufactured and tested in accordance with ANSI A21.51 (AWWA C151) and ANSI A21.50 (AWWA C150) in the latest revision thereof. Cement mortar lining and bituminous coatings shall conform to ANSI 21.4 (AWWA C104) or latest version thereto. Minimum

class shall be 52. Bituminous coating applied to the outside shall be approximately 1 millimeter thick.

a. Push-on joints shall be single rubber gasket in accordance to ANSI A21.11 (AWWA C111), latest revision.

b. Mechanical joints shall be a bolted joint in accordance with ANSI A21.11 (AWWA C-111), latest revision.

c. Flange joints shall be in accordance with ANSI A21.10 (AWWA C110) latest revision. Flanged joints shall be faced and drilled to ASA standards.

d. All ductile iron pipe and fittings shall be adequately encased in polyethylene wrap regardless of soil resistivity test results.

B. PVC Pipe:

1. PVC pipe shall conform to the requirements of AWWA C900 (ductile iron pipe dimensions) latest revision or higher, per the District Engineer's recommendation. Minimum Class 305 (DR 14). PVC pipe shall bear the NSF Seal of Approval.

a. Joints shall be rubber-ring gasketed that conform to the requirements of ASTM F-477

2. PVC Pipe for potable water distribution shall be blue in color.

C. Fittings:

1. Fittings shall be cement mortar-lined cast iron of a minimum pressure rating of 250 psi and shall be in accordance with ANSI A21.10 – (AWWA C110) or ANSI A21.53 – (AWWA C153) or the latest version thereto.

a. Mechanical joints shall be a bolted joint in accordance with ANSI A21.11 (AWWA C-111), latest revision.

b. Flange joints shall be in accordance with ANSI A21.10 (AWWA C110) latest revision. Flanged joints shall be faced and drilled to ASA standards. Flange joints shall not be used in a buried application.

c. All ductile iron pipe and fittings shall be adequately encased in polyethylene wrap regardless of soil resistivity test results.

d. For mechanical joints or flanges installed underground, bolts shall be Stainless steel or low alloy steel such as "Cor-Ten" or "US Alloy".

D. Fire Hydrants:

1. The fire hydrant operating mechanism shall be of the straight line type, direct from stem nut to inlet valve. The main valve and the drain valve shall be a unit assembly attached directly to the stem. The operating nut style and size must match those being accepted by the local fire agency. Bury length shall be as required to bring hydrant to finished grade.

2. The main valve shall be 5 ¼ inches and shall be constructed so the main valve can be removed without excavating the hydrant.

3. The drain valves shall automatically open when the main valve is closed, and close when the main valve is opened.

4. The hydrant bottom and standpipe shall be made of cast iron. The above-ground portion of the hydrant shall be painted yellow with a durable weatherproof paint, and the below-ground portion shall be painted with corrosion resistant varnish finish.

5. The hydrant shall have two (2) 2 ½ inch hose nozzles and one (1) 4 ½ inch pumper nozzle. The nozzles shall be bronze with smooth interior surfaces with bell-shaped entrances to effect minimum friction loss. The nozzles shall be threaded National Standard Threads. The nozzle caps shall be the nut type and shall be connected to the hydrant with chains.

6. The hydrant shall be designed so the upper section breaks off when struck by a car or truck, to prevent major damage to the hydrant.

7. Hydrants shall be one piece to correct bury depth. The use of extensions shall not be allowed.

8. The top of the hydrant shall be constructed to prevent water from entering and shall include an oil reservoir or grease fitting for thread lubrication.

9. Fire hydrants shall meet or exceed AWWA C502, latest revision. Hydrants shall be Waterous Pacer (Model Number 250). Yellow, Open Left, Six Foot Minimum cover, NST Specifications, no substitutions.

E. Valves and Boxes:

1. The following valves will be acceptable for use:

   a. Resilient Seat Gate Valve conforming to AWWA C-509, latest revisions

   b. Butterfly valve conforming to AWWA C-504, latest revision

2. All valves used shall open by turning left or counter-clockwise

3. Valve boxes shall be cast iron, 5 ¼ inch diameter adjustable valve boxes. The valve box shall be of the screw type and of sufficient length for the pipe bury

as specified. The cast iron cover shall be a deep socket type with the word "WATER" cast in the top side.

4. Air-vac valves shall be combination air release valves as manufactured by Clow, Apco, or approved equal.

2.03 Water Service Lines

A. Copper service pipe shall be seamless and suitable for use as copper underground service connections. Soft copper tubing shall conform to ASTM Class K Specifications and U.S. Government Type K Specification WW-T-799. The use of Ford Grip Joint Compression Couplings with locking gripper ring or a Comparable Grip Joint Compression Coupling is required on all joints.

B. High Density Polyethylene (HDPE) pipe shall be AWWA C901 DR 9, pressure rated to 250 psi, unless otherwise required. The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. The pipe shall be NSF 61 rated and suitable for potable water use. HDPE is allowed only after the meter pit for open trench installations. HDPE is allowed the entire length for directionally drilled service line except from the curb stop through the meter pit, which is required to be copper.

C. Curb stops shall be Ford B44 Series w/ compression type joint connections with locking gripper ring, or approved equal, for all curb stops.

D. Curb boxes shall be McDonald Box arch type 5601. Stationary rod and guide ring shall be required to bring the shut-off rod depth up to 3 feet or less.

E. Corporation stops shall be Ford FB1000 with compression type joint pipe and threaded on inlet end with AWWA Corporation stop thread or approved equal for all services.

F. Service saddles shall be double-strapped bronze.

1. Service saddles shall be used to connect small diameter service lines to main lines when shown on the Drawings. The saddle gasket shall be compressed between the saddle body and the main line by two (2) bronze straps which wrap around the main line and bolt through the saddle body. The service saddle shall be designed for a minimum working pressure of 200 psi.

   a. Manufacturer: Romac, Style 202B Saddle, or approved equal.

   b. Body: Cast from bronze in accordance with AWWA C800 and ASTM B 62. Body should be performed when used with ductile iron size PVC.

   c. Straps: (2) Silicon bronze per ASTM B 96, 2" wide per band providing uniform distribution of saddle load around PVC pipe.

   d. Nuts: Heavy Hex silicon bronze per Alloy Number C65100, 5/8-11 National Coarse.

e. Bolts: Silicon bronze per ASTM B 98, 5/8-11 National Coarse roll thread.

f. Gasket: Nitrile Butadiene Rubber with NSF 61 rating.

