

Johnson Utilities, LLC

Design Guide and Standard Details



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JOHNSON UTILITIES, LLC

STANDARD DETAILS

GENERAL:

JU-1001-Typical Utility Layout Detail

TRENCHING

JU-2000-Water Pipe Trench Detail

JU-2001-Water and Gas Joint Trench Detail

JU-2002-sewer Trench Detail

JU-2003-Force Main Trench Detail

WATER:

JU-3100-3/4" Single Water Service Detail

JU-3101-1" Split Double Water Service Detail

JU-3102-1 1/2" Service Installation Detail

JU-3103-2" Service Installation Detail

JU-3104-2 1/2" Service Installation Detail

(For 3", 4" and 6" Service See MAG STD Det. 345-1)

JU-3105-4-Service (for Lift Stations Only)

JU-3106-Water Meter cover With 2" hole for meter

JU-3200-2" Blow-off Detail

JU-3300-Air Release Valve Detail

JU-3400-Valve Box cover Detail

SEWER:

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Items Required By Johnson Utilities

Johnson Utilities LLC

Design Guide

1.0 Policy

The developer is required to install all of the water and sewer lines and appurtenances within and adjacent to its development as determined by Johnson Utilities LLC (the company) or as specified in a Utility Service Agreement between the developer and the Company

A water system infrastructure analysis shall be required for proposed developments determined by the Company to have a large impact on the water system. The developer shall be responsible for all costs associated with the infrastructure analysis.

All sewer system designs shall provide for sufficient capacities and depths to service the entire area tributary to the development, along with the development itself.

Under special conditions the Company will accept lines on private property, the conditions are as follows:

1. Water lines must be fully incorporated into the Companies' system and be connected to it at both ends.
2. Sewer lines must serve property owned by more than one developer.
3. The line must be in a dedicated easement.
4. The line must meet Company construction standards
5. The Company must determine that acceptance of the line is to its benefit.

1.1 Sewer Planning Criteria:

The following design criteria will be utilized for all areas within the Johnson Utilities service area unless directed otherwise by the Company, ADEQ or the A.C.C.

- 80 GPCD for all residential areas requiring sewers (ADWF)
- 1.8 persons/D.U. for all Adult Community Residences
- 3.3 persons/D.U. for all Family Community Residences
- 1,000 GPAD for all commercial and school areas (ADWF)
- 3.0 Peaking Factor for all commercial and school areas (PDWF)
- 250 GPAD for wet weather flow infiltration and inflow

Residential peaking factors are based on the tributary population. The peaking factor relationship adopted by the Pima County Wastewater Management Department has been used to develop the residential peak dry-weather wastewater effluent (see Table 1).

Table 1
Peak Dry Weather Flow Factor Ratios for Wastewater Basin Study
AAZ R18-9-E301 (D)

POPULATION	PEAKING FACTOR
0-100	3.62
200	3.14
300	2.90
400	2.74
500	2.64
600	2.56
700	2.50
800	2.46
900	2.42
1000	2.38
1001 to 10,000	$PF = (6.330 \times p^{-0.231}) + 1.094$
10,001 to 100,000	$PF = 6.177 \times p^{-0.233} + 1.128$
More than 100,000	$PF = 4.500 \times p^{-0.174} + 0.945$

PF= Dry Weather Peaking Factor
P=Upstream Population

- ii. For a lift station serving less than 600 single family dwelling units (d.u.) use either of the following methods to size the pumps for peak dry weather flow in gallons per minute and add allowance for wet weather flow and infiltration:
 - (1) Peak Dry weather flow=17 d.u.^{0.42}, or
 - (2) Peak dry weather flow = 11.2 (population)^{0.42}
- iii. If justified by the applicant, the department may accept lower unit flow values in the served area due to significant use of low fixtures, hydrographs of actual flows, or other factors:

1.2 Water design criteria:

The following design criteria will be utilized for all areas within the Johnson Utilities service area unless directed otherwise by ADEQ or the A.C.C.

A. Average Day Demand

Residential Use shall equal 100 gallons/day/person at 3.3 persons per dwelling or 330 gallons/dwelling/day.

Commercial Use, Schools, parks, community centers and equestrian centers shall equal 1,500 gallons/acre/day.

Minimum pressure conditions are 20 psi and maximum of 80 psi.

Fire flow demand and storage requirements are 1,000 gpm for 2 hours or per U.F.C., whichever is higher.

Water storage facilities shall be sized to provide a usable volume equal to no less than approximately 48% of the peak-day demand plus 120,000 gallons for fire protection.

1.3 Pre-construction Conference Criteria

The following criteria will be utilized for water and sewer construction within the Johnson Utilities Service Area. The developer, his Engineer, or the contractor will be required to schedule a Pre-construction meeting with Johnson Utilities personnel prior to starting construction of water and sewer systems. A copy of the agenda for that Pre-construction meeting is as follows:

JOHNSON UTILITIES PRECONSTRUCTION CONFERENCE

The following items are requirements for construction within the Johnson Utilities service area. These items will be requirements throughout the construction of the project.

1. Contractor will give Johnson Utilities between 24 and 48 hours notice of required testing.
2. Any changes in materials must be submitted to Johnson Utilities and the Engineer for approval prior to ordering.
3. During the testing of the water and sewer pipelines either a representative from Johnson Utilities or a construction manager or observer selected by the developer to witness the test. Contractor cannot self certify his own testing. Johnson Utilities personnel must be present during flushing and chlorination. Any questions please call Gary Larsen at Johnson utilities.
4. Tracer wire 12 gage all underground pipe *(special note for manholes and waterlines)

5. WATER LINE CONSTRUCTION INCLUDES:

- a. Installation
- b. Backfill and compaction testing
- c. Pressure testing
- d. Chlorination
- e. Chlorine residual testing
- f. Bacti testing.
- g. No Flare Fittings
- h. No Copper Kinks
- i. Mag Meter box No. 1 for ¾", Mag Meter Box No. 2 for 1" w/ 2" hole in lid
- j. **Johnson Utilities to receive a copy of As Built plans, ECC and all testing.- Same package that is sent to ADEQ.**
- k. If 90° bends are used both Meg-a-lug (or approved equal) joint restraints and thrush blocks are required, if 45° bends are used only Meg-a-lug (or approved equal) joint restraints are required.
 - l. Backflow prevention device enclosures (one type Guard-Shack G5-5/G5-1/G5-2) Tan in color.
- m. Call Johnson Utilities when flushing.
- n. All valve box covers shall be Star -VBLIDLV 5-1/4" HD Water lid Las Vegas-or approved equal- See Detail JU-3400

6. SEWER LINE CONSTRUCTION INCLUDES:

- a. Installation *(Tracer wire 12 gage taped to the center line of pipe on manholes over the top of pipe enter above the cone and below the adjustment rings. Allow 3 feet of extra wire.)
- b. Backfill and compaction testing
- c. Low pressure air testing-100% of all sewer using F1417 Table 2.
- d. Mandrel pipeline-100% of all sewer mains.
- e. Video camera testing –100% of all sewer main-tape to be given to Johnson Utilities fro review and storage.
- f. Vacuum testing of manholes-100% of all manholes
- g. Exfiltration testing of the lift stations and Grit chambers
- h. Pressure testing of force mains-C-900 PVC pipe or DIP-100% of total force main.
- i. Hydo-vac after final rim adjustment.
- j. Pesticide Paint all Manholes.
- k. Install meter at lift stations.
- l. No Curved Sewers are allowed by Johnson Utilities.
- m. Install 4" water service to lift station compound.
- n. Sewer lines over 12 feet deep require 5' diameter manholes.
- o. **Johnson Utilities to receive a copy of As Built plans, ECC and all testing. Same package that is sent to ADEQ**
- p. No stub outs-Replace with clean outs
- q. Place plug's @ main connection (Do not remove until the Approval of Construction has been delivered to Johnson Utilities.

2.0 Definitions

Appurtenances: Items attached to a main structure to enable it to function, but not considered an integral part of it.

Company: Johnson Utilities LLC

Developer: Any person or persons, corporation, firm desiring municipal water service.

Distribution System: The network of public water lines sixteen-inches in diameter and smaller that compose the basic grid and distribution system for Public water service.

Fire Line: A private water line located on private property which is utilized exclusively for providing water to fixed fire protection systems.

Interceptor, Trunk, or Collector Sewer: A sewer line greater than 12 inches in diameter and tributary to an outfall sewer. It collects the entire sewage from a large sewer service.

