CHAPTER 4

4.000 WATER

4.010 General

A. Any extension of the Airway Heights Water System must be approved by the Public Works Department and the Airway Heights Fire Chief and all extensions must conform to the WSDOH Water System Design Manual and the Coordinated Water System Plan, City of Airway Heights Comprehensive Water Plan, 1995, or most recent revision. In the event of any conflict between this document and the Comprehensive Water Plan, the Comprehensive Water Plan will govern.

B. In designing and planning for any development, it is the developer's responsibility to see that adequate water for both domestic use and fire protection is attainable. The developer must show in the proposed plans how water will be supplied and whether adequate water pressure will be attained in case of fire. An analysis of the system may be required if it appears that the system might be inadequate. Any additions to the City's water system which is needed for a development's approval will be made at the developer's expense. Any facility upgrade in excess of what is needed for the development at the City's request may be eligible for a latecomer's agreement.

C. Anyone who wishes to extend or connect to the City's water system should contact the Public Works Department for a water extension/connection fee estimate. This fee estimate is an estimate of the costs due the City for a waterline extension or connection. A copy of the fee schedule may be found Appendix. A.

D. Anyone outside the City limits who wishes to extend to the City's water system shall submit a written request to the City to be forwarded for the City Council's consideration. In addition to the City's review other approvals by affected state, county and municipal agencies will be required for an extention to be granted.

E. Prior to the release of any water meters, all Public Works improvements must be completed and approved including granting of right-of-way or easements, and all applicable fees must be paid, or a mutually agreed upon time frame for such as determined by the Public Works Director.

4.020 Design Standards

A. The design of any water extension/connection shall conform to City standards and any applicable standards as set forth herein and in Sections 1.010 and 1.040. The layout of extensions shall provide for the future continuation and/or "looping" of the existing system as determined by the City. In addition, main extensions shall be extended as required in Section 1.130.

B. The General Notes on the following page shall be included on any plans dealing with water system design.

GENERAL NOTES (WATER MAIN INSTALLATION)

A. All workmanship and material shall be in accordance with City of Airway Heights Standards and the most recent edition of the State of Washington Standard Specifications for Road, Bridge, and Municipal Construction.

B. A preconstruction meeting shall be held with the City prior to the start of construction.

C. Water mains shall be constructed of AWWA C-900 Class 150 PVC or AWWA C-151 Class 50 ductile iron with AWWA C-104 cement mortar lining. AWWA approved.

D. Gate valves shall be resilient wedge, NRS (Non Rising Stem) with O-ring seals. Valve ends shall be mechanical joint or ANSI flanges. Valves shall conform to AWWA 509-80. Existing valves to be operated by City employees only.

E. Hydrants shall be Mueller, American Darling. Hydrants shall be bagged until system is approved.

F. All lines shall be disinfected and tested in conformance Section 4.180.

G. All pipe and services shall be installed with continuous tracer tape installed 12" to 18" under the final ground surface.

H. Provide traffic control plan(s) as required in accordance with MUTCD.

I. All water mains shall be staked for grades and alignment by an engineering or surveying firm capable of performing such work.

J. Call Underground Locate at 1-509-456-8000 a minimum of 48 hours prior to any excavations.

K. Where connections required field verification, connection points will be exposed by contractor and fittings verified 48 hours prior to distributing shutdown notices.

L. At any connection to an existing line where a new valve is not installed, the existing valve must be pressure tested to City standards prior to connection. If an existing valve fails to pass the test, the contractor shall make the necessary provisions to test the new line prior to connection to the existing system or install a new valve.

M. When fire flow will be interrupted, the Airway Heights Fire Chief and Spokane County Fire District No. 10 shall be given 24 hours notice of time period and locations affected.

4.030 Main Line

A. Water mains shall be sized to provide adequate domestic service plus fire flow at the required residual pressure. Fire flow requirements will be determined by the Airway Heights Fire Chief, however, the quantity of water required will in no case be less than 750 GPM at 20 psi residual pressure for a period of 45 minutes for a single family residence.

