



# APACHE JUNCTION SEWER DISTRICT

RECLAIMING WATER FOR THE FUTURE

**Standard Specifications  
of Design and Construction**

**Dated  
January 13, 2025**

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## 1.0 Introduction

### 1.1 General Information

Apache Junction Sewer District (“the District”) was created by the City of Apache Junction to operate, and maintain, a regional system for the collection, transport, and treatment of sewage from the properties existing within its boundaries. The sanitary sewer system that the District oversees is a master planned system that includes hundreds of miles of gravity collection mains, force mains, lift stations and a water reclamation facility.

Within this document are the design guidelines and construction criteria for wastewater collection system improvements within the District’s service area. This document is to be used in the planning, design, and construction phases of any sewer related improvement projects.

### 1.2 Abbreviations

<b>AAC</b>	Arizona Administrative Code
<b>AASHTO</b>	American Association of State Highway and Transportation Officials
<b>ADEQ</b>	Arizona Department of Environmental Quality
<b>fps</b>	Feet per second
<b>ft.</b>	Feet
<b>GPM</b>	Gallons per minute
<b>HDPE</b>	High Density Polyethylene
<b>ID</b>	Inner diameter
<b>in</b>	Inch
<b>lb</b>	Pound
<b>MAG</b>	Maricopa Association of Governments
<b>OD</b>	Outer diameter
<b>PDF</b>	Portable document format
<b>psi</b>	Pounds per square inch
<b>PUE</b>	Public Utility Easement
<b>PVC</b>	Polyvinyl Chloride
<b>SDR</b>	Standard Dimension Ratio

### 1.3 Basic Requirements

The construction or adjustment of sewer mains, service lines, lift stations, force mains and manholes shall conform to the Apache Junction Sewer District Specifications of Design and Construction, except as otherwise approved by the District’s Authorized Representative. Materials shall conform to the District’s applicable materials specifications. In specific circumstances where this specification does not provide adequate information, A.A.C. R18-9-E301, 4.01 General Permit: Sewage Collection Systems shall be used. Other references include Maricopa Association of Governments Uniform Standard Specifications and Details for Public Works Construction.

All work is to be completed in a safe, professional manner and in accordance with these Specifications; any deviation therefrom must be approved by the District’s Authorized Representative. Work cannot begin until all permits or other authorized permission has been

received from the District, the City of Apache Junction, and/or Pinal County and/or the Arizona Department of Environmental Quality (“ADEQ”).

Sewer permitting with the District begins at [mygovernmentonline.org](http://mygovernmentonline.org) where an account can be created, and an application submitted. Please provide an applicable phone number and email and as much information as possible. Plan submittals can be added with the application for review.

All installations must conform with the requirements of all governmental regulating agencies and the cost of conforming to such regulations will be borne by the Contractor performing the work, Customer or Developer.

The Contractor shall provide all shoring, safety devices and protective equipment and take any other needed actions, on their own responsibility, as reasonably necessary to protect the life and the health of employees on the job, and the safety of the public. The Contractor shall comply with the provisions of all applicable laws including all Federal and State occupational safety and health acts. The Contractor shall provide a competent person capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

The Contractor shall provide, erect, and maintain all necessary barricades, suitable and sufficient lights, danger signals, warning signs and other traffic control devices, and shall take all necessary precautions for the protection of the work and safety of the public in accordance with the requirements of the City of Apache Junction.

Sewer service availability is subject to approval by a District Authorized Representative. They can be contacted at [engineering@ajsewer.org](mailto:engineering@ajsewer.org).

## 2.0 Design Guidelines

### 2.1 Flow Criteria

Flows in all gravity sewer lines must maintain velocities between 2.25 feet per second (2.25 fps) and 10 feet per second (10 fps) with the pipe flowing full. This ensures that there is no buildup of solids, and that turbulence is minimized within the system.

Designs shall be dedicated to minimizing odor potential by mitigating the production of hydrogen sulfide. Special consideration should be given to drop manholes, larger pipe diameters, changes in slope, changes in direction, and changes in pipe diameters.

Per the District’s Master plan, the average wastewater usage is 80 gallons per capita per day, with 2.5 persons per dwelling unit. Any peaking factors shall be referenced from ADEQ Table 1, R18-9-E301D. Wet weather peaking factor shall be determined by applying a 10% factor to the Dry Weather Peak Flow.

