

## **SEWER DESIGN PROCESS & DESIGN GUIDELINES**

### **Design Approval Process**

Sewer services within the City of Apache Junction are provided by the Superstition Mountains Community Facilities District No. 1 (“District”), a public district established in 1992 by the City Council of Apache Junction. The design of the sewer collection system for the project will be per the specifications and standards of the District and where applicable, the State of Arizona Department of Environmental Quality (“ADEQ”).

The District will own and operate the sewer collection mains and manholes after project completion and its acceptance by the District. In addition to permission from the District, ADEQ must approve any new sewer collection system with an average daily design flow that is greater than 3,000 gallons per day. In such cases, the Developer or project Engineer for the project must file with ADEQ a Notice of Intent to Discharge under a Type 4 General Permit. Please see State of Arizona Administrative Code (“A.A.C.”) sections R18-9-A301 and R18-9-E301.4.01.

The District will issue a Construction Permit for a new sewer collection system after the following has occurred:

- the project design has been approved by the District Manager as indicated by his signature on the cover sheet of the project’s final design (construction) drawing set;
- the Developer and the District have entered into a Collection Main Extension Agreement for the sewer mains that must be extended to serve the proposed development;
- ADEQ has issued a “Construction Authorization” for the system if applicable (see A.A.C. R18-9-A301.D.1) and a copy has been provided to the District;
- an Application Fee has been paid to the District.

The Developer bears all the risk of constructing a sewer system that meets District, City, and if applicable, ADEQ requirements.

Before any work can take place within the City right-of-way or a public utility easement, the Contractor doing the work must obtain an Encroachment Permit from the City of Apache Junction. Proof of the Encroachment Permit will need to be shown to the District Inspector or a Stop Work Order will be issued and the Construction Permit suspended until proof is provided.

During the construction phase of the project, the District Inspector will provide regular field inspections of the work to verify that materials and methods used in the construction of the system conform to District requirements. The District Inspector will not verify, nor be responsible for the sewer collection system layout and slope of pipelines installed by the Contractor. It is the responsibility of the Contractor constructing the work to install the system according to the design. It is the responsibility of the project Engineer to provide final “as-built” drawings showing final manhole rim elevations and inverts, sewer grade lines, and to incorporate any changes that were made to the approved design during the construction of the system.

The new sewer system will need to pass visual inspections and acceptance testing requirements of the District. These include mandrel and low-pressure air testing of all of the pipeline segments, and vacuum testing of the manholes. If there is any uncertainty by the District about the ability of the sewer lines to

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drain by gravity without trapping solids, the pipeline segment will have to pass a flow test specified by the District.

To meet the slope test requirements of A.A.C. R18-9-E301.D.2.k and inspection requirements per A.A.C. R18-9-A301.D.2.a., the District will conduct a visual inspection of the interior of each pipeline segment by video camera. NASSCO guidelines will be used to grade the quality of the construction. Any flaws that are detected by the District in the materials or construction will be required to be repaired at no cost to the District.

After the system has met all the requirements of the District, and the District has received and approved the final “as-built” drawings from the project’s Engineer, the Developer will be sent the inspection and testing reports completed by District’s Inspector, along with a letter of acceptance of the system signed by the District Manager. A copy of the acceptance letter and attachments will be sent to the project’s Engineer. If applicable, a copy will also be provided to ADEQ to alert them of the completion of the construction phase of the project.

If the project is under the purview of ADEQ, it will then be the responsibility of the Developer to obtain a Discharge Authorization from ADEQ (see A.A.C. R18-9-A301.D.1.f), and to notify ADEQ of the transfer of ownership of the system from the Developer to the District. Either the Developer, or the Engineer acting on behalf of the Developer, must send ADEQ a Request for Discharge Authorization and an Engineer’s Certificate of Completion (see A.A.C. R18-9-E301.E) along with the summary documentation of inspections and acceptance testing that was provided by the District. A completed Notice of Transfer form and fee in the amount of \$50.00 must also be submitted to ADEQ (see A.A.C. R18-9-A304.B). The current transfer form and instructions may be downloaded from the ADEQ website at <http://www.azdeq.gov/environ/water/permits/download/gpnot.pdf>. Please note that State rules provide for penalties if the system is operated without ADEQ issuance of the Discharge Authorization and/or the Notice of Transfer has not been received by ADEQ within 15 days of the date of transfer. For these reasons, time is of the essence for submittal of the appropriate documents and fees to ADEQ. If the District does not receive the Discharge Authorization and a copy of the Notice of Transfer within six-weeks of the District’s mailing of its letter of acceptance to the Developer, the District will plug and isolate the project’s sewer system. The District may also discontinue issuing any further connection permits for the system until the proper documents are received.