Lateral or Sub-main Sewer: A sewer line equal to or less than 12 inches in diameter and tributary to an interceptor or large sewer. It collects sewage from two or more service taps.

Private Sewer Line: Any sewer line not owned and maintained by the Company.

Private Water Line: Any water line not owned and maintained by the Company.

Public Sewer Service: Sanitary sewer service provided for domestic, commercial, and industrial purposes.

Public Water Service: Water service provided for domestic, industrial, commercial, recreational, and landscaping purposes.

Public Sewer Main: A sewer line owned and maintained by the Company.

Public Water Line or Main: A water line owned and maintained by the Company.

3.0 Sewer Engineering Requirements

3.1 Standard Specifications and Details

The Maricopa Association of Governments (M.A.G.) Uniform Standard Specifications and Details have been adopted by the Company. The Company's modifications to the M.A.G Standards are as follows:

- 1) Section 744, referring to ABS Truss Pipe has been deleted from the specifications. ABS Truss Pipe is not allowed.
- 2) All references to lead, lead caulked, and lead gaskets have been deleted from section 630 of the specifications. These items are not allowed.
- 3) Section 5.1 of this manual shall be used for all Ductile Iron Pipe sewer line installations.

3.2 Construction Materials

The Company has adopted the requirements given in the M.A.G. Standard Specifications with the modifications presented in section 3.1 of this manual and the Details shown in Section 6. In addition, the Company has the following requirements:

- 1) All lateral sewer lines shall be polyvinyl chloride pipe (PVC) unless ductile iron is required to satisfy the separation requirements of A.D.E.Q.
- 2) All interceptor and larger sewer lines shall be PVC lined reinforced concrete pipe. All PVC lining systems shall cover the entire interior of the pipe, 360 degree lining, and be of a type approved by the Company.
- 3) Lined ductile iron pipe may be used in lieu of the materials listed above when approved by the Company. All sewer pipe installations of lined ductile iron pipe shall be in accordance with Section 5.1 of this document.

In addition, all design and installation details shall conform to the American Society for Testing Materials (ASTM) standards and to the manufacturer's recommended standards. If conflicts occur between any of the standards, the most conservative standard will govern; except where the MAG or Company Standards specifically address the topic. The Company reserves the right to approve alternate design and installation methodology if justified by a detailed analysis.

3.3 Sewer Line Design

All sewer lines shall be designed in accordance with the current Company Waste Water Master Plan, except that the Company reserves the right to modify the requirements of this section when special conditions so dictate. The current Company sewer line design requirements are as follows:

- 1) All sewer lines shall be a minimum of eight-inch diameter with a minimum of four feet of cover.

2) A separate service tap, 4-inches in diameter minimum, shall be provided for each residential lot or unit. An inspection manhole shall be installed on any service tap or private sewer line when determined necessary by the Company. Wye fittings or tapped saddles are acceptable service connections to sewer mains. Commercial service sizes will be established based on the nature and needs of the business. Residential sewer taps can be installed in manholes as needed within cul-de-sac and street elbows and at the end manholes of a sewer lateral. The invert of the sewer tap shall match or be higher than the top of pipe of the main sewer line.

3) Direct service taps may not be installed on interceptor and larger sewers. However, with the approval of the Company, a manhole may be constructed on an interceptor, or larger, sewer and a lateral sewer line extension installed. The lateral sewer line extension will generally terminate upstream in a manhole. Direct service taps may then be installed on the upstream lateral.

4) A manhole is required whenever a change in sewer line alignment, grade or size occurs. When sewer lines of differing sizes enter the same manhole, the smaller sewer lines shall not have their crowns lower than the crown of the largest pipe. Manhole inverts with zero to five degrees deflection shall be constructed at the grade of the sewer line; deflections or intersections of 5.1 to 45 degrees shall drop .1 foot across the manhole and deflections or intersections of 45.1 to 90 degrees shall have a minimum 0.20-foot drop across the manhole. In interceptor and larger sewers, inverts at junctions shall be designed to maintain the energy gradient across the junction and to prevent back flow. Whenever a drop connection is required the drop connection shall be installed per MAG Standard Detail 426. Manholes with water tight bolt down covers will be required when ever a manhole is located within a flood prone area (this includes areas where street drainage is allowed to pond).

5) The maximum allowable manhole spacing is 500 feet for sewer lines less than 18 inches in diameter. Manholes on larger pipe sizes shall be spaced per A.D.E.Q. requirements. A cleanout may be installed in lieu of a manhole at the end of a lateral sewer providing that the distance from the cleanout to the nearest manhole does not exceed 300 feet. A cleanout will be installed on all stub-outs for future connections. Plugs at the end of a stub-out are not allowed.

6) For all sewer lines with an invert depth greater than 12 feet or pipe size larger than 12", 5-foot diameter manholes with 30-inch diameter covers are required. For all other installations, 4-foot diameter manholes with 24-inch diameter covers may be used.

7) For all drop manholes, manholes with an invert depth greater than 15 feet, and manholes receiving sewage flow from a force main, polymer concrete is required.

8) Johnson Utilities requires that all lift stations constructed will be required to have a grit chamber separate from the lift station wetwell. The grit chamber will have a bar screen over the outlet pipe that drains to the lift station. The grit (sump) chamber and the wetwell shall be coated on the interior with Sauereisen or other approved corrosion proof material prior to testing. The method used must be approved by Johnson utility company prior to installation. All lift stations will have a concrete wash down pad with 6-inch curbing

around the entire perimeter with a drain that drains to the grit chamber. All sewer lift stations shall be constructed in conjunction with the Johnson Utilities field manager. Johnson Utilities also requires that the electrical work for the lift station be completed by the Johnson Utilities Electrical contractor. All sewage lift stations will require a 6 foot minimum high chain link fence with 3 stands of barbed wire or an 8-foot CMU wall that matches the development. Developer will furnish the details for the block wall.

9) A 4" water tap shall be installed at all lift station sites. Either a fire hydrant or Siamese hose connection will be required at the end of the 4" water tap.

10) In addition to the requirements of this document designers shall also meet the requirements of the Arizona Administrative Code. For convenience, the most applicable portion of the Code is reproduced below. Designers are responsible for compliance with the most current version of all State and Municipal Codes. Where the requirements of this document are more stringent than the Code requirements, this document shall control.

11) Grease traps are required on commercial sewer service taps leading from sinks, drains, and other fixtures or equipment in establishments such as restaurants, cafes, lunch counters, cafeterias, bars, and clubs, hotel, hospital, sanitarium, factory or school kitchens, or other establishments where grease may be introduced into the drainage or sewage system.

12) All repair garages and gasoline stations with grease racks or grease pits, and all factories which have oily, flammable, or both types of wastes as a result of manufacturing, storage, maintenance, repair, or testing processes, shall be provided with an oil or flammable liquid interceptor which will be connected to the necessary floor drains.

13) Upsizing sewer pipe due to grade constraints is not acceptable. Johnson Utilities must be made aware of and approve of this prior to the final design.

14) All sewer lines must be tested and accepted by the Engineer signing off on the Engineer's Certificate of Completion prior to the paving of the street. If the sewer system testing shows substandard construction the sewer line will be repaired prior to acceptance by Johnson Utilities.