G. Meter Pits shall be 24-inch inner diameter. Meter pits shall be preformed fiber, no concrete meter pits allowed. Meter pits shall include 12" black cast iron lid as well as frost proof meter cover.

2.04 Pipe Bedding

A. All water main lines and service lines shall be bedded with granular materials. For water service lines installed utilizing directional drilling, bedding is required at all approach trenches and pits.

B. The following materials will be accepted:

1. Class #67 Bedding: This bedding shall consist of a durable crushed granular material with a well graded mineral aggregate mixture which will provide good stability. This bedding material is typically accepted in locations of swelling bedrock.

Class 67 Gradation	
Nominal Size	**Percent Passing by Weight**
3/4"	90-100
3/8"	20-55
No. 4	0-10
No. 8	0-5

2. Pipe Bedding Granular Material: Bedding meeting clean well graded sand or squeegee sand. Bedding material for service lines is required to meet this bedding material only. Meeting the gradation classification as follows:

Pipe Bedding Granular Material	
Nominal Size	**Percent Passing by Weight**
3/8"	100
No. 4	70-100
No. 50	2-30
No. 100	1-10
No. 200	0-3

Squeegee Sand Material	
Nominal Size	**Percent Passing by Weight**
3/8"	100
No. 200	0-5

Natural Bedding: The existing soil bedding material is acceptable if service line is installed between April 1 and December 1. Rocks larger than 2" shall be removed from the bedding.

2.05 Tracer Wire

A. Tracer wire shall be 12 AWG insulated wire and color coded pe APWA uniform color code. Insulation shall be PVC with a minimum thickness of 0.060 inches.

B. Tracer wire test stations shall include cast iron locking lid marked "Test" with 15" ABS plastic box with 2-3/8" interior diameter.

C. Tracer wire splice kits shall be 3M Direct Bury Splice Kit DBR/Y-6.

2.06 Marking Tape

A. Marking tape shall consist of a tri-layer laminate consisting of a 100% virgin polyolefin film, a solid aluminum foil core and a clear encapsulating film pigmented in blue for all water lines.

B. The tape shall be a minimum of 3 inches wide by 6 mils thick.

C. Large contrasting words shall be used to warn of specific transmission line (i.e. Caution Water Line Buried Below) which must repeat continuously for the entire length of the tape.

D. The tape shall be installed above the centerline of all main lines. All mains and service lines shall have marking tape installed in trenches, between 12 to 24 inches above the pipe.

E. All marking tape shall meet APWA standards.

Part 3 – EXECUTION

3.01 General

A. Furnish and install all pipe material and appurtenances, perform all testing, sterilization, cleaning to the lines and grades indicated on the drawings, record information on as-constructed drawings and maintain traffic barricades and construction site through course of work as specified herein.

B. Unload and handle pipes, fittings, and accessories so as to minimize the possibility of damage prior to installation.

C. No discolored, sun damaged, or weather damaged pipe will be accepted.

3.02 Trenching, Backfill and Compaction

A. General: All trenching shall be by open cut methods except where the presence of structures makes open cuts undesirable. In such instances, tunneling or jacking methods may be used providing written permission from the District is obtained prior to the use of such methods at each location. In no case will tunneling be permitted for distances greater than six (6) feet. When jacking is permitted, only persons experienced in that work using suitable equipment shall perform the jacking operation in no case shall excavating tools or equipment be allowed to precede the sleeve being jacked.

Trenches shall be excavated to the width necessary to permit the pipe to be laid and jointed properly and the backfill placed as specified, and as shown on the drawings included herein. The trench shall be excavated to the proper depth and the trench bottom shall be graded to provide uniform bearing and support for the joint to permit the jointing to be performed properly and so that the pipe will be uniformly supported.

Whenever soil is encountered in the bottom of the trench that is incapable of supporting the pipe, such soils shall be removed and the trench backfilled and compacted to the proper grade with gravel bedding material. When rock is encountered in the bottom of the trench, the trench shall be over-excavated six (6) inches and backfilled and compacted to the proper grade with gravel bedding material. Not more than 400 feet of the trench may be left open at any time without approval in writing from the District and County.

The allowable width of the pavement removed for trench excavation shall be approved by the District and County. Trenches shall be excavated and maintained so that the horizontal distance from the top edge of the trench is not less than six (6) inches from the edge of the cut pavement.

B. Backfill and Compaction: All backfill material in trenches shall be compacted to a minimum of 95% of the maximum density as determined by ASTM Standard test D-698. The moisture content of the backfill material shall be at or above optimum moisture content when placed. Backfill on services lines outside of a driving surface and away from the main line trench shall be compacted to a minimum of 90%.

All backfill shall be brought up to equal height along each side of the pipe in such a manner as to avoid displacement. Wet, soft, or frozen material, snow, asphalt chunks, or other deleterious substances shall not be used for backfill.

From the bottom of the trench to twelve (12) inches above the highest point on the pipe, the backfill shall be compacted with hand-operated tamping equipment. The remainder of the backfill shall be placed in twelve (12) inch maximum lifts and may be compacted with motorized equipment of a size and type which will not injure the pipe.

Under no conditions will flooding or jetting be used as a means of compacting.

Backfill in proposed street areas shown by the drawings included herein shall be the same as that indicated above for backfill in trenches beneath pavements.

If driven sheet piling is used, it shall be cut off at or above the top of the pipe and the portion below the cut-off line shall be left in the ground.

Any settling of backfill at main lines, service lines, or meter pits shall be repaired by the Contractor under warranty and at no cost to the District.

C. Trench maintenance: Throughout the guarantee period, the Contractor and/or Constructor shall maintain and repair any trench settlement which may occur and shall make suitable repairs to any pavement, sidewalks, or other structures which may be damaged as a result of backfill settlement at no cost to the District.

D. Trench Dewatering: Where groundwater is encountered in the trench excavation, it shall be removed so that all pipe laying and other construction operations can be performed within the specifications. Water encountered in trench or manhole excavations shall be removed by pumping, drained to sumps through sub drains or by other methods devised by the Contractor and acceptable to the District.

