

Pima County Department of Environmental Quality

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Public Water System Plan Review Checklist

Requirements for Approval to Construct Water Projects are found in the Arizona Administrative Code, Title 18, Chapter 5 and Arizona Department of Environmental Quality Engineering Bulletins #10 and #8

The most common plan submission errors are in red

Application

Approval to Construct Water Facilities application (AAC R18-5-505)

- Project Owner's or Acting Agent's information is complete
- Engineer's information is complete
- Application is completely filled out
- Public water system number is correct (this can be obtained from the water company; some water companies have multiple systems)
- The lot numbers requested in the application are shown on the plans and included in the title of the plans
- Project Title is the same as on the title or title block on the construction plans
- Project description describes what type of improvements or replacements the request for approval is for, including what lots will be served

Hydraulic Modeling Report or Capacity Letter

Submit a capacity letter or a Statement from the Water Company/Utility that assures 20 psi will be maintained per Arizona Administrative Code R18-5-502(B) and that there is appropriate storage per R18-5-503 for this project's addition to the water distribution system.

The following water systems are capable of performing their own hydraulic modeling and determining if the minimum pressures and storage are maintained. Therefore, they are permitted to submit a capacity letter rather than a full hydraulic modeling report:

- City of Tucson Water Department
- Oro Valley Water Utility
- Metropolitan Domestic Water Improvement District

A hydraulic modeling report must be submitted for all line extensions that will serve an additional population to the public water system with the exception of the aforementioned water systems that may submit a capacity letter or statement of assurance of pressure and storage.

Design Requirements

An applicant shall design modifications or make additions to Public Water Systems according to [Arizona Administrative Code R18-5-501 through 509](#), [ADEQ Engineering Bulletin #10](#), [Engineering Bulletin #8](#) and may include other approved public water system standards such as [Tucson Water Standard Specifications and Details](#).

- _____ Professional Engineer registered in Arizona has signed and sealed the design report or hydraulic modeling report, unless the total cost of project is less than \$12,500.00 (AAC R18-5-505).
- _____ Design report describes the proposed construction and basis of design, provides design data and other pertinent information that defines the work to be done, and establishes the adequacy of the design to meet the system demands (AAC R18-5-505.B.1.c).

General Criteria That Apply to All Water Projects

- _____ All plans, specifications, and design reports submitted for a public water system shall be prepared by, or under the supervision of, a professional engineer registered in Arizona and have the seal and signature of the engineer affixed to them, except that an engineer not registered in Arizona may design a water treatment plant or additions, modifications, revisions, or extensions, which include extensions to potable water distributions systems, if the total cost of the construction does not exceed \$12,500.00 for material, equipment, and labor, as verified by a cost estimate submitted with the plan documents (AAC R18-5-505.B.2).
- _____ Construction plans specify what design standards will be used for construction (i.e. ADEQ's Engineering Bulletin #10 and/or City of Tucson Water Standards and Specifications). In addition to Engineering Bulletin #10 and City of Tucson's Water Standards, each water utility may have their own standards, which are specific to their utility.
- _____ **The plans have been approved by the water utility and the utility's approval signature and date are on the plans.**
- _____ Construction shall conform to approved plans and specifications. In order to make a change in an approved design that will affect water quality, capacity, flow, sanitary features, or performance, a revised set of plans and specifications shall be submitted to PDEQ for review, together with a written statement regarding the reasons for the change. The public water system shall not proceed with the construction affected by the design change without written approval from PDEQ. Revisions not affecting water quality, capacity, flow, sanitary features, or performance may be permitted during construction without further approval if the changes are documented on the As-built drawings (AAC R18-5-506).
- _____ Pipes, fittings, valves, fire hydrants, and other appurtenances conform to the current standards of the American Water Works Association, the American Standards Association, or the Federal Government. In addition, plastic pipes and fittings bear the seal of the National Sanitation Foundation (Bulletin #10, Chapter 7.B.8).
- _____ **Invert elevations of the water and sewer lines and/or reclaimed water lines are given at all locations where they cross or are within 6 feet horizontally of each other (including fire hydrant lines).**
- _____ **An Approval to Construct becomes void if an extension of time is not granted by PDEQ within 90 days after the passage of one of the following:**
 - 1. Construction does not begin within one year after the date the Approval to Construct is issued,**
 - 2. There is a halt in construction of more than one year, or**
 - 3. Construction is not completed within three years after the date construction begins (AAC R18-5-505.E).**

Distribution or Line Extensions

- _____ Water line extensions are designed to maintain 20 psi at ground level at all points in the distribution system under all conditions of flow (AAC R18-5-502.B).
- _____ **The water main is not placed 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 encasing both the water and sewer mains in at least 6 inches of concrete for at least 10 feet beyond the crossing (AAC R18-5-502.C.1.a).