The minimum water main size shall be 8 inches diameter as long as fire flow requirements can be met. Larger size mains are required in specific areas outlined in the Coordinated Water System Plan. Nothing shall preclude the City from requiring the installation of a larger sized main in areas not addressed in the Coordinated Water System Plan if the City determines a larger size is needed to meet fire protection requirements or for future service.

No dead end 8-inch main shall be longer than 1200 lineal feet.

B. All pipe for water mains shall have flexible gasketed joints and shall comply with one of the following types:

Ductile Iron Pipe: Ductile iron pipe shall conform to AWWA C-151 Class 52 and have a cement mortar lining conforming to AWWA C-104. All pipes shall be joined using non-restrained joints which shall be rubber gaskets, push on type or mechanical joint, conforming to AWWA C-111.

PVC Pipe: All PVC pipe shall conform to the latest revision of the following specifications:

Four inch through 12-inch pipe shall meet AWWA C-900 or ASTM 2241 Class 150 standards. Fourteen inch through 20-inch pipe shall meet AWWA C-905 Class 235 standards.

C. All fittings for ductile iron pipe or PVC pipe shall be ductile iron compact fittings conforming to AWWA C-153 or Class 250 Gray Iron conforming to AWWA C-110 and C-111. All shall be cement mortar lined conforming to AWWA C-104. Plan end fittings shall be ductile iron if mechanical joint retainer glands are installed on the plain ends. All fittings shall be connected by flanges or mechanical joints.

D. All pipe and services shall be installed with continuous tracer tape installed 12 to 18 inches under the final ground surface. The marker shall be plastic non-biodegradable, metal core or backing marked “water” which can be detected by a standard metal detector. Tape shall be Terra Tape "D" or approved equal. In addition to tracer tape, install 14 gauge coated copper wire, taped to the top of pipe, brought up and tied off at valve body.

E. The minimum cover for all water mains from top of pipe to finish grade shall be 54 inches unless otherwise approved.

4.040 Connection to Existing Water Main

The developer's engineer shall be responsible for determining the scope of work for connection to existing water mains.

It shall be the Contractor's responsibility to field verify the location and depth of the existing main and the fittings required to make the connection to the existing mains.

Tapping existing water mains will be permitted provided the tap is one nominal pipe size smaller than the main being tapped. Size on size taps may be permitted by the City Engineer.

4.050 Service Interruption

The contractor shall give the City Public Works and the Airway Heights Fire

Department a minimum of 48 hours notice of any planned connection to an existing pipeline. This includes all cut-ins and live taps. Notice is required so any disruptions to existing services can be scheduled. The City will notify customers involved or affected of the water service interruption. The contractor shall make every effort to schedule water main construction with a minimum interruption of water service. In certain situations, the City may dictate scheduling of water main shutdowns so as not to impose unnecessary shutdowns during specific periods to existing customers.

4.060 Hydrants

A. The lead from the service main to the fire hydrant shall be C-900 or Class 50 ductile iron no less than 6 inches in diameter. The lead shall originate from no less than an 8-inch pipe.

B. Fire Hydrants shall have two 2-1/2 inch outlets and one 4-1/2 inch pumper port outlet, with 5" Storz Fitting. All outport threads shall be National Standard thread. The valve opening shall be 5-1/4 inch diameter. The hydrant shall have a positive and automatic barrel drain and shall be of the "safety" or breakaway style. Fire hydrants shall be painted “safety yellow”.

   All hydrants shall be bagged until system is approved.

C. The Public Works Department and Airway Heights Fire Chief shall work together to insure that adequate hydrant spacing and installation are achieved.

   Unless otherwise required by the governing authority, the following guidelines shall apply for hydrant number and location:

   1. At least one hydrant shall be installed at all intersections.

   2. Hydrant spacing shall be required in accordance with the following schedule.

Type of Development	Hydrant Spacing
Subdivisions & Short Subdivisions - Limited to Single Family Dwellings	600 ft.
Multiple Dwelling - Low Density Twelve or Less Units Per Acre	500 ft.

Commercial & Multiple Dwelling High Density - More than Twelve Units/acre	400 ft.
Industrial, Hospitals, Shopping Centers Schools, areas of more than 20 Commercial Establishments	300 ft.