E. Bracing: The contractor shall provide bracing or alternate means of trench protection in accordance with all local, state and federal requirements including those adopted by the Occupational Safety Health Administration (OSHA). The District will not inspect for safety on the construction site nor will they be liable for means and methods used by the contractor. (Resolution 94-154, Adopted 7/20/1994)

F. Liability: Any structures which are disturbed shall be restored at no cost to the District. The Contractor shall proceed with caution in the excavation so that the exact location of underground structures, both known and unknown, may be determined, and the District shall not be held liable for the repair, or replacement when such structures are broke or otherwise damaged.

G. Soil Compaction Tests: Samples of representative embankment and structural backfill materials to be placed shall be tested to determine the maximum density and optimum moisture for these materials. Test for this determinate will be made using methods conforming to requirements of ASTM D-698. These test results shall be the basis of control for compaction effort.

The density and moisture content of each compact layer of embankment, structural and/or trench backfill will be determined in accordance with ASTM D-2167, or D-2922. Any material found to not comply with the minimum specified density shall be recompacted until the required density it obtained.

A minimum of one density test shall be performed:

1. Per 250 lineal feet of trench backfill or,

2. As required by the District or County.

All test results shall be submitted to the District for analysis and action, if necessary and shall become property of the District.

3.03 Pipe Installation

A. General: Proper implements, tools, materials, and facilities shall be provided and used for the execution of the work. Every precaution shall be taken to prevent foreign material from entering the pipe. If the pipe-laying crew cannot put the pipe in the trench and in place without getting earth in it, the District Engineer may require that before lowering the pipe into the trench, a tightly woven canvas bag of suitable size be placed over each end and left there until connection is to be made to the adjacent pipe. During laying operation, no debris, tools, clothing or other material shall be placed in the pipe. When pipe laying is not in progress, the open ends of the pipe and fittings shall be closed by a water tight plug or other means.

B. Pipe Laying: No pipe shall be laid when trench or weather conditions are unsuitable for such work.

C. Anchorage: Thrust blocking and restrained joints shall be provided on all pipes, tees, plugs, caps, valves, hydrants, and bends of 11-1/2 degrees or more. Such anchorage shall be constructed of concrete or of coated and wrapped tie rods.

D. Permissible Deflection of Joints: Wherever necessary to deflect pipe from a straight line either in a vertical or horizontal plane to avoid obstructions, or where radius curves are permitted, the degree of deflection shall be approved by the District's Engineer.

E. All fittings shall be wrapped with polyethylene plastic.

F. The minimum depth of cover shall be 6 feet to top of pipe.

G. Deviation for Utility Structures: Wherever existing utility structures, conduits, ducts, pipes or other obstructions to grade and alignment of the pipeline are encountered, they shall be permanently supported, protected, removed, relocated, or reconstructed by the Contractor through the cooperation of the Owner of the utility structure involved. Water main line locations shall be modified for future utilities where required.

There may be locations where the proposed water main line will cross existing sanitary wastewater main lines. At these crossings, a minimum 18-inch vertical clear separation shall be maintained, with the wastewater main line below the water line. Where the depth requirement over the proposed water main line does not allow a vertical clear separation of 18 inches above the existing sanitary wastewater main, the wastewater main line shall be concrete-encased for a minimum of 10 feet on each side of the proposed water main line and the proposed water main line shall be placed below the wastewater main line, maintaining a vertical clear separation of 18 inches.

H. Tracer Wire: Install with all water pipe, including service lines. Before completing backfilling, a tracer wire shall be taped directly on top of the pipe. The wire shall provide a continuous electrical conductor between fire hydrants. A tracer wire box shall be placed behind each fire hydrant and at each curb stop. Tracer wire boxes shall be added if required, so as to provide a maximum distance of 600 feet between tracer wire boxes on the new transmission main lines. Tracer wire boxes shall be added if required, so as to provide a maximum distance of approximately a town

block on all other proposed water main lines. Each end of wire shall be brought up inside the tracer wire box to the ground surface and looped back with two (2) feet of wire free or fastened to the vertical metal rod inside the box. The wire shall be a minimum 12-gauge copper and shall be electrically continuous between tracer wire boxes.

In addition to tracer wire, where as described above, the Contractor shall install detectable tracer tape. Detectable tracer tape shall consist of a continuous aluminum foil core inseparable bonded on both sides with tough high-density cross-laminated plastic films pigmented in orange, blue, or other warning color. The tape shall be a minimum of 2 inches wide, imprinted with large contrasting words to warn of specific transmission line (i.e. buried water line below) which must repeat continuously for the entire length of the tape.

The tracer tape shall be installed above the centerline of all main lines. Future location of the tape will be by an inductive method, therefore, it is not required that the tape be spliced or that it be brought up inside valve boxes. The tape shall be placed in the trench during backfilling so as to be at the recommended depth below the finished ground surface for easy detection. The maximum depth of the tape shall be as recommended by the tape manufacturer, but in no case, shall it be buried less than 12 inches nor more than 24 inches below the finished ground surface.

I. All water main and water service lines shall have marking tape installed in trenches, between 12 to 24 inches above the pipe. Marking tape shall be placed in conjunction with tracer wire. Marking tape shall be in place at time of inspection.

3.04 Directionally Drilled Water Service Lines

A. Excavate approach trenches and pits as indicated in Section 3.02. Provide sump areas to contain drilling fluids.

B. Guide drill remotely from the ground surface to maintain alignment by monitoring signals transmitted from the drill bit. Monitor depth, pitch, and position of pilot bore. Adjust drill head orientation to maintain correct alignment.

C. Pipe Installation. Install reamer and pipe pulling head; select reamer with minimum bore diameter required for pipe installation. Attach pipe to pulling head and pull reamer and pipe to entry pit along pilot bore. Inject drilling fluid through reamer to stabilize bore and lubricate pipe. Protect and support pipe being pulled into bore such that pipe moves freely and is not damaged during installation. Do not exceed pipe manufacturer's recommended pullback forces. Install tracer wire continuously with each bore. Provide sufficient length of pipe to extend past termination point to allow connection to other pipe sections or allow transition to connect to alternate material. Maintain utility separation as indicated in 3.03.G. Allow minimum of 24 hours for stabilization after installing pipe before making connections to pipe. Mark locations and depth of bore with spray paint on paved surfaces and on wooden stakes on non-paved surfaces at 25-foot intervals. Upon completion of pipe installation, complete hydrostatic test of waterline.