- _____ The water main is not placed within 2 feet horizontally and 2 feet below the sewer main (AAC R18-5-502.C.1.b).
- _____ The water main does not pass through or come into contact with any part of a sewer manhole and the minimum horizontal separation between water mains and manholes is 6 feet, measured from the center of the manhole (AAC R18-5-502.C.2).
- _____ Minimum separation between force mains and water mains is 2 feet vertically and 6 feet horizontally under all conditions (AAC R18-5-502.C.3).
- _____ 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 (AAC R18-5-502.C.3).
- _____ Minimum separation between reclaimed water lines and potable water lines is two feet vertically and six feet horizontally unless the reclaimed water line is encased in at least six inches of concrete or constructed of mechanical joint ductile iron pipe for at least 10 feet beyond any point on the reclaimed water line within the specified minimum separation distance (AAC R18-9-602.F.2 and 3).
- _____ Water pipe fittings, including tees and elbow joints, have the appropriate thrust blocks or have mechanically restrained joints (Bulletin #10, Chapter 7.C.7).
- _____ Water mains serving fire hydrants are at least 6 inches in diameter and have an isolation valve (Bulletin #10, Chapter 7.C.3 and D.1).
- _____ Water lines smaller than 6 inches have not exceeded the following: (Bulletin #10, Chapter 7.C.3)

I.D. Size	Dead-ended	Circulating
2 inch.....	300 feet.....	600 feet
3 inch.....	500 feet.....	1000 feet
4 inch.....	1300 feet.....	2600 feet
- _____ Depth of pipe is not less than 3 feet, unless adequate structural protection is provided.
- _____ Mechanically restrained ductile iron pipe can be used for additional structural protection (Bulletin #10, Chapter 7.C.4).
- _____ **Dead end lines have the appropriate blowoff valves, hydrants, or other suitable means of flushing the line. Any dead end line which is greater than 10 feet in length shall have a suitable means of flushing the dead end (Bulletin #10, Chapter 7.C.6).**
- _____ Shutoff valves are shown in appropriate locations. Minimum number and valve separation are shown below: (Bulletin #10, Chapter 7.D.1)
 - Valves are to be located at not more than 500 foot intervals in commercial districts.
 - Valves are to be located at not more than 800 foot intervals or one block, whichever is the lesser distance in other districts.
 - Tee intersections have 2 shutoff valves.
 - Cross intersections have 3 shutoff valves.
 - Valves are provided to allow shut-off of lines on either side of streams, railroads, and major highways.
 - Each hydrant branch has a valve.
- _____ **Air and vacuum relief valves are located at appropriate high points in the distribution or transmission system (Bulletin #10, Chapter 7.D.3).**
- _____ Water lines, 12 inches and greater in diameter, have both a plan and a profile view shown on the plans (Bulletin #10, Chapter 1.E.2.b).
- _____ Water mains are designed for a minimum internal working pressure of 150 pounds per square inch plus allowances for water hammer (Bulletin #10, Chapter 7.C.2).

Minimum cover of water line is not less than 2 feet below the scour level in washes, streams or rivers and valves are provided at both ends of the water crossings. Provide scour level on plans or in the design report (Bulletin #10, Chapter 7.G.2).

Booster Pumps

- _____ Maximum number of pump cycles is less than 6 times per hour if possible. Normal pump cycling is in the range of 2 to 6 times per hour (Bulletin #10, Chapter 3.A.1).
- _____ Capacity-head curves are shown in design report to ensure the pump can produce required flow against system pressures (Bulletin #10, Chapter 3.A.1).
- _____ Pump bypass installed if required (Bulletin #10, Chapter 3.D).
- _____ Adequate controls are in place for the operation of pumps (Bulletin #10, Chapter 3.C.9).
- _____ Provide a minimum of 2 pumps, each capable of delivering the required flow while maintaining minimum system pressure (Bulletin #10, Chapter 3.C.1).
- _____ Means shall be provided to prevent backflow through the pump (Bulletin #10, Chapter 3.C.4).
- _____ Accessible shut-off valves of appropriate type installed on discharge and suction lines of each pump (Bulletin #10, Chapter 3.C.4).
- _____ Pressure and vacuum relief equipment are provided where needed (Bulletin #10, Chapter 3.C.5).
- _____ Pressure gauge is present on pump discharge line. If the water is pumped directly to a hydropneumatic tank, the pressure gauge on the hydropneumatic is sufficient (Bulletin #10, Chapter 3.C.7).
- _____ Pump is mounted on a solid concrete foundation (Bulletin #10, Chapter 3.A.2).
- _____ Pump foundation is a minimum of 1 foot above a 100-year flood level or protected to such an elevation (Bulletin #10, Chapter 3.B).
- _____ Security shall be provided for pumping stations either by locked doors, or by 6 foot high security fencing with locked gates (Bulletin #10, Chapter 3.E).
- _____ Electrical controls shall be located above grade and housed in NEMA approved enclosures (Bulletin #10, Chapter 3.C.9).