Arizona Administrative Code
Title 18. Chapter 9
Section E-301 D

2. Gravity sewer lines. An applicant shall:
 - a. Ensure that any sewer line that runs between manholes, if not straight, is of constant horizontal curvature with a radius of curvature not less than 200 feet; (Curved sewers are not allowed by JUC.
 - b. Cover each sewer line with at least three feet of backfill meeting the requirements of subsection (D)(2)(h)(i). The applicant shall:
 - i. Include at least one note specifying this requirement in construction plans;
 - ii. If site-specific limitations prevent three feet of earth cover, provide the maximum cover attainable, and construct the sewer line of ductile iron pipe or other materials of equivalent or greater tensile and compressive strength;
 - iii. If ductile iron pipe is not used, design and construct the sewer line pipe with restrained joints or an equivalent feature; and
 - iv. Ensure that the design of the pipe and joints can withstand crushing or shearing from any expected load. Construction plans shall note locations requiring these measures.
 - c. If sewer lines cross floodways, place the lines at least two feet below the 100-year storm scour depth and construct the lines using ductile iron pipe or pipe with equivalent tensile strength, compressive strength, shear resistance, and scour protection. The applicant shall ensure that sewer lines constructed in this manner extend at least 10 feet beyond the boundary of the 100-year storm scouring. Construction plans shall note locations requiring these measures.
 - d. Ensure that each sewer line is eight inches in diameter or larger except:
 - i. The first 400 feet of a dead end sewer line with no potential for extension may be six inches in diameter if the design flow criteria specified in subsection (D)(1)(c) are met. If the line is ever extended, the applicant seeking the extension shall replace the entire length with larger pipe to accommodate the new design flow; or
 - ii. The sewer lines for a sewage collection system for a manufactured home, mobile home, or recreational vehicle park are not less than four-inches in diameter for up to 20 units, five-inches in diameter for 21 to 36 units, and six-inches in diameter for 37 to 60 units.
 - e. Design sewer lines with at least the minimum slope calculated from Manning's Formula using a coefficient of roughness of 0.013 and a sewage velocity of two feet per second when flowing full.
 - i. An applicant may request a smaller minimum slope under R18-9-A312(G) if the smaller slope is justified by a quarterly program of inspections, flushings, and cleanings.
 - ii. If a smaller minimum slope is requested, the slope shall not be less than 50% of that calculated from Manning's formula using a coefficient of roughness of 0.013 and a sewage velocity of two feet per second.
 - f. Design sewer lines to avoid a slope that creates a sewage velocity greater than 10 feet per second. The applicant shall construct any sewer line carrying a flow with a normal velocity of greater than 10 feet per second using ductile iron pipe or pipe with equivalent erosion resistance, and structurally reinforce the receiving manhole or sewer main.
 - g. Design and install sewer lines, connections, and fittings with materials that meet or exceed manufacturer's specifications not inconsistent with this Chapter to:
 - i. Limit inflows, infiltration, and exfiltration;
 - ii. Resist corrosion in the project electrochemical environment;
 - iii. Withstand anticipated live and dead loads; and
 - iv. Provide internal erosion protection.
 - h. Indicate trenching and bedding details applicable for each pipe material and size in the design plans. Sewer lines shall be placed in trenches and bedded following the specifications established in subsections (D)(2)(h)(i) and (D)(2)(h)(ii). This material is incorporated by reference and does not include any later amendments or editions of the incorporated matter. Copies of the incorporated material are available for inspection at the Department of Environmental Quality and the Office of the Secretary of State, or may be obtained from the Maricopa Association of Governments, 302 N. 1st Avenue, Suite 300, Phoenix, Arizona 85003, or from Pima County Wastewater Management, 201 N. Stone Avenue, Tucson, Arizona 85701-1207.
 - i. "Trench Excavation, Backfilling, and Compaction" (Section 601), published in the "Uniform Standard Specifications for Public Works Construction," published by the Maricopa Association of Governments, revisions through 2000; and
 - ii. "Rigid Pipe Bedding for Sanitary Sewers" (WWM 104), and "Flexible Pipe Bedding for Sanitary Sewers" (WWM 105), published by Pima County Wastewater Management, revised November 1994.

- i. Perform a deflection test of the total length of all sewer lines made of flexible materials to ensure that the installation meets or exceeds the manufacturer’s recommendations and record the results.
 - j. Test each segment of the sewer line for leakage using the applicable method below and record the results:
 - i. “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, (F 1417-92), reapproved 1998;
 - ii. “Standard Practice for Testing Concrete Pipe Sewer Lines by Low-pressure Air Test Method” published by the American Society for Testing and Materials, (C 924-89), reapproved 1997;
 - iii. “Standard Test Method for Low-pressure Air Test of Vitrified Clay Pipe Lines” published by the American Society for Testing and Materials, (C 828-98), approved March 10, 1998; or
 - iv. The material listed in subsections (D)(2)(j)(i), (D)(2)(j)(ii), and (D)(2)(j)(iii) is incorporated by reference and does not include any later amendments or editions of the incorporated matter. Copies of the incorporated material are available for inspection at the Department of Environmental Quality and the Office of the Secretary of State, or may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, Conshohocken, PA 19428-2959.
 - k. Test the total length of the sewer line for uniform slope by lamp lighting, remote camera or similar method approved by the Department, and record the results.
3. Manholes.
- a. An applicant shall install manholes at all grade changes, all size changes, all alignment changes, all sewer intersections, and at any location necessary to comply with the following spacing requirements:

Sewer Pipe Diameter (inches)	Maximum Manhole Spacing (feet)
4 to less than 8	300
8 to less than 18	500
18 to less than 36	600
36 to less than 60	800
60 or greater	1300

- b. The Department shall allow greater manhole spacing following the procedure provided in R18-9-A312(G) if documentation is provided showing the operator possesses or has available specialized sewer cleaning equipment suitable for the increased spacing.
- c. The applicant shall ensure that manhole design is consistent with “Pre-cast Concrete Sewer Manhole” (#420), “Offset Manhole for 8” - 30” Pipe” (#421), and “Brick Sewer Manhole and Cover Frame Adjustment” (#422), 1998, including revisions through 2000, published by the Maricopa Association of Governments; and “Manholes and Appurtenant Items” (WWM 201 through WWM 211), Standard Details for Public Improvements, 1994 Edition, published by Pima County Wastewater Management.
- d. The material specified in subsection (D)(3)(c) is incorporated by reference and does not include any later amendments or editions of the incorporated matter. Copies of the incorporated material are available for inspection at the Department of Environmental Quality and the Office of the Secretary of State, or may be obtained from the Maricopa Association of Governments, 302 N. 1st Avenue, Suite 300, Phoenix, Arizona 85003, or from Pima County Wastewater Management, 201 N. Stone Avenue, Tucson, Arizona 85701-1207.
- e. The applicant shall not locate manholes in areas subject to more than incidental runoff from rain falling in the immediate vicinity unless the manhole cover assembly is designed to restrict or eliminate storm water inflow.
- f. The applicant shall test manholes using one of the following test protocols:
 - i. Watertightness testing by filling the manhole with water. The applicant shall ensure that the drop in water level does not exceed 0.001 of total manhole volume in one hour.
 - ii. Air pressure testing using the “Standard Test Method for Concrete Sewer Manholes by Negative Air Pressure (Vacuum) Test,” published by the American Society for Testing and Materials, (C 1244-93), approved August 15, 1993. This material is incorporated by reference, does not include any later amendments or editions of the incorporated matter, and is on file with the Office of the Secretary of State. The material may be viewed at the Department of Environmental Quality, Water Quality Division, or obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, Conshohocken, PA 19428-2959.
- g. The applicant shall perform manhole testing under subsection (D)(3)(f) after installation of the manhole cone to verify watertightness of the manhole from the top of the cone down.
 - i. Upon satisfactory test results, the applicant shall install the manhole ring and any spacers, complete the joints, and seal the manhole to a watertight condition.
 - ii. If the manhole cone, spacers, and ring can be installed to final grade without disturbance or adjustment by later construction, the applicant may perform the testing from the top of the manhole ring on down.
- h. The applicant shall locate a manhole to provide adequate visibility and vehicular maintenance accessibility after the manhole has been built.