## 2.2 Sewer Mains

### A. General

Sewer mains and service lines shall be constructed of SDR-35 PVC pipe. Sewer mains shall be at least six inches (6") in diameter or larger.

All sewer mains shall be constructed parallel to property or center lines and shall not cross or recross center lines unless prior design approval has been given.

All sewers shall be designed based upon Manning's formula using an "n" value of 0.013. See Table 1 below.

TABLE 1	
Size of Pipe (I.D.)	Min. Pipeline Slope (%)
4-inch	1.00%
6-inch	0.64 %
8-inch	0.42 %
10-inch	0.31 %
12-inch	0.24 %
15-inch	0.18 %
18-inch	0.14 %
≥ 21-inch	0.10%

Bedding, haunching and backfill to 12 inches over the top of pipe. Please see section 4.5 for backfill details.

There shall be a minimum cover of three feet of backfill over all sewer lines. Reference **AJS200** for bedding detail. This detail must be included in the improvement plans.

### B. Required Separation and Easement Requirements

Sewer mains not installed in a public right of way shall require a dedicated easement with a width of no less than 12 feet for District maintenance personnel and equipment. Trees, bushes or other shrubs are not allowed to be planted within the limits of the sewer easement. Fences, gates or walls cannot be built within the limits of the easement to maintain access for District personnel.

To provide sufficient separation, the installation of the sewer mains must conform to A.A.C. R18-5-502 and the following requirements:

#### 1. Horizontal Distance

The horizontal distance between any underground utility shall not be less than **6 feet**. Each line shall be laid on undisturbed or bedded material in a separate trench.

Where conditions prevent the minimum horizontal separation set forth above, extra protection will be required. Extra protection for water mains shall consist of encasing

both the water and sewer main in at least 6 inches of concrete for 10 feet beyond the area covered in this subsection. In some circumstances constructing the sewer main with mechanical joint ductile iron pipe or with slip-joint ductile iron pipe will be permitted but must be authorized by the District's Authorized Representative.

Under no circumstances will the horizontal separation between sewer mains and water mains be less than **2 feet**. All distances are to be measured from the outside of the sewer main to the outside of the water main.

The minimum horizontal separation between water mains and manholes shall be **6 feet**, measured from the center of the manhole.

## 2. Vertical Distance

When a water main crosses a sewer main within **2 feet** above the sewer or greater than **2 feet** below the sewer, extra protection will be required in the form of encasing both the water and sewer main in class 'C' concrete according to MAG Section 725 and MAG Standard Detail 404.

Under no circumstances will the vertical separation of a sewer main installed above a water main be less than **2 feet**. All distances are to be measured from the outside of the sewer main to the outside of the water main.

The minimum separation between force mains or pressure sewers and water mains shall be **6 feet** vertically and **6 feet** horizontally under all conditions. Where a sewer force main crosses above a water line, the sewer main shall be encased in at least **6 inches** of concrete for **10 feet** on either side of the water main.

### 2.3 Service Lines

All service lines shall be connected and installed per **AJS440 Sewer Building Connection**. Lines shall be connected to a disconnect cleanout and adhere to all notes on the detail. All service line connections that serve greater than six housing units require a manhole connection to Sewer Mains.

### 2.4 Manholes

Five-foot (60-inch) diameter manholes are required. Manhole covers are thirty inches standard. Provide watertight manhole covers for areas subject to flooding or in low lying areas.

Manholes shall be installed at the end of each line except as noted above. Manholes should be placed at all sewer pipe intersections, at all changes in grade, pipe size, or alignment, and at distances not exceeding those shown below in Table 2:

TABLE 2	
Size of Pipe (I.D.)	Max. Manhole Spacing (feet)
6-inch	400 feet
8-inch – 18-inch	500 feet
>18-inch – 30-inch	600 feet

Manhole covers are not to be designed to be in any sidewalks, driveways, curbs, gutters, trails, washes, or retention basins unless approved by the District Authorized Representative.

**2.5 Cleanouts**

A main line cleanout is acceptable at the end of sewer mains where the pipeline segment is two hundred feet (200') or less in length and the pipeline diameter is eight inches (8") or less. Main line cleanouts are to be installed per **MAG Section 441**. All cleanouts in asphalt must have a concrete collar and be at finished grade.