Ownership and responsibility for operation and maintenance of the sewer system will pass to the District after all of the following has occurred:

- copies of any applicable sewer easements have been provided to the District for recording with Pinal County;
- the District has received a copy of the ADEQ Discharge Authorization for the system (if applicable);
- the District has received a copy of the Notice of Transfer form submitted to ADEQ (if applicable)
- the District has received one full-size and one half-size set of black line “As-built” drawings from the project’s Engineer;
- the District has received a computer file of the sewer collection system “As-built” of the project in a format that can be opened in AutoCAD LT.

Connection permits for building units to tie in to the project sewer collection system will be issued at the District’s discretion. The Developer will be required to pay the Connection Fee for each unit at the time

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of issuance of the connection permit. Please note that the City of Apache Junction will not issue a building permit unless a sewer Connection Permit has been issued for the unit by the District.

## **Sewer Design Guidelines**

### **Sewer Lines and Manholes**

Sewer systems within RV and mobile home parks, apartment complexes, or commercial developments shall be designed to the District's standards and not to the standards of the UPC.

Sewer mains shall be at least 6 inches (6") in diameter or larger. Six-inch diameter sewers may be approved by the District Manager for extensions serving one project where the line cannot be extended beyond the project, and the daily dry weather peak flow does not exceed a liquid depth to pipe diameter ratio of 0.7 using the method in A.A.C. R18-9-E301.D.1 and has an "N" value of 0.013. All other sewer pipe lines shall be 8 inches or greater in diameter. Building laterals, lateral collection systems and service lines shall be 4 inches (4") or 6 inches (6") in diameter. Four-inch service lines to buildings are standard where the daily dry weather peak flow does not exceed a liquid depth to pipe diameter of 0.7 using the method in A.A.C R18-9-E301.D.1 and has an "N" value of 0.013. Above that a 6 inch diameter service line must be used.

All sewers shall be designed to give mean velocities when flowing half-full of not less than 2.25 feet per second, based upon Manning's formula using an "n" value of 0.013. See Minimum Design Slope Table below. Maximum design velocity in sewers shall be limited to 10 feet per second.

<b>Minimum Design Slope</b>	
<b>Size of Pipe (I.D.)</b>	<b>Min. Pipeline Slope (%)</b>
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 %

A manhole shall be placed at the end of all sewer lines. A main line cleanout is acceptable at the end of sewer mains where the pipeline segment is three-hundred feet (300') or less in length and the pipeline diameter is eight inches (8') or less. Manholes shall be installed at all sewer pipe intersections, at all changes in grade, pipe size, or alignment, and at distances not exceeding 500 feet for 8" diameter and larger sewer mains and 400 feet for 6" diameter sewer mains.

Pre-cast five-foot (5') diameter manholes constructed per MAG standards (see #'s 420-1, 420-2, 421, 422) are required for the District sewer mains. Manhole covers shall exhibit the District's logo which can be obtained from East Jordan Ironworks and Neenah Foundry. Manholes in areas considered by the District to be at risk for vandalism will be required to be supplied with lockable covers.

Sewer pipelines shall be constructed of SDR-35 PVC pipe. Bedding, haunching and backfill to 12 inches over the top of pipe shall be screened MAG Low-Volume 3/8" fractured stone chips (MAG Section 716,

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Table 716-1, Low Volume Traffic). There shall be a minimum cover of three feet of backfill over all sewer lines.