D. The minimum depth of cover shall be 6 feet.

E. Install marking tape at all open pit locations.

F. Slurry Removal and Disposal. Contain excess drilling fluids at entry and exit points until recycled or removed from site. Remove drilling spoils from access pits. Do not discharge spoils into sanitary sewers, storm sewers, or other drainage systems.

G. Upon completion of drilling and pipe installation, remove drilling spoils, debris, and unacceptable material from approach trenches and pits.

3.05 Connection of New Water Mains to Existing Water Main Lines

A. Whenever possible, water main connections shall be made under pressure.

B. Prior to connecting to existing water mains, the District must be notified a minimum of 72 hours in advance of planned shutdown for approval. Shutdowns are not permitted on Fridays, Saturdays, or Sundays. Any residents who will be affected by the shutting off of water shall be given written advanced notice by the District as to when and for how long service will be interrupted. The notice shall be delivered at least 48 hours in advance of shut off and shall state the Contractor's name, address and telephone numbers (for both business and after-hours). All shut off times must be agreed to by the District prior to notices being issued and work must not be undertaken unless District personnel are present. Prior to connecting to existing water mains, the Contractor shall have all laborers, materials, and equipment ready to do the work, so as to keep the shutoff time to a minimum. As soon as possible after making the connections, the Contractor shall connect the new main as to prevent any contamination of the existing facilities. All new valves and fittings which cannot be disinfected by the standard chlorination method shall be sprayed internally and externally with a strong chlorine solution immediately before installation in to existing water main line.

The contractor shall construct temporary thrust blocks where necessary to expedite resumption of service in existing lines before permanent concrete thrust blocks have fully cured. Design of temporary thrust blocks shall be approved by the District Engineer before connection work begins.

3.06 Setting Hydrants

A. Hydrants shall be set so that at least the minimum pipe cover is provided for the branch supply line and the nozzles are at least eighteen inches (18") above finished grade. Each hydrant shall be blocked against the end of the trench with concrete, taking care to protect accessibility to bolts and to keep drainage holes open. Drainage shall be provided by installing gravel or crushed rock around the hydrant, and below the top of the hydrant to the point at least six inches (6") above the drain hole. All hydrants shall stand plumb with pumper nozzle perpendicular to the street. Parts of the hydrant below ground should be wrapped with polyethylene wrap, taking care not to cover up drainage holes.

Hydrants shall normally be set without the use of extensions. Extensions must be specifically authorized by the District before installation.

Immediately before installation of a hydrant, the following operations shall be performed:

1. The hydrant shall be thoroughly inspected.

2. The hydrant shall be thoroughly cleaned.

3. The hydrant shall be opened and closed as many times as may be necessary to determine if all parts are in proper working order, with valves seating properly and the drain valve operating freely.

3.07 Setting Valves and Valve Boxes

A. Valves and pipe fittings shall be set and jointed to new pipe conforming to the specified manner for cleaning, laying, and jointing pipe. Line valves shall be supported on blocks. All pressure tapping valves shall be supported on concrete blocks.

B. Valve boxes shall be firmly supported and maintained centered and plumb, over the wrench nut of the valve, with box cover flush with the surface of the finished pavement or at such other level as may be directed. Valve extension stems must be provided for valves installed with more than (6) feet of cover.

3.08 Hydrostatic Pressure Tests

A. After the pipeline is laid and blocked, each section as defined herein shall be hydrostatically tested. The procedure for hydrostatic tests shall be in accordance with AWWA C-651, latest revision. The minimum test pressures shall not be less than the pressure class of the pipe as specified, but in no case less than 150 pounds per square inch or the expected operating pressure or the pipe, whichever is higher. The required minimum test pressure shall be measured at the point of highest elevation. Maximum pressures shall be measured at the point of lowest elevation.

B. The Contractor shall provide all necessary equipment, additional valves and taps if necessary, and shall perform all work required in connection with the test at no cost to the District.

C. Prior to performing all hydrostatic pressure tests, the pipeline shall be completely filled with water by the District. Air shall be expelled by means of air relief valves, blow off valves, service connection or other means devised by the Contractor. Wherever necessary, taps shall be made at high points not provided with air reliefs; after expelling air, such taps shall be plugged as accepted by the District Engineer.

D. Test pressure shall be maintained without loss for a minimum of three (3) hours or until the test section is inspected and approved, whichever is the greater. Maximum leakage allowance during the test period shall be ten (10) gallons per day, per inch of inside diameter per miles of length.

E. In the event that leaks are found during hydrostatic pressure tests, or if it is not possible to maintain the test pressure without loss for the stipulated period, repairs shall be made and the test repeated until compliance is ascertained.

F. In the event that air is admitted to the pipeline after being expelled for the hydrostatic test, such air shall be removed prior to completion of the system and acceptance by the District. The air may be removed by methods described elsewhere. In no case shall the system be placed in operation prior the removal of the air.

G. Pipeline testing shall be conducted in increments as construction progresses. Increments in subdivisions, or other developed areas shall be coordinated with and acceptable to the District. Pipeline testing areas shall not exceed 2500 linear foot increments. Pipeline construction may occur simultaneously for the section while testing occurs.

3.09 Disinfection of Water Lines

A. Sterilized by chlorination in accordance with AWWA Standard C651, latest version thereto and as stated herein. Furnish all equipment, labor, materials, chemical tests for chlorine residual, and water for the proper disinfection of the water main lines.

B. Flush prior to chlorination as thoroughly as possible with the water pressure available. Sterilization of the water lines may be done simultaneously with hydrostatic testing where accepted by the District Engineer.

C. The chlorine-water mixture shall be made by the use of chlorine tablets or other method accepted by the District's Engineer. The chlorine tablets shall be used to obtain an initial dosage of 50 ppm or greater.

1. Chlorinated water shall be retained in the water main long enough to destroy non-spore forming bacteria. The period shall be at least 24 hours. After the chlorinated water has been retained for that period, the chlorine residual at the pipe extremities and at other representative points shall be at least ten (10) ppm. Should the disinfection procedure fail to produce satisfactory results, as evidence by chlorine residual, the chlorination procedure shall be repeated until acceptable results are obtained.

2. During the process of chlorinating the water mainlines, all valves and other appurtenances shall be operated while the water mainlines are filled with the heavily chlorinated water. Following chlorination all treated water shall be flushed from the water main lines by adding water at the ends. The chlorine residual after flushing shall be less than or equal to the chlorine concentration of water in the existing distribution system. Should the chlorine residual be greater than the chlorine concentration of water in the existing distribution system, flushing shall be repeated until satisfactory results are obtained.