**2.6 Lift Stations**

Lift stations shall have engineering justification and will be subject to review on a case-by-case basis by the District. They shall adhere to AAC Title 18, Chapter 9.

**2.7 Force Mains**

Force Mains are subject to review on a case-by-case basis. Materials used should have engineering justification and must adhere to testing standards from the AAC or MAG. AJSD requires the use of High-Density Polyethylene (HDPE) pipe unless otherwise approved the District. See below section 4.8 for testing requirements.

**2.8 Private Sewer Systems**

Private sewer systems that connect to the District’s collection system are subject to approval by the District’s Authorized Representative. All materials, construction and testing of a private system within the District’s jurisdiction must adhere to these Specifications. After testing and approval, the District will authorize the system to be placed into service. The District will not be responsible for the operation and maintenance of any private sewer infrastructure.

**2.9 Grease, Sand and Oil Interceptors**

Any commercial facilities such as, but not limited to, restaurants, car washes, laundry facilities and automobile facilities must install a pre-treatment device to minimize unauthorized materials from entering the collection system. Designs shall account for appropriate tank size that will accommodate all necessary plumbing fixtures. Calculations shall be presented on improvement plans and are subject to review of the District’s Authorized representative.

## 3.0 System Materials

### 3.1 PVC Sewer Pipe and Fittings

#### A. General

Unless otherwise noted on the plans or in the special provisions, gravity sanitary sewer mains and service lines shall be constructed using PVC pipe for diameters not exceeding **15 inches**. For pipes exceeding 15 inches, the District's Authorized Representative will review proposed materials. Pipe, fittings, couplings, and joints shall be in conformance with the requirements of **ASTM D-3034, SDR-35**.

#### B. Pipe and Fittings

Per MAG Section 745 Pipe and Fittings including those required for stubs shall have a pipe stiffness (PS) of 46 psi at 5% deflection of the initial inside pipe diameter. Sizes less than or equal to 15 inches shall conform to ASTM D-3034, Type PSM, SDR-35 or SDR-26 if at depths below eighteen feet (18'). Force Main shall be HDPE.

Identification marks shall be clearly and permanently marked at not greater than 5-foot intervals with pipe diameter, PVC cell classification, manufacturer, plant, ASTM, SDR, date designations and service designation.

#### C. Caps and Plugs

Caps and plugs for building connections may be molded or fabricated from rubber, polyurethane, PVC, or other suitable compound.

#### D. Gaskets

Rubber gaskets shall be manufactured from a synthetic elastomer and shall comply in all respects with the physical requirements specified in ASTM F-477.

#### E. Lubricant

The lubricant used for assembly shall have no detrimental effect on the gasket or on the pipe.

#### F. Fittings

New building service lines tying into existing sewer mains must use an integral wye fitting. Saddle type fittings are not allowed. Any required deviations shall be approved by the District's Authorized Representative. All metal products used are to be made of stainless steel. **ABS plastic lines and fittings are not allowed**.

#### G. Joining Systems

Joints for the piping system and fittings shall be push on, conforming to **ASTM D-3212 and F-477**, and consisting of an internally cast bell with one sealing ring, designed to hold the pipe in alignment, provide flexibility, separate the ends of the pipe lengths, resist applied earth pressures, and provide fluid tightness. All pipe shall have a home mark on the spigot



end to indicate proper penetration when the joint is made. The bell and spigot configurations for the fittings shall be compatible to those used for the pipe.

### **3.2 HDPE and Other**

The use of HDPE or other pipe material for gravity sewer mains shall be approved by the District's Authorized Representative. Any submittal requiring the use of this pipe shall have engineering justification and will be subject to a case-by-case review by the District. Any design containing HDPE pipe shall reference **MAG Section 738** and shall adhere to testing which is detailed below.

### **3.3 Manholes**

All manhole construction and materials are to adhere to **MAG Section 625**.

#### **A. Mortar**

Mortar for bonding grade rings, setting frames and plugging lift holes. Use rapid-set patching material or equivalent.

#### **B. Concrete Mix**

Cast in place concrete materials shall adhere to **MAG Specification Section 725, Class A**.

#### **C. Base**

Pre-cast or Cast-in-Place concrete bases are acceptable. Tops should be accurately shaped by ring forms to suit riser sections. Pipe connections shall be cast and built into bases during manufacture including future pipe connections

#### **D. Walls (Risers and Cones)**

Pre-cast concrete per MAG Specification Section 742. Cement ASTM C-150, Type II (See MAG Specification, Section 725).