### **Traps**

Restaurants, commercial projects incorporating restaurants or food preparation areas, supermarkets, laundries, car washes, car repair and auto mechanics facilities, amongst others, must have an appropriate trap included in the building sewer design that is at least 1,500 gallons in size. The trap must be followed immediately downstream with an inspection manhole. See SMCDF Detail No. SM430. The District has a pre-treatment program that includes regular inspection of all installed traps on its system and a requirement for regular cleaning, normally on a quarterly basis.

### **Service Lines and Building Laterals**

Sewer service lines and building laterals shall be 4-inches diameter and constructed of SDR-35 PVC pipe. ABS plastic or clay pipe is not allowed, nor is 3 inch diameter pipe. A service line to a multi-unit residential building may require a 6" diameter service line from the sewer main to the property with 4" service lines branching away to serve the individual units. Bedding (4") and backfill to 12 inches over the top of pipe shall be 3/8" fractured stone chips (MAG Section 716, Table 716-1, Low Volume Traffic). Building service line connections to existing main lines shall be made with a service wye fitting per SMCDF Detail No. SM442. Saddle fittings are not allowed.

Where two (or more), 4-inch diameter building laterals join, the common lateral must be 6-inches in diameter with cleanouts placed at the end of all straight pipe line segments. A manhole is required at the junction of all 6-inch pipe line segments. When in doubt about the requirements for the project please contact the District Manager.

The depth of all service lines at the property line shall be not less than three and a half feet, or more than six feet, as measured from the top of the pipe to the surrounding grade.

The service pipeline shall have a disconnect cleanout installed at the building property line, preferably on the public side of the P.U.E. However a disconnect cleanout is not required where the building service line ties in to the District's public sewer main at a manhole. The disconnect cleanout shall be a 4-inch diameter PVC Elder Valve Tee fitting set to the minimum pipeline slope of 1.00%. The riser pipe shall be of 4" PVC SDR-35 pipe. The end of the riser pipe shall be cleanly cut at 90 degrees perpendicular to the line of the pipe, and topped with a PVC threaded female fitting and flush brass cap installed 6" below the final grade surface. The cleanout cap shall be enclosed and protected within a ductile iron valve box at the finished surface grade. See SMCDF Detail No. SM440. The District supplies both the Elder valve fitting and the ductile iron valve box as part of the connection permit process.

### **Acceptance Testing**

The discovery of any flaws in the materials, pipe slope, construction of the pipeline, manholes and/or installation of cleanouts, at the District's sole discretion, must be fixed at no cost to the District before the District will give final written approval of the construction.

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The entire length of sewer pipelines shall be tested for deflection using a 5% mandrel. The entire length sewer pipelines shall also be low-pressure air-tested per “Standard Test Method for Installation of Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air” published by the American Society for Testing and Materials, ASTM designation F 1417-92(1998).

All manholes shall be tested using the “Standard Test Method for Concrete Sewer Manholes by Negative Air Pressure (Vacuum) Test” published by the American Society for Testing and Materials, ASTM designation C 1244-02e1 (2002).

Building sewer laterals are required to be water tested to the specifications of the U.P.C., 1994 Edition, Section 712.

The District will inspect finished sewer mains by video camera to meet the slope test requirements of A.A.C. R18-9-E301.D.2.k and inspection requirements per A.A.C. R18-9-A301.D.2.a. Any defects found by the camera inspection will be required to be fixed by the contractor at no cost to the District. Examples of common defects found are: standing water greater than ¼” deep; rough edges on pipe cuts; un-squared pipe cuts exposing rubber gaskets on the adjacent pipe or fitting; pinched or un-seated gaskets; and cracked or dimpled pipe.

The District Inspector will conduct a final inspection of every building service line/lateral after all final surfacing or grading has been completed. This inspection is done to ensure that building and disconnect cleanouts have been properly installed and capped, and that the disconnect valve box cover has been properly installed to finished surface grade over the end of the disconnect cleanout riser pipe. The District Inspector will not provide written approval of any building connection until the disconnect cleanout riser, flush brass cap and valve box cover have been properly installed.