3.10 Restoration of Street Surfaces

A. Asphalt and concrete replacement shall be done using materials and methods meeting or exceeding the Douglas County requirements. All pavement cuts shall be sharp-cut in a straight line prior to repaving.

B. On gravel road, the base shall be restored to its original condition.

END OF SECTION

Perry Park
Water & Sanitation District

WASTEWATER COLLECTION SYSTEM

Division 300

INDEX

Effective May 19, 2021, Resolution 21-038

Perry Park
Water & Sanitation District

DIVISION 300

SECTION 301

MINIMUM DESIGN STANDARDS FOR WASTEWATER COLLECTION SYSTEMS

Part I – GENERAL

1.01 Scope

A. All wastewater collection system construction within the Perry Park Water and Sanitation District shall be accomplished in accordance with the requirements of these Specifications.

B. All construction activities shall comply with local and state codes and regulations.

C. All permitting, submittals, notifications, inspections, guarantees, bonds, drawings, specifications, and traffic regulations shall conform to Section 100 of these specifications.

Part 2 – Design

2.01 General

A. Conform to the latest requirements of the Colorado Department of Public Health and Environment, Water Quality Control Division and to the District's existing Discharge Permit.

2.02 Design Flow

A. Sanitary wastewater main lines must be designed to carry the peak discharge and to transport suspended material so that deposits in the wastewater main line are precluded.

B. New wastewater systems shall be designed on the basis of an average daily per capita flow of not less than 100 gallons per day. This figure is assumed to cover normal infiltration, but an additional allowance should be made where conditions are unfavorable. Generally the wastewater main lines should be designed to carry, when running fully, not less than 400 gallons daily per capita for laterals and sub-main wastewater lines and not less than 250 gallons daily per capita for main, trunk, and outfall wastewater main lines. Per capita contributions are exclusive of sewage or other waste from industrial plants or commercial businesses.

2.03 Minimum Size

A. No public sanitary wastewater main line shall be less than 8 inches in diameter.

B. Minimum size of wastewater gravity service lines shall be 4 inches in diameter.

2.04 Depth of Cover

A. In general, sanitary wastewater main lines shall be designed of sufficient depth to permit floor drains from basements to be connected.

B. In no case shall sanitary wastewater main lines be designed from a depth of cover less than 36 inches without consideration given to ductile iron, or similarly protected wastewater line with or without insulation as circumstances may direct.

C. Proper consideration shall be given for load on the wastewater line because of width and depth of trench.

D. Services lines are required to be a minimum of 36 inches deep. In the condition where a individual sewer service forcemain is required, the service line is required to be a minimum of 6 feet deep.

2.05 Alignment

A. Wastewater main lines should be laid with straight alignment between manholes. Alignment tests such as “Lamping” must be conducted.

2.06 Slope

A. To prevent deposition of solids, all wastewater main lines should be so designed and constructed as to transport average wastewater flows at mean velocities of 2.0 feet per second, based on a reasonable formulation and roughness factor. The slope between manholes must be uniform. Where the above design would not be practical due to low tributary population, as would often be the case with laterals and sub-mains, 8-inch wastewater main lines must be installed at a slope of at least 0.4%.

B. Where velocities greater than 15 feet per second are attained, special provision shall be made to protect against displacement by erosion or shock.

2.07 Manholes

A. Manholes shall be installed at the end of each line: at all changes in grade, size, or alignment; at all wastewater main intersections; and at distances not greater than 400 feet for wastewater main lines 15 inches or less, and 500 feet for wastewater main lines 18 inches to 30 inches in diameter. For larger wastewater main lines, greater spacing is a possibility. Cleanouts should not be used in public wastewater systems to replace manholes.

B. An outside drop pipe should be provided for a wastewater line entering a manhole at an elevation of 24 inches or more above the manhole invert. Where the difference in elevation between the incoming sewer and the manhole invert is less than 24 inches, the invert should be filleted to prevent solids deposition.

C. The minimum inside diameter shall have an internal diameter of four (4) feet for wastewater lines of 12-inch diameter or less and five (5) feet diameter for wastewater lines greater than 12-inches.

D. Floor troughs shall be furnished for all wastewater lines entering manholes.

E. The minimum drop through a manhole shall be 0.1 ft.; where there is a change in direction the drop shall be 0.2 ft. minimum.

2.08 Materials

A. Materials for construction are included in Section 302, Part 2 of these standards. Used materials will not be accepted.

2.09 Joints and Infiltration

A. Wastewater line joints shall be designed to minimize infiltration and to prevent the entrance of roots.

B. Leakage test shall be observed by the District's Engineer. Acceptable tests are specified in Section 302- 3.06 of these Standards.

2.10 Service Line Connections

A. Service connections to proposed wastewater main lines shall be made only to be wye installed at the time of connection.

B. Service connections to existing wastewater mains may be made by an approved saddle or by cutting in a wye fitting.

C. Minimum slope for 4-inch service lines shall be 1 percent. Minimum slope for 6-inch service lines shall be 0.5 percent. If service line depth exceeds 12 feet at property line, increase slope to a minimum of 2 percent grade or as required to provide approximately 12 feet of depth at the property line.

D. Where slope exceeds 19% or velocities exceed 15 feet per second, special provisions shall be made to protect against displacement / injury to the District's main lines and facilities.

E. Service lines shall generally be installed perpendicular to the property lot line. Provide deflection or bends as necessary at wastewater main connection to maintain perpendicular installation at the property line. Bends shall not exceed 45 degrees.

F. Service lines shall be installed approximately 15 feet from the property line. Wastewater service lines shall be installed on the low side of the lot and spaced 10 feet from the water service line. Install wastewater service lines on the same side of the lot as the water service line.

2.11 Tracer Wire

A. Tracer wire shall be installed on all wastewater main lines and service lines. Tracer wire shall be taped directly to the pipe. Tracer wire shall be continuous between manholes and services. Complete splices as required to maintain continuous connection.

B. Tracer wire test stations shall be installed at all sewer cleanouts and at all manholes.

2.12 Protection of Water Supplies

A. There shall be no physical connection between a public or private potable water supply system and a wastewater system or appurtenance thereto which would permit the passage of any wastewater or polluted water into the potable supply.