#### **E. Top of Cone**

Reinforced concrete grading rings shall be a minimum 4-inch depth and used for adjusting frame to match finished surface. Grading rings shall not exceed 18 inches per MAG Specification Section 420-1.

#### **F. Polymer Manholes**

For trunk or interceptor manholes over 12-inches (12") polymer manholes that adhere to **MAG Specification Section 744** are required. All bases for polymer manholes must be monolithically cast and all polymer structures must be FRP reinforced.

#### **G. Inverts**

Form invert channels of concrete or PVC half pipe. Conform to adjoining pipes size. Curve side inverts and lay out main inverts (where direction changes) in smooth curves of longest possible radius tangent to adjoining pipelines centerline. The elevation difference

between invert to be installed per the approved plan, but not less than 0.1 feet. **Drop Manholes over 1' (1-foot) should be avoided.**

#### **H. Frames and Covers**

Cast Iron minimum Class 25 conforming to ASTM A-48. Cover castings are to be free from scale, lumps, blisters, and sand holes. Frames and Covers are to have machined contact surfaces to prevent rocking and should be capable of withstanding AASHTO H-20 loading unless otherwise indicated or specified. All manhole covers are to include the District Logo on top.

#### **I. Manhole Collars**

Manholes to have a circular concrete collar (MAG Specification 422) sloped to finish grade for unpaved areas.

#### **J. Joints**

Joints between pre-cast sections: 2" rope type butyl rubber-based sealants per Type B, AASHTO M-198, but no bitumen content. Interlocking neoprene rubber link-type seal sleeves or neoprene rubber boot water stops to be used for pipe connections to manholes: resilient material that will fit snugly over pipes, held firmly against pipe surface by friction or means of adjustable stainless steel pipe clamps. Water stop designed and installed so that leakage between pipe and manhole is minimized. Materials and manufacture of water stops to adhere to ASTM C-923. Non-shrink mortar grout for pipe connections to existing manholes.

#### **K. Steps**

The use of steps in manholes is not permitted.

#### **L. Insect Coating**

Insecta spray or equivalent is required in all new manhole installations.

### **3.4 Tracer Wire and Marker Tape**

The use of tracer wire or marking tape is required. Tracer wire can be used for service lines and sewer tape can be used for mains.

Sewer warning tape shall be installed and of the type specifically manufactured for marking and locating underground utilities. The tape shall be installed directly above sewer mains and service pipes, at a depth of **12 inches** below finished grade unless otherwise shown. The tape shall be acid and alkali-resistant polyethylene film, **6 inches** wide with minimum thickness of **0.004 inch**.

## 4.0 System Construction

### 4.1 Site Preparation

Unless otherwise provided by the District, it is the responsibility of the Contractor to provide all surveying and alignment staking.

The Contractor shall notify all known utilities in the area of the work performed under the contract and shall make arrangements to have their facilities marked in accordance with **Arizona Revised Statutes Section 40-360.22**. The Contractor shall be responsible for locating and preserving all marked facilities. Any damages to these marked facilities shall be repaired at the expense of the Contractor.

All work being performed shall exist within the authorized area. Any clearing, grubbing, and stripping of existing vegetation shall be promptly disposed of and shall not be reused or stockpiled. In doing so, observe all applicable laws, ordinances, rules, and regulations.

### 4.2 Trenching

#### A. Description

The Contractor shall perform all excavations to the depths indicated on the plans. All excavation shall be open cut unless otherwise shown on the plans or approved by the District's Authorized Representative.

#### B. Trench Widths

Per **MAG Specification, Section 601** trenches shall conform to the dimensions in Table 3 (values from **MAG Table 601-1**), unless otherwise specified in the special provisions, indicated on the plans, and/or approved by the District's Authorized Representative. The width of the trench shall not be greater than the maximum indicated at and below the level of the top of the pipe. The width of the trench above that level may be made as wide as necessary for sheeting and bracing, and for proper installation of the work.

If the maximum trench width as specified is exceeded at the top of the pipe, the Contractor shall provide, at no additional cost to the District, the necessary additional load bearing capacity by means of bedding, or a higher strength pipe, or a concrete cradle, cap or encasement, or by other means approved in writing by the District's Authorized Representative.