Hydropneumatic Tanks

- _____ All hydropneumatic tanks shall be designed and constructed in accordance with the current requirements of the American Society of Mechanical Engineer's (ASME) Code for Unfired Pressure Vessels, Section VIII, Division 1 (Bulletin #10, Chapter 5.C.1).
- _____ Tank is sized such that the system can supply instantaneous demand for a minimum of 20 minutes. Instantaneous demand is determined from Table 3, Tabulated Maximum Instantaneous Flows (Bulletin #10, Chapter 5.C.2).
- _____ Show the type or means of adding air to the pressure tank. Air must be supplied to hydropneumatic tanks to replace air loss in the tank due to leakage and air absorbed into the water (Bulletin #10, Chapter 5.C.5).
- _____ The hydropneumatic tank shall be equipped with easily visible pressure gauge showing instantaneous pressure in the tank (Bulletin #10, Chapter 5.D.1).
- _____ A pressure relief valve shall be provided on all hydropneumatic tanks. The valves shall be set to open at the greater of the maximum allowable pressure rating for the equipment, or 80% of the rated working pressure of the tank. The orifice opening of the valve should be large enough to discharge all or most of the capacity of the pumps. If a smaller valve is chosen then it must be placed on the top of the tank to ensure the air is released first (Bulletin #10, Chapter 5.D.2).
- _____ An air relief valve shall be provided in all air-charging pneumatic systems. The air relief valve shall be located at the low water level setting of the tank, unless alternative design concepts are provided (Bulletin #10, Chapter 5.D.3).

- _____ All hydropneumatic tanks shall have a water level indicator or sight glass (Bulletin #10, Chapter 5.D.4).
- _____ All hydropneumatic tanks shall be equipped with a drain valve (Bulletin #10, Chapter 5.D.5).
- _____ Hydropneumatic tanks shall be equipped with liquid level controls that will not allow the tank to be drawn down to 10% capacity. Hydropneumatic tanks designed to serve any public water system shall have controls necessary to maintain pressure in the distribution system (Bulletin #10, Chapter 5.D.4).

Storage Tanks or Reservoirs

- _____ Steel storage tank construction shall follow the current AWWA Standard D100 (Bulletin #10, Chapter 6.C).
- _____ Storage tanks shall be placed above the 100-year flood level or protected from a 100-year flood (Bulletin #10, Chapter 6.E.1.a).
- _____ Storage tank has a watertight roof which excludes birds, animals, insects, and excessive dust (Bulletin #10, Chapter 6.E.2).
- _____ Storage tanks are secured by a 6-foot fence, locks on access manholes or have other necessary precautions to prevent trespassing or vandalism (Bulletin #10, Chapter 6.E.3).
- _____ Provisions are made to permit complete isolation and drainage while maintaining service to the system (Bulletin #10, Chapter 6.E.4).
- _____ Storage tank has adequate bedding or foundation commensurate with the soil bearing properties (Bulletin #10, Chapter 6.E.5).
- _____ Overflow pipe extends 12 to 24 inches above the ground surface (Bulletin #10, Chapter 6.E.6).
- _____ Overflow pipe is screened with 16-mesh non-corrodible screen or has a flapper valve (Bulletin #10, Chapter 6.E.6).
- _____ Overflow pipe is of sufficient diameter to permit waste equal to or in excess of the filling rate (Bulletin #10, Chapter 6.E.6).
- _____ Water level indicating device is provided (Bulletin #10, Chapter 6.E.7).
- _____ Adequate water level controls are provided (Bulletin #10, Chapter 6.E.7).
- _____ Roof access hatches are framed and the frame is at least 4 inches above the roof surface. Hatch cover is watertight and extends down around the frame at least 2 inches. Hatch cover is hinged on one side and has a locking device (Bulletin #10, Chapter 6.E.8).
- _____ Storage tank is vented (overflows are not considered vents) and must prevent the entrance of rainwater, birds, animals, insects, and excessive dust. 16-mesh non-corrodible screen may be used for insect protection (Bulletin #10, Chapter 6.E.9).
- _____ Roof and sidewalls are watertight with no openings except properly constructed vents, manholes, overflows, risers, drains, control parts, or piping for inflow and outflow (Bulletin #10, Chapter 6.E.10).
- _____ Storage tank is equipped with interior and exterior ladders, ladder guards, and balcony railings (Bulletin #10, Chapter 6.E.12).
- _____ Area is graded to prevent surface water from ponding within 100 feet of the storage tank (Bulletin #10, Chapter 6.E.14).
- _____ Interior protection of metal storage tanks shall be by painting and/or cathodic protection and shall be in accordance with the current AWWA Standard D102 (Bulletin #10, Chapter 6.E.17).