B. While no general statement can be made to cover all conditions, it is generally recognized that wastewater lines must be kept remote from public water supply wells or other water supply sources or structures.

C. Where wastewater main lines cross water main lines or come within 10 horizontal feet of each other, the water main shall be protected from contamination by the wastewater main line through one or more of the following:

1. The wastewater line shall be located a minimum of 18 inches clear distance vertically below the water main line.

2. Encase wastewater line in concrete for entire section where the wastewater line is within 10 feet of the waterline (shall be measured perpendicularly from waterline).

2.13 Roof and Foundation Drains

A. Under no circumstances shall roof drains, foundation drains, storm drains or sub-drains be connected to the sanitary wastewater system.

2.14 Service Line Cleanouts

A. Cleanouts shall be provided at all property lines. Cleanouts at the property line shall be installed at least 2 feet from the driveway.

B. Cleanouts shall be installed at intervals no more than 100 feet and at any bend in the alignment of the wastewater service line.

C. Cleanouts shall be installed in accordance with the District Standards, latest edition.

D. Cleanouts shall be installed as identified on the approved Site Plan.

PART 3 – EXECUTION (NOT USED)

END OF SECTION

Perry Park
Water & Sanitation District

DIVISION 300

SECTION 302

SPECIFICATIONS FOR WASTEWATER MAIN LINE AND SERVICE LINE CONSTRUCTION

Part I – General

1.01 Scope

A. All wastewater main line and service line construction within the Perry Park Water and Sanitation District shall be accomplished in accordance with the requirements of these Specifications.

B. All construction activities shall comply with local and state codes and regulations.

C. All permitting, submittals, notifications, inspections, guarantees, bonds, drawings, specifications, and traffic regulations shall conform to Section 100 of these specifications.

Part 2 – Products

2.01 General

A. The materials used in this work shall be all new and shall conform to the requirements for class, kind, size and material as specified below.

B. Pipe shall be clearly marked with type, class, and manufacturer. Markings shall be legible and permanent under normal conditions of handling and storage.

C. The contractor will submit project submittals and shop drawings which must be accepted by the Developer's/Constructor's Registered Professional Engineer and forwarded to the District's Engineer for approval.

D. When required by the District, the contractor shall furnish certification by the manufacturer that materials comply with the applicable specifications.

2.02 Pipe Materials

A. PVC pipe shall conform to ASTM D-3034, SDR 35. The pipe shall have bell and spigot joints with an approved gasketed joint.

B. Reinforced concrete pipe shall conform to ASTM C76 latest revision. Pipe joints shall conform to ASTM C361, section 7. Neoprene gasket shall conform to ASTM C361.

C. Service line pipe materials shall be PVC sewer pipe (ASTM D2665, D3033, or D3034).

D. PVC pipe shall for wastewater use shall be green in color.

2.03 Manholes

A. Manholes shall be precast concrete and shall have an internal diameter of four (4) feet for wastewater lines of 12-inch diameter or less and five (5) feet diameter for wastewater lines greater than 12-inches.

B. Precast manhole risers and cones shall be manufactured in conformity with ASTM Specification C478. All manhole cones shall be eccentric.

C. Manhole frames and covers shall be as indicated on drawings included herein.

D. Manhole steps shall be steel reinforced, copolymer polypropylene, 14-in wide, M.A. Industries INC. PF Series, or approved equal. Copolymer polypropylene shall conform to ASTM D4101 Classification PP200 B33450 Z02. Steel reinforcing shall be 1/2 –inch diameter, conforming to ASTM A615, Grade 60, and shall be continuous throughout rung.

E. Ram-Nek or approved equal shall be placed between manhole base and precast concrete sections and between individual precast sections, to prevent infiltration.

F. Concrete used in manhole bases and invert channels shall have a 28-day strength of 2500 psi and shall contain not less than five (5) sacks of Portland cement per cubic yard. All cement used in concrete and mortar shall conform to ASTM Specification C 150, Type II.

2.04 Pipe Bedding

A. Pipe Bedding:

1. All wastewater main lines shall be bedded with granular materials.

2. The following materials will be accepted:

   a. Class #67 Bedding: This bedding shall consist of a durable crushed granular material with a well graded mineral aggregate mixture which will provide good stability.

Class 67 Gradation	
Nominal Size	**Percent Passing by Weight**
3/4"	90-100
3/8"	20-55
No. 4	0-10
No. 8	0-5

3. The following materials will be accepted for service lines only:

   a. Bedding meeting clean well graded sand or squeegee sand. Meeting the gradation classification as follows:

Pipe Bedding Granular Material	
Nominal Size	**Percent Passing by Weight**
3/8"	100
No. 4	70-100
No. 50	2-30
No. 100	1-10
No. 200	0-3

2.05 Tracer Wire

A. Tracer wire shall be 12 AWG insulated wire and color coded pe APWA uniform color code. Insulation shall be PVC with a minimum thickness of 0.060 inches.

B. Tracer wire test stations shall include cast iron locking lid marked “Test” with 15” ABS plastic box with 2-3/8” interior diameter.

C. Tracer wire splice kits shall be 3M Direct Bury Splice Kit DBR/Y-6.

2.06 Marking Tape

A. Marking tape shall consist of a tri-layer laminate consisting of a 100% virgin polyolefin film, a solid aluminum foil core and a clear encapsulating film pigmented in green for all wastewater lines.

B. The tape shall be a minimum of 3 inches wide by 6 mils thick.

C. Large contrasting words shall be used to warn of specific transmission line (i.e. Caution Sewer Line Buried Below) which must repeat continuously for the entire length of the tape.

D. The tape shall be installed above the centerline of all main lines. All mains and service lines shall have marking tape installed in trenches, between 12 to 24 inches above the pipe.

E. All marking tape shall meet APWA standards.

PART 3 – EXECUTION

3.01 General

A. Furnish and install all pipe material, manholes, cleanouts, perform all testing, cleaning and maintain record drawings as specified in the Standards.

3.02 Trenching, Backfill, and Compaction

A. General: All trenching shall be by open cut methods except where the presence of structures makes open cuts undesirable. In such instances, tunneling or jacking methods may be used providing written permission from the District Engineer is obtained prior to the use of such methods at each location. In no case will tunneling be permitted for distances greater than six (6) feet. When jacking is permitted, only persons experienced in that work using suitable equipment shall perform the jacking operation. In no case shall excavating tools or equipment be allowed to precede the sleeve being jacked.