TABLE 3 (values from MAG Table 601-1)		
Size of Pipe (Nom. Dia.)	Maximum Width at Top of Pipe Greater than O.D. of Bell	Minimum Width at Springline Each Side of Pipe Barrel
Less than 18"	16 inches	6 inches
18" to 24" inclusive	19 inches	7.5 inches

For larger value nominal diameter pipes, please refer to **MAG Table 601-1**.

### C. Trench Grade

Alignment and elevation stakes shall be furnished by the Contractor at set intervals and agreed upon offsets.

**For all pipe from 4 inches in diameter and up, the Contractor shall over excavate a minimum of 4" below the design grade line and a maximum of 6" below the design grade line.**

Remove or pulverize rocks, soil clumps and other debris greater than 2" diameter and then rake or otherwise smooth out the bottom of the trench.

### D. Applying Bedding to the Grade Line

Place an initial bedding of specified stone chips to bring trench bottom surface to the grade line. The bedding material shall be placed at a uniform density and raked to provide a firm trench surface.

Dig bell and joint holes after the trench bottom has been graded and the pipe section is about to be installed. Holes shall be excavated only as necessary to permit accurate work in the making of the joints and to ensure that the pipe will rest upon the prepared bottom of the trench and not be supported by any portion of the joint.

**See AJS200 for bedding detail**

### E. Over-excavation

Per **MAG 601.2.5**, excavation more than 6" below the specified grade line shall be refilled at the Contractor's expense with ABC material compacted to a uniform density of not less than **95%** of the maximum density as determined by **AASHTO T-99** and **T-191** or **ASTM D-2922** and **D-3017**. When **AASHTO T-99**, method **A** or **B**, and **T-191** are used for density determination, **ARIZ 227c** will be used for rock correction.

For circumstances of encountering rock or unsuitable soil, please contact a District Authorized Representative.

### F. Excavation for Manholes and Other Accessories

Per **MAG 601.2.6** The Contractor may excavate to place the concrete structure directly against the excavated surface, provided that the faces of the excavation are firm and unyielding and are at all points outside the structure lines shown on the plans. If the native material is such that it will not stand without sloughing or if pre-cast structures are used, the Contractor shall over-excavate to place the structure. This over excavation shall be backfilled with the same material required for the adjoining pipe.

Any excavation below the elevation indicated for the foundation of any structure shall be filled with ABC and compacted to at least **95%** at the expense of the Contractor.

Excavation for manholes or similar structures shall be sufficient to leave at least **12 inches** clear between the outer structure surfaces and the face of the excavation or support

members. Rock shall be cleaned of loose debris and cut to a firm surface either level, stepped, or serrated. Loose disintegrated rock and thin strata shall be removed. When concrete or masonry is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed.

#### **G. Pavement and Concrete Cutting and Removal**

Where trenches lie within paved or concrete sections of streets, alleys, driveways, or sidewalks, etc., such pavement or concrete shall be saw cut to neat, vertical, true lines in such a manner that the adjoining surface will not be damaged per the City of Apache Junction requirements.

#### **H. Trench Shoring**

The Contractor shall do such trench bracing, sheathing, or shoring necessary to perform and protect the excavation as required for safety and conformance to governing federal and state OSHA regulations. The bracing, sheathing, or shoring shall not be removed in one operation but shall be done in successive stages to prevent overloading of the pipe during back-filling operations.

#### **I. Open Trench**

Work within existing City roadways and public utility easements where the construction is in any stage of completion (excavation, pipe laying, or back-filling), shall not exceed **400 feet** in the aggregate at any one location. Similar work within new subdivisions where the public roadways have not been constructed shall not exceed **1,000 feet**.

Any excavated area shall be considered open trench until all slurry and/or base course to the pavement surface has been placed and compacted. With the approval of the District's Authorized Representative, pipe laying may be carried on at more than one separate location: the restrictions on open trench applying to each location.

Trenches shall be completely back-filled as soon as possible after pipe laying.

Per **MAG 601.2.10**: Substantial steel plates with adequate trench bracing shall be used to bridge across trenches at street crossings where trench backfill and temporary patches have not been completed during regular work hours. Safe and convenient passage for pedestrians shall be provided. The District's Authorized Representative may designate a passage to be provided at any point they deem necessary. Access to hospitals, fire stations, and fire hydrants must be maintained at all times.