4. Force mains. If it is impractical to install a gravity sewer line system, an applicant may install a force main if it meets the following design, installation, and testing requirements. The applicant shall:
 - a. Design force mains to maintain a minimum flow velocity of three feet per second and a maximum flow velocity of seven feet per second.
 - b. Ensure that force mains have the appropriate valves and controls required to prevent drainback to the lift station. If drainback is necessary during cold weather to prevent freezing, the control system may allow manual or automatic drainback.
 - c. Incorporate air release valves or other appropriate components in force mains at all high points along the line to eliminate air accumulation. If engineering calculations provided by the applicant demonstrate that air will not accumulate in a given high point under typical flow conditions, the Department shall waive the requirement for an air release valve.
 - d. Provide thrust blocks or restrained joints if needed to prevent excessive movement of the force main. Construction plans shall show thrust block or restrained joint locations and details. The documentation submitted to the Department for verification of the general permit shall include calculations and analysis of water hammer potential and surge control measures and shall be signed and sealed by an Arizona-registered professional engineer.
 - e. If a force main is proposed to discharge directly to a sewage treatment facility without entering a flow equalization basin, include in the Notice of Intent to Discharge a statement from the owner or operator of the sewage treatment facility that the design is acceptable.
 - f. Design a force main to withstand, and upon completion test the force main for leakage, at a pressure of 50 pounds per square inch or more above the design working pressure.
 - g. Supply flow to a force main using a lift station that meets the requirements of subsection (D)(5).
 5. Lift stations. An applicant shall:
 - a. Secure a lift station to prevent tampering and affix on its exterior, or on the nearest vertical object if the lift station is entirely below grade, at least one warning sign that includes the 24-hour emergency phone number of the owner or operator of the collection system;
 - b. Protect lift stations from physical damage from a 100-year flood event. Construction of a lift station is prohibited in a floodway;
 - c. Lift station wet well design. The applicant shall:
 - i. Ensure that the minimum wet well volume in gallons shall be 1/4 of the product of the minimum pump cycle time, in minutes, and the total pump capacity, in gallons per minute;
 - ii. Protect the wet well against corrosion to provide at least a 20-year design life;
 - iii. Ensure that wet well volume does not allow the sewage retention time to exceed 30 minutes unless the sewage is aerated, chemicals are added to prevent or eliminate hydrogen sulfide formation, or adequate ventilation is provided. Notwithstanding these measures, the applicant shall not allow the septic condition of the sewage to adversely affect downstream collection systems or sewage treatment facility performance;
 - iv. Ensure that excessively high or low levels of sewage in the wet well trigger an audible or visual alarm at the wet well site and at the system control center; and
 - v. Ensure that a wet well designed to accommodate more than 5000 gallons per day has a horizontal open cross-sectional area of at least 20 square feet.
 - d. Equip a lift station wet well with at least two pumps. The applicant shall ensure that:
 - i. The pumps are capable of passing a 2.5-inch sphere or are grinder pumps;
 - ii. The lift station is capable of operating at design flow with any one pump out of service; and
 - iii. Piping, valves, and controls are arranged to allow independent operation of each pump.
 - e. Not use suction pumps if the sewage lift is more than 15 feet. The applicant shall ensure that other types of pumps are self-priming and that pump water brake horsepower is at least 0.00025 times the product of the required discharge, in gallons per minute, and the required total dynamic head, in feet.
 - f. For safety during operation and maintenance, design lift stations to conform with all applicable state and federal confined space requirements; and
 - g. For lift stations receiving an average flow of more than 10,000 gallons per day, include a standby power source in the lift station design that may be put into service immediately and remain available for 24 hours per day.
- E. Additional Verification of General Permit Conformance requirements. An applicant shall:**
1. Supply a signed and sealed Engineer's Certificate of Completion, unless prohibited by law, in a format approved by the Department that provides the following:
 - a. Confirmation that the project was completed in compliance with the requirements of this Chapter, as described in the plans and specifications corresponding to the Provisional Verification of General Permit Conformance issued by the Director, or with changes that are reflected in as-built plans submitted with the Engineer's Certificate of Completion;
 - b. As-built plans, if required, that are properly identified and numbered; and
 - c. Confirmation of satisfactory test results from deflection, leakage, and uniform slope testing.
 2. Provide any other relevant information required by the Department to determine that the facility conforms to the terms of this general permit; and

3. If the project has a design flow of more than 10,000 gallons per day, provide a final operation and maintenance plan that includes the 24-hour emergency number of the owner or operator of the system.
- F. Operation and maintenance requirements.
1. The permittee of a sewage collection system that includes a force main and lift station or that has a design flow of more than 10,000 gallons per day shall maintain, and revise as needed, an operation and maintenance plan for the system at the system control center.
 2. The permittee shall ensure that the operation and maintenance plan is the basis for operation and continuing maintenance of the sewer collection system.

Note: Item 2a: Curved sewers are not allowed with the Johnson Utilities Service Area.

3.4 Sewer Line Locations

All public sewer lines shall be placed in either the public right-of-way or in a dedicated easement. The minimum easement width is 12 feet, with the entire easement free of property lines, boundary walls and other obstructions for its entire length and width. The standard location for sewer lines within the public right-of-way is five feet from the centerline on the north or east side of the street as shown in the Standard Details.

Generally, sewer lines shall only be permitted to cross and re-cross the street centerline for short distances, providing that the sewer line does not encroach within 10 feet of water mains. The Company reserves the right to modify the requirements of this section when special conditions justify it.

3.5 Miscellaneous Requirements

Curved sewer lines are not allowed. (7/31/02)

Manholes shall be coated with insecticidal paint prior to acceptance. (7/31/02)

Television camera inspection at developer expense is required of all sewers. VCR tape is to be given to Johnson Utilities for review and storage.

Service taps may be connected to the manholes on the sewer line. A detail for this installation is given in the appendix.

Developers of commercial and industrial projects are required to complete a Wastewater Discharge Questionnaire.

For sewers constructed in arterial streets, the minimum size for stubouts at the one half and one quarter section lines is 12 inches in diameter. All other stubouts shall be at least 8 inches in diameter.

When sewage flow approximations are necessary the values given in Section 1.1 shall be used, unless more accurate information is available.

Sewer lines are required within half streets when the south or west one-half is being constructed, providing that a tributary area exists. The tributary area can be either the development itself or a separate sewer service area that is sewered through the development. The Company reserves the right to modify the provisions of this paragraph

when special conditions warrant it.

In the case of the phased development, each successive phase shall provide sufficient sewers to service all of the areas tributary to the phase, including the phase, irrespective of any future phases.

3.6 Sewer Plan Requirements

All construction plans shall be prepared and signed by a professional engineer who is qualified and registered by the State of Arizona to practice in a particular field of competency required by the type of improvements.

Plans shall be submitted on 24" x 36" sheets. The plans shall be drawn to an engineering scale, architectural scales are not allowed.

All sewer lines and utility crossings shall be shown in both plan and profile views.

There are no specific engineering scale requirements, however, 1" = 20' and 1" = 40' are the preferred horizontal scales. The vertical scale is preferred to differ from the horizontal scale by a factor of 10. Water, sewer and paving plans may all be shown on the same plan sheets if a horizontal scale no smaller than 1" = 20' is used.

All elevations shown on the plans shall be referenced to a benchmark on the Company datum. Additional plan requirements are given in the Appendix, see the sewer plans checklist which is used by the Company plan reviewers whenever a sewer plan is reviewed.

3.7 Pretreatment Standards

3.7.1 Applicability

In accordance with the Johnson Utilities' Tariff (I. Customer Discharge to System, B. Waste Limitations) Johnson Utilities has established waste limitations. The Tariff requires all commercial and industrial customers, including their professional engineer, to provide an affidavit stating that the wastewater discharged to the system does not exceed domestic strength. Domestic strength wastewater is defined in 18 A.A.C. 9, Article 1, which states that the total suspended solids (TSS) content does not exceed 430 mg/l, the five-day biochemical oxygen demand (BOD5) does not exceed 380 mg/l, the total nitrogen does not exceed 53 mg/l, and the content of oil and grease does not exceed 75 mg/l. In the event the wastewater discharged is not as stipulated in the affidavit, A.A.C. R14-2-609(C)(1)(e) authorizes Johnson Utilities to terminate service for a customer's breach of a written contract.

3.7.2 Enforcement

JU enforces the limits of these discharges through the Corporation's sewer utility rules, A.A.C. Title 14, Chapter 2, Article 6. A.A.C. R14-2-603(C)(2) authorizes Johnson Utilities to refuse service if "a condition exists which in the utility's judgment is unsafe or hazardous to the applicant, the general population, or the utility's personnel or facilities." A.A.C. R14-2-609(B)(1)(a) authorizes Johnson Utilities to terminate service without notice for "the existence of an obvious hazard to the safety or health of the consumer or the general population." In the event of an

upset defined by A.R.S. § 49-255(8) caused by an industrial discharge, it would be considered an obvious hazard to the general population and result in determination of service.

In all cases of termination, a customer has the right to dispute the disconnection by making arrangements to discuss the cause with Johnson Utilities. If Johnson Utilities concludes that the reason for termination is justified, the customer is advised of their right to file a complaint with the Commission.

Pursuant to the Tariff, Section C. Inspection and Right of Entry, Johnson Utilities has the right to inspect any facility that is directly or indirectly discharging to the wastewater treatment plants. Section D, Termination of Water Service for Violation of Wastewater Rules and Regulations, allow Johnson Utilities to discontinue service to any customer who violates the conditions set forth in Part Four of the Tariff.

3.7.3 Commercial Waste

All commercial and light industrial facilities are required to have grease traps or interceptors in accordance with the Uniform Plumbing Code, Chapter 10. Johnson Utilities may waive this requirement based on information provided in the affidavit.