Trenches shall be excavated to the width necessary to permit the pipe to be laid and jointed properly and the backfill placed as specified; and as shown on the drawings. The trench shall be excavated to the proper depth and the trench bottom shall be graded to provide uniform bearing and support for the pipe bedding and pipe for its entire length. Bell holes shall be provided at each joint to permit the jointing to be performed properly and so that the pipe will be uniformly supported.

Whenever soil is encountered in the bottom of the trench that is incapable of supporting pipe, such soil shall be removed to the depth directed and the trench backfilled and compacted to the proper grade with gravel bedding material. When rock is encountered in the bottom of the trench, the trench shall be over excavated six (6) inches and backfilled and compacted to the proper grade with gravel bedding material. Not more than 400 feet of the trench may be left open at any time without approval in writing by the District Engineer and the County.

The allowed width of the pavement removed for trench excavation shall be approved by the District and the County (or private road owner). Trenches shall be excavated and maintained so that the horizontal distance from the top edge of the trench is not less than six (6) inches from the edge of the cut pavement.

B. Backfill and Compaction: All backfill material in trenches shall be compacted to a minimum of 95 percent of maximum density as determined by ASTM Standard Test D-698. The moisture content of the backfill material shall be at or above optimum moisture content when placed.

From the bottom of the trench to twelve (12) inches above the highest point on the pipe the backfill shall be compacted with hand operated tamping equipment. The remainder of the backfill shall be placed in twelve (12) inch maximum lifts and may be compacted with motorized equipment of a size and type which will not injure the pipe.

Under no condition will flooding or jetting be used as a means of compacting.

Backfill in proposed street areas shown by the drawings included herein shall be the same as that indicated above for backfill in trenches beneath pavements.

If driven sheet piling is used, it shall be cut off at or above the top of the pipe and portion below the cut-off line shall be left in the ground.

C. Trench Maintenance: Throughout the guarantee period, the Contractor and / or Constructor shall maintain and repair any trench settlement which may occur and shall make suitable repairs to any pavement, sidewalks, or other structures which may be damaged as a result of backfill settlement at no cost to the District.

D. Trench Dewatering: Where groundwater is encountered in the trench excavation, it shall be removed so that all pipe laying and other construction operations can be performed within the specifications. Water encountered in trench or manhole excavations shall be removed by pumping, drained to sumps through sub drains or by other methods devised by the Contractor and acceptable to the District.

E. Bracing: The Contractor shall provide all necessary bracing to prevent cave-ins which might endanger life or property. The bracing shall be of sufficient strength and spacing to insure complete safety and shall be left in place until backfilling starts.

Where bracing is omitted and is required for protection of persons or property, the Contractor may be ordered to install bracing sufficient for the conditions. Such orders, or lack thereof, will in no way relieve the Contractor of his responsibility to adequately protect his excavation against caving or damage at all times. Temporary support, adequate protection and maintenance of all underground and surface structures, drains, wastewater lines and other obstructions encountered in the progress of the work shall be furnished by the Contractor at no cost to the District.

F. Liability: Any structures which are disturbed shall be restored at no cost to the District. The Contractor shall proceed with caution in the excavation so that the exact location of underground structures, both known and unknown, may be determined, and the District shall not be held liable for the repair, or replacement when such structures are broken or otherwise damaged.

G. Soil Compaction Tests: Samples of representative embankment and structural backfill materials to be placed shall be tested to determine the maximum density and

optimum moisture for these materials. Test for this determinate will be made using methods conforming to requirements of ASTM D-698. These test results shall be the basis of control for compaction effort.

The density and moisture content of each compact layer of embankment, structural and/or trench backfill will be determined in accordance with ASTM D-2167, or D-2922. Any material found to not comply with the minimum specified density shall be recompacted until the required density it obtained.

A minimum of one density test shall be performed:

1. Per 250 lineal feet of trench backfill or,

2. As required by the District or County.

All test results shall be submitted to the District for analysis and action, if necessary and shall become property of the District.

3.03 Wastewater Main Line Installation

A. Proper implements, tools, materials, and facilities shall be provided and used for the safe and convenient prosecution of the work. Pipe manufacturer's installation instructions shall be followed and supplemented by these specifications.

B. Inspect pipe for defects or cracks. Any defective, damaged, discolored, faded, or unsound pipe shall be rejected.

C. All foreign matter shall be removed before laying pipe. Pipe shall be kept clean after laying. All openings along the wastewater line shall be securely closed and in the suspension of work; suitable watertight stoppers shall be placed to prevent earth, water, and other material from entering the wastewater line.

D. All wastewater pipe shall be bedded.

E. Pipe shall be laid to the lines and grades indicated on the construction drawings approved by the District.

F. Maintain alignment and grade using batter board, laser beam equipment, or surveying instruments.

G. Holes shall be dug for pipe bells so that the pipe will be supported through its entire length by the bedding.

H. Pipe laying shall proceed from the existing wastewater main line upgrade with the spigot ends pointed in the direction of the flow.

I. When connecting to existing wastewater main lines, take every precaution to prevent dirt or debris from entering the existing lines.

J. All wastewater main pipe shall have marking tape installed in trenches, between 12 to 24 inches above the pipe. Marking tape shall be placed in conjunction with tracer wire. Marking tape shall be in place at time of inspection.

3.04 Construction of Manholes

A. Concrete for each manhole base shall be placed after the wastewater mainlines have been extended beyond the manhole. The base shall not be less than six (6) feet in diameter and not less than eight (8) inches thick below the wastewater pipe invert.

B. Invert channels may be placed monolithically within manhole base or separately, if more convenient.

C. Ram-Nek or approved equal shall be placed between manhole base and precast concrete sections and between individual precast sections to prevent infiltration.

D. Precast grade rings, mortared in place, shall be used on the top precast cone to support the manhole frame to the final grade.

3.05 Service Line Connections

A. It shall be the duty of the Contractor to keep an accurate record of service connections as to the location, elevation of the service line at the property line, type of connection, etc. Service line inspections shall conform to the Rules and Regulations of the District.

B. Four (4) inch service lines shall be installed on a minimum 1 percent grade. Six (6) inch service lines shall be installed at a minimum 0.5 percent grade. If service line depth exceeds 12 feet at property line, increase slope to a minimum of 2 percent grade or as required to provide approximately 12 feet of depth at the property line.