### **4.3 Sewer Installation**

#### **A. Excavation Inspection**

Examine the excavation before pipe placement to ensure excavation is complete to elevations and slopes indicated. Inspect and ensure that appropriate shoring, shielding or sidewall stepping has been completed, and appropriate means of entry and exit are in place so that work can proceed in a safe fashion.

Inspect each pipe and fitting before installation. Non-straight pipe sections shall not be installed. Remove defective pipe and replace with sound pipe.

## **B. Handling**

All Sewer Materials to be installed should be handled to ensure no loss of performance will be experienced by the District or end user when ownership is assumed.

## **C. Laying Pipe**

The laying of the pipe shall be in finished trenches free from water or debris and shall be commenced at the lowest point with the spigot (plain) ends pointing (downhill) in the direction of the flow and the bell end.

Each pipe shall be laid firmly and true to line and grade, in such manner as to form a close concentric joint with the adjoining pipe, and to prevent sudden offsets of the flow line. Since PVC pipe sections have a slight bend to them, the **pipe shall be laid flat in the trench so that the curve of the pipe section is to the right or left of the center line of the trench, and not up or down from the grade line.** Any adjustment to line and grade shall be made by scraping away or filling in chips under the body of the pipe, never by wedging or blocking under the pipe ends. Pipe shall be free from debris at testing and final acceptance and should not be flushed into the sewer collection system.

Carefully clean the gasket area. Make sure the gasket is seated uniformly in the groove of the bell end. Do not remove the gasket from the bell.

Place haunching of specified chips. A District Inspection is required after haunching has been placed, and at least three pipe sections are completed, or after the installation of a sewer service line. The alignment and grade of each length of pipe shall be checked after setting by measurement from the string line, laser beam target or other approved means. A uniform slope of the pipe will be maintained toward the point of disposal.

Before the District accepts the construction, the contractor will water flush the lines and video inspect the entirety of the system using National Association of Sewer Service Companies ("NASSCO") certified inspectors. Observation of any of the following will be cause for requiring excavation and relaying of the pipe section at Contractor expense:

- any standing water in a pipe section greater than  $\frac{1}{4}$ " ; or,
- any cracked or other obvious pipe defect; or,
- any pipe joint that has more than  $\frac{1}{2}$ " opening from the spigot end to the proper stop point in the bell end of the pipe; or,
- any evidence of damage to or misplacement of the bell end rubber gasket.

## **D. Cleaning**

Prevent earth, water, and other material from entering the pipeline. At all times when work is not in progress, the open ends of the pipe and fittings shall be securely closed with temporary plugs to the satisfaction of the District's Authorized Representative. If water is

in trench, do not remove plug until provisions are made to prevent water, earth, or other substances from entering the pipe; then resume work. The pipeline shall not be used for trench drainage during its construction. Clean pipeline and manholes of dirt, rock, debris, and obstructions upon completion. Any material that has accumulated into the pipeline should not be washed into the District's system.

#### **E. Fittings and Jointing**

All fittings shall conform to the requirements of the pipe specifications and shall be located as shown on the plans, or as directed by the District's Authorized Representative, in accordance with the standards details.

Prior to making pipe joints, all surfaces of the portions of the pipes to be joined shall be cleaned, dried and deviate no more than 1/2" from square to the perpendicular of the pipe section.

#### **F. Service Lines**

**Service lines and building laterals shall be constructed of PVC SDR-35 pipe not less than 4" in diameter.**

The location of the service line for each property shall be as shown on the approved plans, in the downstream **1/3** of the lot, or as requested by the property owner. Sewer service lines and laterals shall not be covered until they have been inspected and approved by the District's Authorized Representative.

When any damage occurs to the pipe ribs or walls outside of the tap area, the Contractor shall perform repairs, as recommended by the manufacturer at no cost to the District. Damage to the pipe will include, but not be limited to, gouging, marring, and scratching forming a clear depression in the pipe.

The depth of the service line at the property line shall be not less than **3.75 feet or more than 5 feet per AJS440**, as measured from the top of the pipe to the surrounding grade, unless the minimum required slope of the service pipeline from the sewer main to the property line forces the end of the line to be less.