Spacing shall be measured to the pathway required for the City of Airway Heights Fire Department to lay the fire hose. This spacing shall be determined by the Airway Heights Fire Chief.

Where possible, hydrants shall be located at street intersections, except that in no event shall any hydrant be more than three hundred (300) feet from the center of the frontage of any lot except on dead-end cul-de-sacs with dwellings only. When the dead-end cul-de-sac exceeds six hundred (600) feet from the center of the intersection to the end of the cul-de-sac, a hydrant shall be located at the intersection and additional hydrant(s) will be required. The hydrant(s) shall be located three hundred (300) feet from the center of the frontage from the last lot on the cul-de-sac, and shall comply with the maximum spacing requirements listed above.

3. When any portion of a proposed building is in excess of 150 feet from a water supply on a public street, on-site hydrants shall be required and the main service line shall be equipped with a Double Check Detector Assembly, placed in a vault at the property line as shown in Detail Drawing 4-15. Such hydrants shall be located per Airway Heights Fire Department.

D. Fire hydrants shall be set as shown in Detail Drawing 4-01.

E. For requirements regarding use, size and location of a fire department connection (FDC) and/or post indicator valve, contact the Airway Heights Fire Chief. Location of FDC shall be shown on water plans.

F. Where needed, the Public Works Department or the Airway Heights Fire Chief may require hydrants to be protected by two or more posts, each six inches in diameter by five feet in height made of steel and filled with concrete. (See Detail Drawing 4-13)

G. Fire hydrants must be installed, tested, and accepted prior to the issuance of a building permit in new subdivisions and short plats. Fire hydrants must be installed, tested, and accepted prior to bringing combustible materials on to the site for other developments.

4.070 Valves

All valves and fittings shall be ductile iron with ANSI flanges or mechanical joint ends. All existing valves shall be operated by City employees only.

Valves shall be installed in the distribution system at sufficient intervals to facilitate system repair and maintenance, but in no case shall there be less than one valve every 1000 feet. Generally, there shall be two valves on each tee and three valves on each cross. Specific requirements for valve spacing will be made at the plan review stage.

A. Gate Valves, 6 inch to 12 inch. The design, materials, and workmanship of all gate valves shall conform to AWWA C-509. Gate valves shall be resilient wedge non-rising stems (NRS) with two internal O-ring stem seals. Gate valves shall be Mueller, M&H Style 4067, Kennedy, Clow R/W or American Flow Control Series 500.

   Gate valves shall be used on all 6 to 12 inch lines.

B. Butterfly Valves. Butterfly valves shall conform to AWWA C-504, Class 150B, with cast iron short body and O-ring stem seals. Butterfly valves shall be Mueller, Linseal Lineseal III, Kennedy Style 4500, Pratt Ground hog, or Allis Chalmers.

   Butterfly valves shall be used on all lines 14 inches and larger.

C. Valve Box. All valves shall have a standard Inland Foundry, Airway Heights valve box set to grade with a 6 inch ASTM 3034 SDR 35 PVC riser from valve to within 4 to 6 inches of valve box top. If valves are not set in paved area, a 3-foot by 3-foot by 4-inch concrete pad shall be set around each valve box at finished grade. In areas where valve box falls in road shoulder, the ditch and shoulder shall be graded before placing asphalt or concrete pad. See sDrawing Drawing 4-09.

4.080 Casing

Steel casing pipe shall be schedule 20 steel or equal. Pipe spacers shall be Cascade style CC5 with 8-inch runners as available from Cascade Waterworks or equivalent vendor. Casing pipe and spacers shall be sized for pipe being installed. Install minimum of three spacers per section of pipe.

4.090 Air and Vacuum Release Valve

Air and vacuum release valves shall be APCO 145C combination air release valves. Installation shall be as shown on standard drawings 4-17 and 4-18.

The installation shall be set at the high point of the line when required. Where possible, pipes are to be graded to prevent the need for an air release valve. Air release valves may not be required when services are in the vicinity.