C. Cleanouts shall be provided for as required by the District's Rules and Regulations at intervals no more than 100 feet and / or at any bend or angle in the alignment of the line. Cleanouts shall be installed in accordance with the Uniform Plumbing Code, latest edition. Bends shall not exceed 45 degrees.

D. Service lines shall be installed approximately 15 feet from the property line. Wastewater service lines shall be installed on the low side of the lot and spaced 10 feet from the water service line. Install wastewater service lines on the same side of the lot as the water service line.

E. On all service line installations, install a water-tight plug that will permanently remain in place until a structure is built on the lot that will begin utilizing the service line.

F. All service lines shall have marking tape installed in trenches, between 12 to 24 inches above the pipe. Marking tape shall be installed in conjunction with tracer wire and shall be in place at time of inspection.

3.06 Tracer Wire

A. Tracer wire shall be taped directly on all wastewater main pipe and all service lines. Splice new tracer wire to existing tracer wire, wherever present at existing pipeline connections and intersections.

B. Tracer wire test stations are to be located at all manholes and wastewater service line cleanouts at the property line. Provide a minimum of twelve inches (12") of slack wire in the test box.

3.07 Infiltration and Inspection

A. Upon completion of all utility construction and before any house and / or equivalent dwelling unit services are connected, tests will be required of all sanitary wastewater lines and manholes.

B. AIR TESTS: The contractor shall perform these tests with suitable equipment designed for air-testing wastewater lines.

The air test shall be made when the wastewater line is clean. The pipe or sections of pipe to be tested may be wetted before the air test. The line shall be plugged at each manhole with pneumatic balls. Low-pressure air shall be introduced into the plugged line until the internal pressure reaches four (4.0) p.s.i.g. greater than the average backpressure of any ground water pressure that may submerge the pipe. At least two (2) minutes shall be allowed for the air temperature to stabilize before readings are taken and the timing started.

The portion being tested shall pass if it does not lose air at a rate to cause the pressure to drop from 3.6 to 3.0 p.s.i.g (greater than the average back pressure of any ground water that may submerge the pipe) in less time than listed below:

Pipe Diameter (inches)	Minimum Allowable Minutes 3.6-3.0 P.S.I.G Pressure
4	2.0
6	3.0
8	4.0
10	5.0
12	6.0
15	7.5
18	9.0
21	10.5
24	12.0

If the installation fails this test, the testing equipment shall be used to determine the location of the pipe leak.

All service line plugs shall be secured in place to prevent displacement during testing operations.

C. EXFILTRATION TEST: In lieu of the standard sanitary wastewater line air test, the contractor may make exfiltration tests on wastewater lines.

The test section shall be bulkheaded and the pipe subjected to a hydrostatic pressure produced by a head of water at a depth of three (3) feet above the invert of the wastewater line at the upper manhole under test. In areas where ground water exists, this head of water shall be three (3) feet above the existing water table.

This head of water shall be maintained for a period of one hour during which it is presumed that full absorption of the pipe body has taken place, and thereafter for a further period of one (1) hour for the actual test leakage. During this one (1) hour test period, the measured maximum allowable rate of exfiltration for any section of wastewater line, including service line stubs, shall be as listed below:

Main Wastewater Line Diameter (inches)	Maximum Allowable Exfiltration- Gallons per Hour per 100 Feet
4	0.8
6	1.2
8	1.6
10	2.0
12	2.4
15	2.8
18	3.2
21	3.6
24 & larger	4.0

In case measurements indicate an exfiltration greater than the maximum allowable leakage, additional measurements shall be taken and continued until all leaks are located and the necessary repairs and corrective work have reduced the leakage in the section being tested below the maximum allowed by the Specifications. All repair work and materials used must be approved by the Districts Engineer. For purposes of the test, the line between adjoining manholes will be considered a section and will be tested as such.

The Contractor shall furnish the plugs, standpipe and other material and labor for placing the plugs and standpipe in the wastewater line and shall assist the District's Engineer in making measurements. The Contractor shall receive no additional compensation for making the leakage teats or corrective work necessary to reduce leakage below the maximum allowed by the Specifications.

The introduction of any substance into the water used for testing with the intent of sealing such leaks as may be indicated will not be permitted.

If results of either of these tests are not satisfactory, repairs or pipe replacement will be required until the District's Engineer is satisfied that the leakage requirements are being met.

D. INFILTRATION TEST: If the ground water level is greater than three (3) feet above the invert of the upper manhole and the District's Engineer give written approval, infiltration tests may be allowed in lieu of the above tests. The allowable leakage for this test will be the same as for the exfiltration test.

E. INSPECTION AND FLUSHING: Prior to final acceptance each section of the wastewater main line shall be video inspected. The District shall witness the video inspection and a copy of the DVD/files shall be provided to the District.

Upon completion of the Contract, the District's Engineer will carefully inspect all wastewater lines and appurtenances. Any unsatisfactory work shall be removed and replaced in a proper manner, at no cost to the District. The invert of the wastewater line and manholes shall be left smooth, clean and free from any obstructions throughout the entire line.

F. MANHOLE TESTING: Repair both outside and inside of joint to ensure permanent seal. Test manholes with manhole frame set in place. If unsatisfactory testing results are achieved, repair manhole and retest until results meets criteria. Repair visible leaks regardless of quantity of leakage. Manhole testing shall be completed with a representative of the District onsite. Complete vacuum testing in accordance with the following:

1. Comply with ASTM C1244. Plug pipe openings and securely brace plugs and pipe. Inflate compression band and create seal between vacuum base and structure. Connect vacuum pump to outlet port with valve open, then draw vacuum of 10 in. Hg. Close valve. Complete test for following durations:

Manhole Diameter (ft)	Test Duration (seconds)
4	60
5	75
6	90

Record vacuum drop during test period. If vacuum drop is greater than 1 in. Hg during testing period, repair and retest manhole. If vacuum drop of 1 in. Hg does not occur during test period, manhole is acceptable.

3.08 Restoration of Street Surfaces

A. Asphalt and concrete replacement shall be done using materials and methods meeting or exceeding the Douglas County Public Works Department requirements. All pavements shall be sharp cut in a straight line prior to repairing.

B. On gravel roads, the base shall be restored to its original condition.

END OF SECTION