#### **G. Means of Disconnection Required at Property Line**

For all residential construction the service line and disconnect cleanout shall be of 4" diameter PVC SDR-35 or Schedule 40 pipe. The riser pipe shall be of 4" PVC SDR-35 pipe. The top of the riser pipe shall be cleanly cut at 90 degrees perpendicular to the line of the pipe and completed with a PVC threaded female fitting. The cleanout cap shall be enclosed and protected within a ductile iron monument at the finished surface grade. The District supplies both the disconnect valve and the monument as part of the connection permit process.

#### **4.4 Manhole Installation**

##### **A. Setting Pre-cast Sections**

Set verticals with sections in alignment. Set bases true to line and elevation. Install Butyl rubber-based sealant in joints between sections. Plug holes for handling with mortar. Hammer mortar into hole until dense and excess of paste appears, then smooth flush with adjoining surface.

##### **B. Laying Grade Rings**

If grade rings are used, lay grade rings in full bed and joint of mortar without subsequent grouting, flushing, or filling, bond thoroughly.

##### **C. Jointing and Connections**

Hold rubber ring water stops for pipe-to-manhole firmly against pipe surface by mechanical take-up device to compress resilient material when tightened. Install to minimize leakage. Apply non-shrink mortar according to manufacturer's instruction.

##### **D. Setting Frames and Covers**

Set frames with top conforming to finished ground or pavement surface as indicated. Set circular frames concentric with top of masonry. Set frames in full bed of mortar to fill and make watertight the space between top of cone or grade ring, and bottom flange of frame.

If manhole is in an unpaved area, they shall be, at minimum, 6 inches above finished grade.

Remove all fallen debris from inside of manhole on base and invert after placement of frame is completed. Place covers on frames after completion of work.

##### **E. Leakage Tests**

Inspect for visible leakage after backfilling with ground water at normal level. Locate visible leakage inside manhole and repair leaks. Vacuum testing is required on all manholes installed, which is referenced below in Section 4.8

##### **F. Connection to Existing System**

Unless approved by the District's Authorized Representative, no tie-in on the existing system shall be made unless the District's inspector is present.

#### **4.5 Backfill Requirements**

##### **A. Initial Backfill**

Backfill from the spring line of the pipe to 12" over the top of the pipe shall be fractured 3/8" stone chips (M.A.G. Section 716 – Low Volume type). Backfill around utilities that are exposed during trench excavation shall be fractured stone chips from 4" below the utility line to 12" over the utility line.



## **B. Final Backfill and Compaction**

Backfill within City of Apache Junction right of way shall be done according to city requirements. In other areas screened 3" minus native material may be used for compacted backfill. The native material must be processed to achieve optimum moisture before placement into the trench and the maximum lift is restricted to 36 inches.

## **C. Final Surface**

The final surface material should match the existing condition surrounding it. The A.C. pavement must be applied to a saw-cut straight edge of unbroken existing pavement. Please refer to City of Apache Junction Specification.

## **4.6 Quality Assurance**

The Contractor is to provide labor necessary to assist the District Authorized Representative in inspecting pipe and all other materials upon delivery. Mark and remove rejected pipe and other materials immediately. Any imperfections which in the opinion of the District Authorized Representative may adversely affect the performance of the pipe, joints, manholes or other material shall be cause for rejection. Upon request of the District Authorized Representative, provide certification that pipe, manholes and fittings comply to the specification.

## **4.7 Inspection**

### **A. Construction Inspection**

The construction of sewer mains shall be inspected by the District's representative as follows:

- After the sewer pipe has been laid to grade and 3/8" screened rock chip haunching has been applied to the spring line of the pipe
- After 3/8" screened rock chips have been placed 12" over the top of the pipe
- After placement of manhole bases
- After manholes have been stacked
- After any sand, lint or grease interceptor or other pre-treatment device has been set in place
- During all acceptance testing of the sewer system
- After construction of the sewer system and final grading/surfacing of the lot.

The District Inspector will conduct a final inspection of every service line after all final surfacing or grading has been completed. During this inspection, the District Inspector will check that building and disconnect cleanouts have been properly installed and capped, and that the monument has been properly installed to finished surface grade over the end of the disconnect cleanout riser pipe. The District Inspector will not sign off on any building connection permit until the disconnect cleanout riser and monument have been properly installed.

## 4.8 Testing

### A. Acceptance Testing

Sewer main pipelines and manholes shall be subject to acceptance testing before the District will accept the construction. This acceptance testing is in addition to the TV video inspection in B. above.