Wells or New Sources

- _____ A copy of the “Notice of Intent to Drill” is included with the application for Approval to Construct Water Facilities (Bulletin #10, Chapter 2.E.1).

- _____ A copy of the “Report of Well Driller” is included with the application for Approval to Construct Water Facilities (Bulletin #10, Chapter 2.E.3).
- _____ A copy of the well pumping tests is included with the application for Approval to Construct Water Facilities (Bulletin #10, Chapter 2.E.3).
- _____ A copy of new source analyses is included with the application for Approval to Construct Water Facilities. Analysis shall include Physical analysis, Radiochemical analysis, Inorganic chemicals analysis, Synthetic organic chemical analysis, Volatile organic chemical analysis, Asbestos analysis, and Microbiological analysis (AAC R18-5-505.B.1.d).
- _____ Well site has adequate drainage shown on the construction plans and is not within a 100-year flood plain (Bulletin #10, Chapter 2.E.6 and AAC R18-5-501).
- _____ Termination of upper well casing pipe is not less than 12 inches above the slab or the top of the pedestal is not less than 12 inches above adjacent ground (Bulletin #10, Chapter 2.E.8).
- _____ The slab extends a minimum of 3 feet from the center of the well, is a minimum of 6 inches thick, and slopes away from the well a minimum of ¼ inch per foot (Bulletin #10, Chapter 2.E.9 and Chapter 3.G.3).
- _____ The annular space outside the casing is filled with suitable grouting or sealing materials and shall be a minimum of 1 ½ inches thick and have a 10 foot minimum depth below the top of the slab (Bulletin #10, Chapter 2.E.9 and 13).
- _____ Well site is secured by a 6-foot fence or has other necessary precautions to prevent trespassing or vandalism (Bulletin #10, Chapter 2.E.18).
- _____ A foot valve is provided when necessary (Bulletin #10, Chapter 3.G.1).
- _____ An air release valve is provided between the pump and the check valve when necessary (Bulletin #10, Chapter 3.G.1).
- _____ An inverted check valve is installed between the pump and the check valve when necessary (Bulletin #10, Chapter 3.G.1).
- _____ A sampling tap is installed on the system side of the check valve (Bulletin #10, Chapter 3.G.1).
- _____ Well vent is installed, which terminates at least 2 feet above the protective slab, opening is turned down, and covered with #16 mesh screen (Bulletin #10, Chapter 3.G.2).
- _____ Well has an approved sanitary well seal that prevents water and dust from entering the well casing (Bulletin #10, Chapter 3.G.3).
- _____ Setback requirements to septic systems, sewer conveyance systems, and Aquifer Permit Protection discharge activities have been met (AAC R18-5-502.D).

Instructions for Approval of Construction (following completion of construction)

_____ The following forms shall be submitted to obtain an Approval of Construction:

- Engineer’s Certificate of Completion
- Water Line Test Documentation Sheet
 - Includes results of pressure, chlorination, and microbiological testing

Upon review, and after approval, PDEQ will issue an Approval Of Construction (AOC), which allows the constructed project to be operated.

[Arizona Administrative Code R18-5-501 through 50](#)

[ADEQ Engineering Bulletin #10](http://www.azdeq.gov/function/compliance/download/eb10.pdf) (http://www.azdeq.gov/function/compliance/download/eb10.pdf)

[ADEQ Engineering Bulletin #8](http://www.azdeq.gov/function/compliance/download/eb8.pdf) (http://www.azdeq.gov/function/compliance/download/eb8.pdf)

[Tucson Water Standard Specifications and Details](https://www.tucsonaz.gov/water/spec-book) (https://www.tucsonaz.gov/water/spec-book)