3.7.4 Industrial Waste

If a facility generates industrial process wastewater that comes from metal-finishing or other industrial processes covered by the EPA categories listed in 40 CFR 413 – 471 and discharges the wastewater to a Johnson Utilities' water reclamation plant, the following must be provided for approval by Johnson Utilities. Refer to the Code of Federal Regulations (CFR) for the specific subcategory, as specified in Table 1, and to the specific instructions for an item to determine whether an item is applicable.

- 1. Principal Facility Activity.** Briefly describe the principal product produced or service provided at the facility. Provide applicable Standard Industrial Classification (SIC) code(s) for these activities, if known. Refer to the Code of Federal Regulations (CFR) for the specific subcategory, as specified in Table 1, and to the specific instructions for an item to determine whether an item is applicable.
- 2. Pretreatment Point Source Category.** Provide the name of the pretreatment point source category which you believe your facility is subject to. The categories are listed in Table 1, below, along with a reference to the relevant citation in the Code of Federal Regulations (CFR). Also list the subcategory or subcategories your facility is subject to, if applicable. The complete listing of subcategories and descriptions are provided in the relevant CFR part.
- 3. Production.** If the Pretreatment Point Source Category your facility is subject to uses production based limits, provide the facility's average production for each regulated process. Refer to the pretreatment category summary to determine whether your facility is subject to production based limits. The summary should also list the processes for which production is needed and the production basis and units in which production should be provided. The production provided should be an actual annual average production, not a facility capacity.
- 4. Monitoring Points.** A "monitoring point" is the location, following treatment, where wastewater being discharged can be monitored, and is the point at which pretreatment standards must be complied with. Describe all monitoring point(s) at your facility. Whenever possible, a single monitoring point should be selected, and should contain all the flow of regulated process with no dilution waste streams.

5. Wastewater Flows. List the separate wastewater streams at the facility and indicate the average and maximum flow rates for each waste stream. If wastewater from one process is subsequently used in another process, please note that fact, and do not include it more than once in the total.

A. Regulated Processes. Individually list each wastewater discharging process that is regulated by any of the pretreatment point source categories your facility is subject to. Only wastewater from processes subject to National Categorical Pretreatment Standards should be listed.

B. Unregulated Processes. Individually list processes not regulated by National Categorical Pretreatment standards, but which are present at a monitoring point(s), or which have the potential to be contaminated with the same pollutants, or pollutants similar to regulated waste streams.

C. Dilution Water. Individually list any other wastewater flows that are present at a monitoring point(s), such as cooling water and sanitary wastewaters. Include only wastewaters present at your monitoring point(s).

D. Total Wastewater Flow. Indicate the total flow of all wastewater flows present at a monitoring point.

6. Wastewater Quality. Identify pollutants contained or potentially contained in the wastewater discharge. Be sure to include all pollutants potentially present at your facility regulated by the pretreatment point source category which your facility is subject to, and unregulated pollutants that may be present. Indicate the processes which result in the discharge of each pollutant, and summarize monitoring data for each pollutant. If additional space is needed, attach a sheet containing all relevant data. All data submitted should be summarized unless you have been specifically instructed otherwise. Laboratory analysis sheets should not be submitted unless specifically requested. If your facility is required to submit a Baseline Monitoring Report (BMR), you may need to perform additional monitoring.

Industrial users subject to National Categorical Pretreatment Standards are required to submit a baseline monitoring report. If this application is for new permit, either for a new or existing facility, and a Baseline Monitoring Report has not previously been submitted, the information required for a baseline monitoring report must be included in this application or submitted separately.

7. Solvent Use. If your facility is subject to a National Categorical Pretreatment standard with limits for Total Toxic Organics (TTO), list all constituents of Total Toxic Organics (TTO) for your category that are used or produced at your facility. Organic Management Plan (TOMP) must be submitted and approved by Johnson Utilities. The Toxic Organics Management Plan (TOMP), when required, must contain at least the following elements:

A. a list of all materials or products at the Facility containing constituents of Total Toxic Organics (TTO) and the respective constituent of TTO for each material or product, including any material or product that may contain a constituent of TTO as a component of a trade name compound;

B. a description of the method of organic compound disposal; and,

C. Procedures and control measures used by the Permittee to prevent toxic organics from entering the POTW system whether by spill, leak, discharge or any other means.

8. Wastewater Treatment and Discharge. Describe the wastewater treatment given to each process wastewater stream. Where multiple wastewater streams are treated together, list the streams that are treated together and describe the treatment that all are given. Indicate whether the discharge is continuous or a batch discharge. Attach a flow chart to this application if needed to describe the treatment provided and its relationship to processes that produce wastewater and discharge monitoring points.

9. Name of Johnson Utilities Water Reclamation Plant Receiving Discharge.

Provide the name of the plant receiving discharge from the facility.

Table 1. Listing of Pretreatment Categories and Corresponding CFR Reference

<u>Pretreatment Category</u>	<u>CFR Reference</u>
Aluminum Forming	40 CFR 467
Asbestos Manufacturing	40 CFR 427
Battery Manufacturing	40 CFR 461
Builders' Paper and Board Mills	40 CFR 431
Carbon Black Manufacturing	40 CFR 458
Cement Manufacturing	40 CFR 411
Coil Coating	40 CFR 465
Copper Forming	40 CFR 468
Dairy Products Processing	40 CFR 405
Electrical and Electronic Components	40 CFR 469
Electroplating	40 CFR 413
Feedlots	40 CFR 412
Ferroalloy Manufacturing	40 CFR 424
Fertilizer Manufacturing	40 CFR 418
Fruits and Vegetables Processing and Manufacturing	40 CFR 407
Glass Manufacturing	40 CFR 426
Grain Mills Manufacturing	40 CFR 406
Ink Formulating	40 CFR 447
Inorganic Chemicals Manufacturing	40 CFR 415
Iron and Steel Manufacturing	40 CFR 420
Leather Tanning and Finishing	40 CFR 425
Meat Processing	40 CFR 432
Metal Finishing	40 CFR 433
Metal Molding and Casting	40 CFR 464
Nonferrous Metals Forming and Metal Powders	40 CFR 471
Nonferrous Metals Manufacturing	40 CFR 421
Oil and Gas Extraction	40 CFR 435
Paint Formulating	40 CFR 446
Paving and Roofing (Tars and Asphalt)	40 CFR 443
Pesticide Chemicals	40 CFR 455
Petroleum Refining	40 CFR 415
Pharmaceutical Manufacturing	40 CFR 439
Phosphate Manufacturing	40 CFR 422
Plastics Molding and Forming	40 CFR 463
Porcelain Enameling	40 CFR 466
Pulp, Paper and Paperboard	40 CFR 430
Rubber Processing	40 CFR 428
Seafood Processing	40 CFR 408
Soaps and Detergents Manufacturing	40 CFR 417
Steam Electric Power Generating	40 CFR 423
Sugar Processing	40 CFR 409
Timber Products Manufacturing	40 CFR 429
Textile Mills	40 CFR 410

4.0 Water Engineering Requirements

4.1 Standard Specifications and Details

The Maricopa Association of Governments (MAG) Standard Specifications and Standard Details have been adopted by the Company. The Company's modifications to the MAG standard are as follows:

- 1.) Sections 753, referring to galvanized pipe and Section 755 referring to polyethylene pipe have been deleted from the specifications.
- 2.) MAG standard Detail 390 type "A" is required for all curb stop installations. Curb stops are required on all long dead end lines and dead end lines with service line attached. Short stub-outs may, with the approval of the Company, be installed with a blind flange on the end.
- 3.) MAG Standard Detail 391-1 type "C" is required for all valve box installations, and
- 4.) Standard Detail 103 is employed for water service installations.
- 5.) Section 610.4 relating to minimum cover over the top of pipe is revised as follows:
 - (A) 48" for mains smaller than 12 inches
 - (B) 60" for mains 12 inches and larger

4.2 Construction Materials

The Company follows the requirements given in the MAG standard Specifications with the only modifications presented in section 5.1 of this manual. However, the Company does publish a separate specification for reclaimed water lines, which follows.