4.100 Blowoff Assembly

If a fire hydrant is not located at the end of a dead end main, a blowoff assembly shall be required. On water mains which will be extended in the future, the valve which operates the blowoff assembly shall be the same size as the main and provided with a concrete thrust block. The pressure rating for blowoff assemblies shall be 200 psi. Installation shall be as shown on Detail Drawings 4-10 through 4-12.

4.110 Backflow Prevention

All water system connections to serve buildings or properties with domestic potable water, multiple water supply sources, fire sprinkler systems, on site hydrants or irrigation systems shall comply with the minimum backflow requirements as established by the AWWA Cross Connection Control Manual, Department of Health and the City of Airway Heights.

The installation of all backflow devices is required to protect the existing water system and users from possible contamination. All backflow devices must be inspected and approved by a certified backflow device tester prior to use. Test results shall be submitted to the City.

The City shall have the authority to inspect all backflow preventive devices connected to the City's water system. Backflow prevention devices shall be tested yearly by individuals with State Certification; written certification shall be forwarded to the City of Airway Heights Public Works Department annually with a filing fee as specified in the latest adopted Resolution as adopted by Council.

4.120 Service Connection

A. All service connections relating to new development shall be installed by the developer at the time of mainline construction. After the lines have been constructed, tested and approved, the owner may apply for a water

meter. The City will install a water meter after the application has been made and all applicable fees have been paid. Water meters will be set only after system is inspected, approved and a final grade has been established.

B. When water is desired to a parcel fronting an existing main but not served by an existing service line, an application must be made to the City. Upon approval of the application and payment of all applicable fees, the City will tap the main, and install the saddle, service line, corp stop, stop/waste, setter, box, and meter. If shut off valve is provided at the home stop and waste and related materials will not be required.

C. Service lines shall be one inch high density polyethylene pipe, minimum pressure class 200 psi, Phillips Drisco 5100 Ultra-Line, galvanized or copper pipe. No glued joints will be accepted. Service lines shall be installed 90 degrees off the main. Tracer tape and wire wrapped around the pipe shall be installed on all service lines.

Service saddle shall be all bronze with stainless steel double straps and shall be Romac style 202S, or approved equal. All clamps shall have rubber gasket and iron pipe threaded outlets.

Corporation stop shall be all bronze and shall be Ford type F1101 or approved equal with iron pipe threads conforming to AWWA C-800. Stainless steel inserts shall be used with pack joints and polyethylene pipe.

D. Master meters will not be allowed for service to more than one per building. An approved backflow prevention system must be installed in conjunction with any master meter. Deviations to this may be granted by the Public Works Director.

4.125 Marking Service Lines

The location of all service lines shall be marked on the face or top of the cement curb with a "W."

4.130 Water Main/Sanitary Sewer Crossings

The Contractor shall maintain a minimum of 18 inches of vertical separation between sanitary sewers and water mains. The minimum cover for water main of 54 inches may be reduced to 36 inches upon approval by the City to provide for as much vertical separation as possible. The water line should always pass over the sewer line.

The longest standard length of water pipe shall be installed so that the joints will fall equidistant from any sewer crossing. In some cases where minimum separation cannot be maintained, it may be necessary to encase the water pipe and/or sewer service in pipe or concrete. No concrete shall be installed unless specifically directed by the City.

4.140 Irrigation

All irrigation systems shall be installed with an approved backflow prevention assembly listed in the most recent version of the "Backflow Prevention Assemblies Approved for Installation" by the Washington State Department of Health.

Irrigation sprinklers shall be situated so as to not wet any public street or sidewalk.

4.150 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed by the State of Washington.

A preconstruction meeting shall be held with the City prior to commencing staking. All construction staking shall be inspected by the City prior to construction.

The minimum staking of waterlines shall be as follows:

A. Stake centerline alignment every 25 feet (50 feet in tangent sections) with cuts and/or fills to bottom of trench maintaining 54 inches of cover over pipe. Centerline cuts are not required when road grade is to finished subgrade elevation.

B. Stake location of all fire hydrants, hydrant flange elevations, tees, water meters, setters and other fixtures with cut or fill to finished grade.