**100% of the sewer pipelines shall be both low-pressure air tested and 5% deflection (mandrel) tested. All manholes shall be vacuum tested from the top of the cone down.**

Pipeline segments that have been installed (as verified per the Design Engineer's stamped "as-built" drawings) at or less than a slope that would give a mean velocity when flowing half-full at 2.0 feet per second, or less based upon Manning's formula using an "n" value of 0.013, shall be flow tested.

### B. Low-pressure Air Test

Testing will be accomplished by the means of low-pressure air testing per "Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air" published by the American Society for Testing and Materials, **ASTM F1417**.

### C. Vacuum Test for Manholes

The air vacuum test for acceptance of manholes shall be per the "Standard Test Method for Concrete Sewer Manholes by Negative Air Pressure (Vacuum) Test" published by the American Society for Testing and Materials, **ASTM C1244**.

### D. Deflection Test for HDPE and PVC Pipe

In addition to the tests prescribed above, the Contractor shall perform a deflection test on the system as directed by the District's Authorized Representative. Any part of the installation which shows deflection in excess of **5%** of the base inside diameter as per **ASTM D-3034**, **ASTM F-679**, **ASTM F-794**, and **ASTM F-789** shall be corrected.

### E. Closed Circuit TV Inspection

Before the District accepts the construction, it will water flush the lines and video inspect the entirety of the system using NASSCO certified inspectors. Observation of any of the following will be cause for requiring excavation, repair or re-laying of the pipe section at Contractor expense:

- Any standing water in a pipe section greater than  $\frac{1}{4}$ "; or,
- Any cracked, dimpled or other obvious pipe defect; or,
- Any pipe joint that has more than  $\frac{1}{2}$ " opening from the spigot end to the proper stop point in the bell end of the pipe; or,
- Any evidence of damage to or misplacement of the bell end rubber gasket; or,
- Any cut pipe end that is not within  $\frac{1}{2}$ " of square; or,
- Any burrs on the inside edge of a cut pipe that can catch debris so as to impede hydraulic flow within the pipe; or,

- Any burrs or trapped debris between the spigot outside edge and the receiving (bell) inside surface that could have damaged or compromised the sealing gasket.

#### **F. Testing of Force Main**

The testing of Force Mains shall adhere to **MAG Section 611.2.2(A)**. This requires that a force main be subjected to pressures between 200-205 psi for two hours or 150 psi for lines smaller than 16 inches. In the event this exceeds the design pressures by a significant amount, according to AAC R18-9-E01.D.4f, the force main pipe must be tested 50 psi above the design pressure. Either testing method must be approved by the District Authorized Representative.

#### **G. Testing of Lift Stations**

The testing of Lift Stations shall be directed by the Contractor. Hydrostatic testing shall be performed to the standards of **ACI 350.1**. Hydrostatic testing of Lift Stations shall be performed before the backfilling of the structure is permitted. The hydrostatic test shall consist of filling the Lift Station with water to the max operational water level. The duration shall not be less than 24 hours, and should be filled for 48 hours before the test duration to allow for absorption. The water tank shall then be refilled to the maximum operation level at which time the test can begin. The net amount of water loss during the test time shall not exceed 0.1% of the tank capacity or volume to which the tank was filled. Any leaks, puddles, or damp spots on the exterior of the Lift Station shall not be permitted.

### **4.9 Final Acceptance**

Commencement of flow into the sewer system is not allowed until the District has given written notice of acceptance and unconditional responsibility for operation and maintenance of the system. For private sewer systems, some steps below will be required but the District will not own or maintain the system.

Ownership of systems constructed under a Collection Main Extension Agreement are transferred to the District when five (5) main conditions are met:

1. the sewer installation has received a final inspection after final cleaning and all acceptance testing and right-of-way improvements have been completed, including the final paving of roads;
2. the District has received a signed and stamped copy in .pdf format of the as-built plans
3. the District has received State Plane coordinates for each manhole on the plans
4. the District has given written notice of acceptance and unconditional responsibility for operation and maintenance of the public portion of the system; and,
5. a written authorization for operation has been received by the District from the Arizona Department of Environmental Quality. Obtaining authorization from ADEQ will require submittals from the Design Engineer to ADEQ.

The District may ask for supplemental information as approved by the design plans or the District Authorized Representative.