4.3 . Water Line Sizes

All lines shall be sized in accordance with the current water master plan, except that reserves the right to modify the requirements of this section when special conditions justifies it. The current water line size requirements are as follows:

- 1.) A sixteen-inch diameter water line is required along all section line streets or one tier of lots off to the section line street. The Company may require the installation of dual parallel twelve-inch diameter waterlines instead of the single sixteen-inch water line noted above when special conditions justify it. Dual parallel twelve-inch diameter water lines are normally required adjacent to transmission mains, one on each side.
- 2.) A twelve-inch diameter water line is required along all one-half section line streets or one tier of lots off of the one-half section line street.
- 3.) An eight-inch diameter water line is required along all one-quarter section line streets or one tier of lots off the one-quarter section line street.
- 4.) Eight-inch diameter water lines are required in all commercial, industrial, and multi-family residential area. The water lines must also be fully looped with intersecting water lines.
- 5.) Minimum eight-inch diameter pipe is required for dead-end lines longer than 30 feet or when the length of water line between intersecting water lines is greater than 1200 feet.

- 6.) All other water lines shall be a minimum of six-inch diameter and fully looped with intersecting water lines.
- 7.) In the case of phased development, each successive phase must satisfy all of the requirements listed above irrespective of the future phases.

4.4 Water Line Locations

The standard location for sixteen-inch and smaller water lines is eight feet from centerline on the opposite side from sewer.

Standard utility locations are graphically shown in the Standard Details in Section 6 of this manual. All public water lines shall be placed in either the public right-of-way or within a dedicated easement free of property lines, boundary walls, and other obstructions for its entire length and width. Water lines, service lines, and fire lines are not allowed in retention basins. The Company reserves the right to modify the requirements noted above when special conditions justify it.

4.5 Valve Locations

Two valves are normally required on all tees and three valves are normally required on all crosses. Two valves are not required on fire hydrant tees unless the fire hydrant installation is also serving as a stub out. Additional isolation valves are normally required at approximately 600-foot intervals or when pipe runs longer than 800 feet are encountered. All stub outs shall be provided with sufficient valving to permit the extension of the water line without impeding the functional characteristics of the distribution system, or interrupting any water services. Valves on transmission mains are required only at the section line and one-half section line points where a bypass type valve assembly is required. Additionally, provisions shall be made to tie the transmission main into the distribution systems at the section line and the one-half section line points with sufficient valving to completely isolate the transmission main from the distribution system, without impeding the functional characteristics of either the transmission main or the distribution system. A bypass type valve assembly is normally required whenever a transmission main is dead-ended with a curb stop required at the end of the main.

4.6 Protection of Water Mains

In addition to the requirements of this document, designers shall also meet the requirements of the Arizona Administrative Code. For convenience, the most applicable portion of the Code is reproduced below. Designers are responsible for verifying that the current version of all State and Municipal Codes are complied with. Where the requirements of this document are more stringent than the Code requirements, this document shall control.

R18-4-502. Minimum Design Criteria

A. A public water system shall be designed using good engineering practices. A public water system which is designed in a manner consistent with the criteria contained in Engineering Bulletin No. 10, "Guidelines for the Construction of Water Systems," issued by the Arizona Department of Health Services, May 1978 (and no future editions), which is incorporated herein by reference and on file with the Office of the Secretary of State, shall be considered to have been designed using good engineering practices. Other system designs shall be approved if the applicant can demonstrate that the system will function properly and may be operated reliably in compliance with this Chapter. Minimum design criteria which are not subject to modification are listed in this Section.

B. A potable water distribution system shall be designed to maintain and shall maintain a pressure of at least 20 pounds per square inch at ground level at all points in the distribution system under all conditions of flow.

C. Water and sewer mains shall be separated in order to protect public water systems from possible contamination. All distances are measured perpendicularly from the outside of the sewer main to the outside of the water main. Separation requirements are as follows:

1. A water main shall not be placed:

a. Within 6 feet, horizontal distance, and below 2 feet, vertical distance, above the top of a sewer main unless extra protection is provided. Extra protection shall consist of constructing the sewer main with mechanical joint ductile iron pipe or with slip-joint ductile iron pipe if joint restraint is provided. Alternate extra protection shall consist of encasing both the water and sewer mains in at least 6 inches of concrete for at least 10 feet beyond the area covered by this subsection (C)(1)(a).

b. Within 2 feet horizontally and 2 feet below the sewer main.

2. No water pipe shall pass through or come into contact with any part of a sewer manhole. The minimum horizontal separation between water mains and manholes shall be 6 feet, measured from the center of the manhole.

3. The minimum separation between force mains or pressure sewers and water mains shall be 2 feet vertically and 6 feet horizontally under all conditions. Where a sewer force main crosses above or less than 6 feet below a water line, the sewer main shall be encased in at least 6 inches of concrete or constructed using mechanical joint ductile iron pipe for 10 feet on either side of the water main.

4. The separation requirements do not apply to building, plumbing, or individual house service connections.

5. Sewer mains (gravity, pressure, and force) shall be kept a minimum of 50 feet from wells unless the following conditions are met:

a. Water main pipe, pressure tested in place to 50 psi without excessive leakage, is used for gravity sewers at distances greater than 20 feet from water wells; or

b. Water main pipe, pressure tested in place to 150 psi without excessive leakage, is used for pressure sewers and force mains at distances greater than 20 feet from water wells. "Excessive leakage" means any amount of leakage which is greater than that permitted under the AWWA Standard applicable to the particular pipe material or valve type.

6. Requests for authorization to use alternate construction techniques, materials, and joints shall be reviewed by the Department, and such requests may be approved on a case-by-case basis.

D. A public water system shall not construct or add to its system a well which is located:

1. Within 50 feet from existing sewers unless the sewer main has been constructed in accordance with subsection (C)(5)(a) or (b) of this Section;

2. Within 100 feet of any existing septic tank or subsurface disposal system;

3. Within 100 feet of a discharge or activity which is required to obtain an Individual Aquifer Protection Permit, pursuant to A.R.S. §§ 49-241(A) through 49-251;

4. Within 100 feet of an underground storage tank as defined in A.R.S. § 49-1001(17); or

5. Within 100 feet of hazardous waste facilities operated by large quantity generators and treatment, storage, and disposal facilities regulated under the Arizona Hazardous Waste Management Act, A.R.S. § 49-921 et seq.

4.7 Miscellaneous Requirements

Water services, fire hydrants, and fire line shall not be installed on transmission mains unless approved by the Company.

Six fire hydrants are the maximum number that may be connected to a system that is supplied by only two six-inch diameter water lines. Fire Hydrants are generally spaced every 1,000 feet in undeveloped areas, every 500 feet in single family residential areas, and every 300 feet in all other areas. The Company and the Fire Marshall reserve the right to modify the spacing requirements listed above when special conditions justify it.

Water lines are required adjacent to half streets when in the opinion of the Company special conditions justify the construction of the water line.

Gate valves are used on twelve inch in diameter, and smaller, water lines. Butterfly valves are used on sixteen inch in diameter, and larger, water lines with the operating nut installed on the side of the water line away from the mounted line.

If 90° bends are used both Meg-a-lug (or approved equal) joint restraints and thrust blocks are required, if 45° bends are used only Meg-a-lug (or approved equal) joint restraints are required.

4.8 Water Plan Requirements

All off-site construction plans shall be prepared and signed by a professional engineer who is qualified and registered by the State of Arizona to practice in the particular field of competency required by the type of improvements.

Plans shall be submitted on 24" X 36" sheets. The plans shall be drawn to an engineering scale, architectural scales are not allowed.

All twelve-inch diameter and larger water lines and transmission mains shall be shown in both plan and profile views. All dip sections shall be shown in both plan and profile views regardless of the water line size.

There are no specific engineering scale requirements, however, 1" = 20' and 1" = 40' are preferred horizontal scales. The vertical scale is preferred to differ from the horizontal scale by a factor of 10. Water, sewer, and paving plans may all be shown on the same plan sheets if a horizontal scale no smaller than 1" = 20' is to be used.

All elevations shown on the plans shall be referenced to a benchmark on the Company datum unless otherwise approved by the Company.

4.9 Reclaimed Water Main Installations

The installation of reclaimed water piping shall be similar to that of potable water piping and as specified below. Special identification and appurtenances shall be required in the installation of reclaimed water pipe to eliminate the possibility of cross connections, backflow or the inadvertent use of non-potable water for potable purposes.

1. Materials

Reclaimed water pipe installed shall be pressure rated polyvinyl chloride (PVC) purple plastic pipe meeting the applicable requirements of AWWA C900-81. The pipe pressure rating shall be for pressure class 150 psi (DR-18). The pipe shall be delivered with rubber gasketed separate couplings meeting AWWA C900-81 or with integral bell ends meeting ASTM D 3139.