4.160 Trench Excavation

A. Clearing and grubbing where required shall be performed within the easement or public right-of-way as permitted by the City and/or governing agencies. Debris resulting from the clearing and grubbing shall be

disposed of by the owner or contractor in accordance with the terms the permits.

B. Trenches shall be excavated to the line and depth designated by the City to provide a minimum of 54 inches of cover over the pipe, as shown in Detail Drawing 4-06. Except for unusual circumstances where approved by the City, the trench sides shall be excavated vertically and the trench width shall be excavated only to such widths as are necessary for adequate working space as allowed by the governing agency. The trench shall be kept free from water until joining is complete. Surface water shall be diverted so as not to enter the trench. The owner shall maintain sufficient pumping equipment on the job to insure that these provisions are carried out.

C. The contractor shall perform all excavation of every description and whatever substance encountered and boulders, rocks, roots, and other obstructions shall be entirely removed or cut out to the width of the trench and to a depth 6 inches below water main grade. Where materials are removed from below water main grade, the trench shall be backfilled to grade with material satisfactory to the City and thoroughly compacted.

D. Trenching and shoring operations shall not proceed more than 100 feet in advance of pipe laying without approval of the City and shall be in conformance with Washington Industrial Safety and Health Administration (WISHA) and Office of Safety and Health Administration (OSHA) Safety Standard.

E. The bottom of the trench shall be finished to grade with hand tools in such a manner that the pipe will have bearing along the entire length of the barrel. The bell holes shall be excavated with hand tools to sufficient size to make up the joint.

4.165 Thrust Blocking

Location of thrust blocking shall be shown on plans. Thrust block concrete shall be Class 3000 poured against undisturbed earth. A plastic barrier shall be placed between all thrust blocks and fittings.

See Detail Drawings 4-19 and 4-20 for thrust block locations and calculations.

4.170 Backfilling

Backfilling and surface restoration shall closely follow installation of pipe so

that not more than 100 feet is left exposed during construction hours without approval of the City. Selected backfill material shall be placed and compacted around and under the water mains by hand tools to a height of 12 inches above the top of the water main. The remaining backfill shall be compacted to 95 percent of the maximum density in traveled areas, 90 percent outside traveled area. Where governmental agencies other than the City have jurisdiction over roadways, the backfill and compaction shall be done to the satisfaction of the agency having jurisdiction. If suitable backfill material, as determined by the City, is not available from trenching operations, the City may order the placing of bedding conforming to 9-30.7A around the water main and gravel base conforming with Section 9-30.7(3) of the Standard Specifications for backfilling the trench.

4.175 Street Patching and Trench Restoration

See Chapter 2B.170 and 2B.180 for requirements regarding street patching and trench restoration.

4.180 Testing and Disinfection

The water main pipes shall be disinfected and tested before being placed in service. Water for testing and disinfecting shall be obtained by the developer by arrangement with the City. All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test shall be furnished, installed and operated by the developer. Feed for the pump shall be from a barrel or other container, wherein the actual amount of "makeup" water can be measured periodically during the test period. The section to be disinfected shall be thoroughly flushed at maximum flow prior to chlorination.

The pipeline shall be backfilled sufficiently to prevent movement of the pipe under pressure. All thrust blocks shall be in place and time allowed for the concrete to cure before testing. Where permanent blocking is not required, the developer shall furnish and install temporary blocking.

The pipeline shall be subjected to hydrostatic pressure test of 200 pounds per square inch (200 psi) for a period of not less than fifteen (15) minutes for all lines. All tests shall be made with the hydrant auxiliary gate valves open and pressure against the hydrant valve. Hydrostatic tests shall be performed on every complete section of water main between two valves, and each valve shall withstand the same test pressure as the pipe with no pressure active in the section of pipe beyond the closed valve.

In addition to the hydrostatic pressure test, a leakage test shall be conducted on the pipeline. The leakage test shall be conducted at one hundred fifty pounds per square inch (150 psi) for a period of not less than two (2) hours. The quantity of water lost from the main shall not exceed the number of gallons per hour determined by the formula:

$$L = \frac{ND(P)^{0.5}}{7{,}400}$$

in which:
- L = allowable leakage, gallons/hour
- N = number of joints in the length of pipeline tested
- D = nominal diameter of the pipe in inches
- P = average test pressure during the leakage test, psi

Defective materials or workmanship, discovered as a result of the tests, shall be replaced. Whenever it is necessary to replace defective material or correct the workmanship, the tests shall be rerun at the developer's own expense, until a satisfactory test is obtained.

The pipe shall also be disinfected when being tested. As each length of pipe is laid, calcium hypochlorite or other disinfecting agent, having an available chlorine content of about sixty-five (65) percent shall be placed in the pipe in sufficient quantities to give a dosage of about fifty (50) parts per million available chlorine, calculated on the volume of water which the pipe will contain.

The disinfectant may be placed in the upstream or high pressure end of the pipe. The following table shows the amount of high-test calcium hypochlorite, which should be used in each twenty- (20) foot length of pipe of various sizes:

PIPE SIZE (Inside Diameter in Inches)	**HIGH TEST HYPOCHLORITE REQUIRED** (Ounces per 20-foot length to give 50 ppm available chlorine)
2, 3, 4 & 6	0.4
8	0.7
10 & 12	1.0
16	2.0

The calcium hypochlorite or other disinfecting agent used for this purpose shall

be furnished by the developer.

When the line is complete and ready to disinfect, water shall be allowed to flow in slowly so not to displace the chlorine agent, until it appears at the far end of the line. The system shall then be flushed through the fire hydrants or into the next section, until a test shows no more than 0.2 parts per million available chlorine. If any of the materials need to be replaced, the line shall again be disinfected and tested. The line may be pressure tested at the same time it is disinfected.

The water system will not be acceptable to the City until receipt of a satisfactory report from the County or State Department of Health on water samples submitted to that office for bacteriological analysis. Should the initial treatment result in an unsatisfactory bacteriological test, the original chlorination procedure shall be repeated by the contractor until satisfactory results are obtained. Testing and sampling shall take place after all underground utilities are installed and compaction of the roadway section is complete.

4.190 Inspection of Work

In no event shall the work or any portion thereof, be covered up until the Construction Inspector has completed inspection and approved the same. If any work should be covered up without prior inspection and approval by the Construction Inspector, it must, if required by the Public Works Director, be uncovered for examination at the developer/contractor's expense. The Construction Inspector shall at all times have access to the work wherever it is in preparation of progress and the developer/contractor shall provide facilities for such access and for such inspection.

The developer/contractor shall make such reasonable tests of the work, at their expense, as the Public Works Director shall request. If the specifications, laws, ordinances, or any public authority shall require any work to be specially tested or approved, the Construction Inspector shall be given timely notice of its readiness for inspection and, if the inspection is by other authority than the City, the date fixed for such inspection. All inspections by the Construction Inspector will be made with all reasonable promptness, but in no event shall the lack of prompt inspections be construed to allow the cover up of the work or any portion of it without inspection. Re-examination of questioned work may be ordered by the Public Works Director and, if so ordered, the work must be uncovered by the developer/contractor. If such work be found in accordance with the contract documents, the City shall pay the cost of re-examination and replacement. If such work be found not in accordance with the contract documents, the contractor/developer shall pay such cost.

LIST OF DRAWINGS

CHAPTER 4 - WATER

TITLE	DRAWING
Typical Fire Hydrant….	4 - 01
5/8" Dual Meter Service	4 - 03
1" Single Meter Service	4 - 04
1 ½ or 2” single meter service	4 - 05
Water Main Depth Requirements	4 - 06
Ductile Iron Water Main Trench Section	4 - 07
Connection to Existing Main	4 - 08
Standard Valve Box…..	4 - 09
2" Blow-Off Assembly	4 - 10
In-Line Blow-Off Assembly	4 - 11
End-Line Blow-Off Assembly	4 - 12
Hydrant Bollard……..	4 - 13
Double Check Detector Valve	4 - 15
Reduced Pressure Backflow Preventer	4 - 16
1" Air and Vacuum Release Assembly	4 - 17
2" Air and Vacuum Release Assembly	4 - 18
Thrust Loads…….	4 - 19
Standard Blocking Details	4 - 20