Fittings shall be cast iron conforming to AWWA C-100 for 250 psi working pressure. Flanged ends shall conform to AWWA C-110. Push-on and mechanical joint ends shall conform to AWWA C-111. Fittings shall be mortar lined and coal tar coated in accordance with AWWA C-104.

2. Trench Excavation, Backfilling and Compaction

Trench excavation, backfilling and compaction shall be as specified in Maricopa Association of Governments (MAG) Standard Specifications Section 601.

- A. Pipe Separation (Potable Water): Where reclaimed water mains are installed in the vicinity of existing water mains or building water connections, the reclaimed water lines shall conform to MAG requirements for sewer lines.
- B. Pipe Separation (Sewers): Where reclaimed water mains are installed in the vicinity of existing sanitary sewers or building sewer connections, the reclaimed water lines shall conform to MAG requirements for potable water lines.

3. Pipe Identification

The following pipeline identification methods from reclaimed water piping systems shall be required for all instructions:

- A. Warning Tape: Metallic, detectable warning tape on pipelines shall have a green field the words “CAUTION – RECLAIMED (OR NON-POTABLE) WATERLINE” in black. The overall width shall be three inches. Warning tapes shall be installed one foot above the top of the pipe longitudinally and centered. The warning tape shall be continuous over the entire length of the pipe.
- B. Pipe Marking: Pipes shall be marked by one of the following methods:
 - 1. Stenciled Pipe: The words, “RECLAIMED (OR NON-POTABLE WATER)” shall be stenciled in two inch green letters in two places on the pipe in at least five areas of a twenty foot section of pipe for a total of ten places per section of pipe. Stenciled PVC irrigation pipe (service lines) shall be white with green stenciling. The stenciling shall appear on both sides of the pipe with the marking, “RECLAIMED (OR NON-POTABLE) WATER,” in 5/8-inch letters repeated every twelve inches.
 - 2. Vinyl Tape: As an alternative to stenciling, all pipe 2.5 inches in diameter and larger may be identified by paperbacked adhesive vinyl tape. The tape shall be six inches wide with a green background and black letters one-inch high. The wording, “RECLAIMED (OR NON-POTABLE) WATER MAIN” shall be placed longitudinally on the pipe. For 2.5 inch through four-inch pipe, the tape shall be centered along the top of the pipe; for six inch through 16-inch pipe, the tape shall be placed on both sides of the top half of the pipe. For 20 inch and larger pipe, the tape shall be placed as on the six inch through 16-inch pipe with a third strip along the center of the top of the pipe. The tape shall be placed from joint to joint.

- C. Warning signs: Reclaimed water lines shall be identified by surface mounted signs, at least six inches square, with the following message in bold, black letters on a white background: “WARNING – RECLAIMED WASTEWATER – DO NOT DRINK” signs shall be prominently located in all areas subject to irrigation. At all lakes at pedestrian entrances or access points, at all hose bibs, and spaced at 100 yard maximum between signs, except for roadway medians, where signs may be spaced at 300 yard intervals.

4. System Appurtenances

The appurtenances in the reclaimed water system shall be identified and safeguarded as follows:

- A. Fire Hydrants: Reclaimed water fire hydrants shall have rocker-lug type caps; pentagon nut caps shall not be used. Hydrants shall be painted aluminum and gloss black. The bonnets and barrel shall be painted aluminum in color, with the top most three inches painted gloss black.
The initials of the hydrant owner(s) shall be stenciled in three-inch gloss black letters on the front of the hydrant barrel.
- B. Valves: Valves shall be equipped with standard cast iron roadway boxes and shall be three-piece, slip type, with square covered painted red. Valve box covers are cast with the word “CAUTION-RECLAIMED WATER-DO NOT DRINK.” The valves shall operate by means of a recessed key slot or by means of hexagonal heads, which require a special tool to exercise the valve.
- C. Meter Boxes: Box lids shall be cast with the words, “CAUTION-RECLAIMED WATER-DO NOT DRINK” Meter boxes shall be pre-cast concrete with stamped steel lids.

5. Fire Hydrants

Fire hydrants furnished by the contractor shall conform to the requirements of MAG Section 756 and Chandler Standard Detail C-303 subject to a modification of the operating nut and painting schedule described in paragraph 4(a) above.

6. Valves

Valves and valve covers shall be furnished by the Contractor as specified in MAG Section 610.6, subject to the modifications listed in paragraph 4(B) above.

7. Testing

The procedures for testing the pipes water tightness shall be as specified in MAG Section 610.14 with the exception that reclaimed water shall be used in lieu of potable water to fill the pipe section being tested. Disinfection of reclaimed water mains shall not be required.

8. Construction Methods

All reclaimed water pipe shall be installed as specified in MAG Section 610.4 and in accordance with manufacturer's recommendations.

9. Storage of PVC Pipe

PVC pipe stored on-site shall not be exposed to direct ultraviolet radiation, and the screening shall be placed to allow sufficient air circulation and ventilation of the pipe.

5.0 MATERIALS

5.1 Ductile Iron Pipe

Ductile Iron Pipe shall conform to MAG 750. In addition, Ductile Iron Pipe for sewer lines shall be lined with catalyzed coal-tar epoxy or ceramic epoxy.

5.2 Pre-approved Materials

The following materials list contains names of manufacturers whose products and materials are approved for use in the system.

Pipe and appurtenances listed are in general from 4" to 16." Service materials are from 3/4" to 2'."

Pipelines and appurtenances larger than 16" are project specific and require submittals to the Company for approval for use in the system.

Submittals are not required for products contained in the Approved Materials List.

A product approval application is included at the end of the approved materials list.

**APPROVED MATERIALS
DISTRIBUTION SYSTEMS**

PIPE

CCP	AMERON
DIP	GIFFIN (Tyton Joint, Fastite Snaplok and Boltlok Restrained US PIPE PACIFIC STATES/CLOW AMERICAN
PVC	VINYL TEC J.M. CERTAIN TEED PW (Pacific Western) UPONOR (C-900 ONLY) DIAMOND
PVC SCH 40 & 80	SPEARS (Fittings) CRESTLINE APACHE
HDPE (Potable)	PERFORMANCE PIPE (FORMERLY PLEXCO) DRISCO NUMEX VANGUARD CSR POLYPIPE
NOTE:	CTS ¾ to 2” service IPS 2” & larger mainline
HDPE (Reclaimed)	PERFORMANCE PIPE (FORMERLY PLEXCO) DRISCO PURPLE CSR POLYPIPE
COPPER PIPE	TYPE “K” MADE IN USA 4” to 16”
GATE VALVES	WATEROUS-AFC (US Pipe and Metroseal) CLOW MUELLER M & H US PIPE AVK

TAPPING SLEEVES DUCTILE
IRON

WATEROUS –AFC
CLOW
KENNEDY
MUELLER
M & H
FORD
US PIPE

TAPPING SLEEVES EPOXY
COATED

INTERNATIONAL
SMITH BLAIR
ROMAC
FORD
JCM
POWERSDEAL
CASCADE

PIPE RESTRAINTS
DUCTILE IRON AND PVC

CERTAINTEED
UNI FLANGE SECTION U
EBBA IRON 1500 & 6500
MEGALUG
MEGA FLANGE
STAR PIPE PRODUCTS
PACIFIC STATES
SIGMA (PV-LOK & ONE LOK)
US PIPE (FIELD LOK)
PIPELINE COMPONENTS INC.
REMAC
GRIFFIN SNAPLOK
US PIPE TR FLEX
ONE BOLT

PIPE RESTRAINTS HDPE PIPE

VICTAULIC
JCM

AIR RELEASE VALVES ¾” to 6”

VALMATIC
GA INDUSTRIES
ARMSTRONG
CRISPIN
APCO
FLOMATIC

PRESSURE REDUCING VALVE 4”
to 12”

CLA VALVE
AMES
BERMAD

CHECKVALVES	HAMMOND NIBCO GRINNEL AFC-WAREROUS GA INDUSTRIES VALMATIC DELLA
CAST IRON AND DUCTILE IRON FITTINGS	CLOW POWER SEAL TYLER STAR PIPE GRIFFIN TRINITY VALLEY
FLEXIBLE COUPLINGS	CLOW VIKING JOHNSON POWER SEAL SMITH BLAIR JCM FORD APAC CASCADE ROMAC
REPAIR CLAMPS	ROMAC VCM INDUSTRIES CLOW POWER SEAL SMITH BLAIR FORD METER BOX APAC PRODUCTS JCM CASCADE
FIRE HYDRANTS	MUELLER (Standard Issue) WATEROUS WB-77 TREND CLOW MEDALLION M&H 129 AMERICAN DARLING KENEDY AVK 2700
FIRE HYDRANT ADJUSTERS	GRADE-LOK
METER BOXES	SIGMA LOPEZ STAR CONTRACTORS ENGINEERS SUPPLY

VALVE BOXES

SIGMA
LOPEZ
STAR

MAGNETIC DETECTOR AND
MARKING TAPE

REEF INDUSTRIES
ALARMA TAPE
PROLINE
HYTECH
NORTH TOWN
LINETEC
TERRA TAPE

SERVICE LINE MATERIALS – COPPER CTS ¾” TO 2”

CORPORATION STOPS, UNIONS
ANGLE METER STOPS
SERVICE SADDLES AND U
BRANCHES

MUELLER
JONES
MCDONALD
FORD
JCM
POWER SEAL
SMITH BLAIR

COATINGS

ROSKOTE OR RYSKOTE
TENEMEC
AMECOAT
RUSTOLEUM

FLANGE INSULATING KITS

APS/BOLT BROKERS
CALIPCO
CENTRAL;
HMS
PIKOTEK
PSI

CORROSION MATERIALS

EXOTHERMIC WELDING
MATERIALS – WELD
METALS., WELDERS, SLEEVES

ERICO/CADWELD
CONTINENTAL/THERM-O-WELD

EXOTHERMIC WELDING
MATERIALS – “T” CAPS #22
PRIMER, #10 MASTIC FLANGE
INSULATION KITS, NON-
CONDUCTIVE TAPES –
2”(V1-10, VINYL
IDENTIFIED)
4”(V1-20, VINYL
IDENTIFIED)

CALIPCO

EXOTHERMIC MATERIALS – “T”
CAPS, #22
PRIMER, #10 MASTIC

ROYSTON MFG.

COLORED PVC MARKING TAPES, #1
CAST IRON METER BOXES, PHE OLIC
RESIN BOARDS –MICARTA NUTS,
MACHINE SCREWS, FLAT WASHERS,
LOCKING WASHERS

GENERIC – NON VENDOR SPECIFIC

ALUMINUM COMPRESSION
CONNECTORS - #60107. #60102,
#60097, # 60500. # 60501, 60507
HEAVY WALL HEAT SHRINK
INSULATOR –
#HS 12-6, # HS12-61, #HS12-6-4

THOMAS & BETTS

PRECAUTION BLUE
SAFETY PURPLE

SEYMOUR PAINT

APWA BLUE

SPRAYON PAINT

BIG FINK CATHODIC PROTECTION
TEST STATIONS –
DARK BLUE
PURPLE

COTT MFG.

LOCKING DEVICE – ASS LD-0001

CASING SPACERS

CASCADE
SMITH BLAIR
UNIFLANG(Restrained)

BACKFLOW PREVENTION ASSEMBLIES

- HHS31-323 Ford DCV
Or APPROVED EQUAL

PRODUCTION FACILITIES

STANDARD STEEL

KELLY

CCP

AMERON

DIP

GRIFFIN
TYLER
US PIPE
PACIFIC STATES

PVC

VINYL TEC
JM
CERTAIN TEED
PW (Pacific Western)
UPONDOR (C-900 Only)
DIAMOND

PVC SCH 40 & 80

COPPER PIPE

BUTTERFLY VALVES

GATE VALVES

TAPPING SLEEVES – DUCTILE
IRON

PIPE RESTRAINTS
DUCTILE IRON AND PVC

COMBINATION AIR RELEASE
VALVES
¾” to 4”

PRESSURE REDUCING VALVE
4” TO 12”

SPEARS

TYPE “K” MADE IN USA
TYPE “K” RIGID COPPER
(2” PRV BYPASS)

M&H
AMERICAN DARLING
CLOW
MUELLER
PRATT
DE ZURIK
KFLOW

MUELLER
M&H
PRATT
AMERICAN DARLING

WATEROUS – AFC
CLOW
KENNEDY
M&H
FORD
US PIPE T-28
EPOXY COATED INTERNATIONAL
SMITH BLAIR
ROMAC
FORD
JCM
POWERSEAL

CERTAINTEED
UNI FLANGE SECTION U
EBBA IRON 1500 & 6500
MEGALUG
MEGA FLANGE
STAR PIPE PRODUCTS
PACIFIC STATES
SIGMA (PV-LOK & ONE LOK)
US PIPE (FIELD LOK)

APCO
VAL-MATIC
GA INDUSTRIES

WATTS (AMES)

CHECK VALVES 4" TO 16"

APCO
GA INDUSTRIES
VAL-MATIC

CAST IRON AND DUCTILE IRON
FITTINGS

CLOW
POWER SEAL
TYLER
STAR PIPE
GRIFFIN
TRINITY VALLEY
CASCADE
SIGMA

FLEXIBLE COUPLINGS

DRESSER
SMITH-BLAIR

CORPORATION STOPS

FORD
MUELLER

PRESSURE GAGES

ASHCROFT
PERMA CAL

JOHNSON UTILITIES LLC

5.3 PRODUCT APPROVAL APPLICATION

Instructions

All information requested below must be submitted in full. Please label each section with the item number conforming to the list below. No application will be reviewed by the Company until the submittal is complete. Failure to provide full disclosure may be grounds for disapproval of product.

Two (2) copy of the application should be sent to:

Johnson Utilities LLC
Attn: Operations Manager
968 E. Hunt Highway
Queen Creek, AZ 85242

Item #:

1. Basic general information. Provide all information requested on attached form (Item 1).
2. Existing Installations of Product. The following data is requested on representative installations of your product. A sample form (Item 2) is attached or you may use your own tabular format. Failure to disclose representative installations can be ground for disapproval of product.
3. Describe materials of construction (including relevant industry standards – e.g., ASTM, ANSI, AWWA, etc.), special manufacturing processes and quality control measures used in the manufacture and installation of your product. Include copies of relevant-referenced specifications or standards. Include Material Safety Data (MSDS) and National Sanitary Foundation (NSF) testing results in all products in contact with potable water or otherwise providing an exposure to operations or maintenance personnel.
4. Indicate if there are any special conditions (such as pipe size or pressure rating) for optimal performance of the product. Specify conditions or requirements for optimal performance. Where appropriate, include the engineering data required for proper application of the products. Indicate relevant safety factors, and pressure, temperature, or environmental limits.
5. Are current Company Water technical specifications adequate for inclusion of the product? Are exceptions to the Company specifications being requested?
6. Provide Certifications of Compliance to applicable Company standard specification.
7. Engineering Design Guide. Attach a copy of the Engineering Design Guide or Installation Guide for the proposed product. This document should indicate that it was prepared under the supervision of a Registered Professional Engineer in the state of manufacturer. Should engineering certification not be a part of the standard printed documents, a letter should be provided from the manufacturer that the Engineering Design Guide was prepared under the supervision of a Registered Professional Engineer. The supervising engineer's name, seal registration number and expiration date should be included in either the design guide as the accompanying letter.

8. Client references. Provide names, addresses, phone numbers and job identification of current and past clients. The Company will contact selected references concerning product performance.
9. Copies of tests conducted by independent testing companies showing conformance with industry standard and specification established for the product.
10. Provide information relating to patents licenses and/or franchises held on the product. Include specific description and relevant data such as patent (license) number and date issued.
11. Provide any other related information. Although not required, our application submittal may include other data to assist the committee in evaluating the product for use of Johnson Utilities projects. This information could include brochures, videotapes, product samples, and/or photographs. The Committee cannot be responsible for return of these materials. (One (1) copy of videotapes and product samples is sufficient for committee review.)

JOHNSON UTILITIES LLC
PRODUCT APPROVAL APPLICATION

APPLICATION NUMBER _____
DATE RECEIVED _____
SUBMITTAL COMPLETE _____

(Do not write above this line for Company use only)

ITEM 1. General Information

Product
Name

Representative Company Name

Individual Contract(s)

Street Address

City, State, Zip Code

Telephone _____ Fax _____

E-Mail Address

Manufacturer Company Name

Individual Contract(s)

Street Address

City, State, Zip Code

Telephone _____ Fax _____

E-Mail Address _____

Product Applications (s)

ITEM 2.

Existing Installations of Products

Page _____

Installation Date	Quantity (Size, Diameter, Length)	Location (Include City and County)	Client/Contract Person (Name, Address and Phone Number)	Total Construction Cost	Years in Service