
CHAPTER 5

5.000 SANITARY SEWER

5A GENERAL CONSIDERATIONS

5A.010 General

Sanitary sewerage refers to wastewater derived from domestic, commercial and industrial pretreated waste to which storm, surface, and ground water are not admitted.

Any extension of Airway Heights' sanitary sewer system must be approved by the Public Work Department and must conform to the City of Airway Heights' Comprehensive Sanitary Sewer Plan, Spokane County Health Department, Department of Ecology (DOE), and Department of Health (DOH) requirements.

Anyone who wishes to extend or connect to the City's sewer system shall contact the Public Work Department for a sewer extension/connection fee estimate of the costs due the City for a sewer extension or connection. A copy of the estimate form may be found in the Appendix A.

Anyone outside the City limits who wishes to extend to the City's sewer system shall submit a written request to the City Administrator to be forwarded for the City Council's consideration.

Prior to the release of any water meters, or operation of any Septic Tank Effluent Pressure (STEP) systems, all Public Works improvements must shall be completed and approved, or performance bond posted, and all applicable fees must be paid as required by the latest adopted resolution.

See Section 1.025 for definitions of specific sewers. Maintenance of the building or side sewer shall be the responsibility of the property owner from the main property line to the building. Maintenance of the lateral main shall be the responsibility of the owner unless other agreements have been made with the Public Works Department.

5A.011 Grease Traps/Interceptors

When, in the judgment of the Department of Health and/or Public Work Director, waste pretreatment is required, a grease trap shall be installed in the waste line 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 in quantities that can effect line stoppage or hinder sewage treatment or disposal.

The grease trap installation shall comply with the provisions of Section 7 of the most current Uniform Plumbing Code, and shall result in the discharge of no more than 100 mg grease per liter.

A grease trap is not required for individual dwelling units.

Car washing facilities and/or other businesses which handle liquid wastes containing grease, flammable wastes, sand, solids, acid or alkaline substances, or other ingredients harmful to sewage/drainage systems of the City and the treatment plant operated by the City of Spokane shall be required to install Industrial Interceptors (Clarifiers) and Separators.

See Appendix D for detailed requirements for Grease Interceptor requirements and Grease Interceptor Checklist and Appendix E for Requirements for Car Washington Facilities.

5A.012 Grinder Pump Specifications

Side Sewer Connections to the sewer main which originate from elevations lower than the sewer stub elevation will require installation of a grinder pump. See Appendix F for grinder pump specifications.

5A.015 Marking Side Sewers

The location of all side sewers shall be marked on the face or top of the cement concrete curb with an "S" 1/4" into the concrete, also, mark stub with 2 x 4 treated wood with locate wire.

5A.020 Sanitary Sewer/Water Main Crossings

See Chapter 4.130 for requirements regarding sewer and water separation.

5A.030 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 sewer lines shall be as follows:

- A. Centerline alignment must be staked with cuts and/or fills to flowline every 100 feet.
- B. Manholes must be staked with hubs to include invert elevations of all pipes and top of rim elevations to finished grade.
- C. Location of valves, fixtures and septic tank shall be staked for force mains and STEP systems.

5A.040 Trench Excavation

See Chapter 4.160 for requirements regarding trench excavation.

5A.050 Backfilling

See Chapter 4.170 for requirements regarding backfilling.

5A.060 Street Patching and Trench Restoration

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

5A.070 Testing

Prior to acceptance and approval of construction, the following tests shall apply to each type of construction.

A. Gravity Sewer

1. Prior to acceptance of the project, the gravity sewer pipe shall be subject to a thorough cleaning. No water used in the cleaning process will be allowed to be sent to the treatment facility. The down stream manhole will be plugged and the water pumped out prior to acceptance of the line.
2. A low pressure air test per WSDOT/APWA Standards. The contractor shall furnish all equipment and personnel for conducting the test under the observation of the City Inspector. The testing equipment shall be subject to the approval of the City.

The contractor shall make an air test for his own purposes prior to notifying the City to witness the test. The acceptance air test shall be made after trench is backfilled and compacted per specifications and the roadway section is completed to subgrade if applicable.

All wyes, tees, and end of side sewer stubs shall be plugged with flexible joint caps, or acceptable alternates, securely fastened to withstand the internal test pressures. Such plugs or caps shall be readily removable and their removal shall provide a socket suitable for making a flexible jointed lateral connection or extension.

Immediately following the pipe cleaning, the pipe installation shall be tested with low-pressure air.

3. Testing of the sewer main shall include a television inspection by the city or contractor in accordance with Section 7-17.3(4)I of the Standard Specifications. Television inspection shall be done after the air test has passed and before the roadway is paved. Immediately prior to a television inspection, enough water shall be run down the line so it comes out the lower manhole. A copy of the video tape and written report shall be submitted to the City. Acceptance of the line will be made after the tape has been reviewed and approved by the Inspector. Any tap to an existing system needs to be televised as well.
4. A water test of all manholes is also required. The water test shall be made by the contractor first by filling the manhole up with water and letting it sit for 24 hours to allow the water to saturate the concrete. After 24 hours the manhole shall be filled to the top

of the cone. The water cannot drop more than 0.05 gallons in 15 minutes per foot of head above invert to pass. Upon completion of the water test, the water shall be pumped out of the manhole and not allowed to be released to the system.

5. A mandrel test in accordance with Section 7-17.3(4)H of the Standard Specifications shall be required on all sewers except laterals as defined in Section 1.025 of these standards.
6. A mandrel test shall be conducted 18 months after acceptance.

B. Force Main

1. Prior to acceptance of the project, the pressure line and service lines shall be subjected to a hydrostatic pressure test of 200 pounds for 15 minutes and any leaks or imperfections developing under said pressure shall be remedied by the contractor. No air will be allowed in the line. The main shall be tested between valves. Insofar as possible, no hydrostatic pressure shall be placed against the opposite side of the valve being tested. The pressure test shall be maintained while the entire installation is inspected.

The contractor shall provide all necessary equipment and shall perform all work connected with the tests. Tests shall be made after all connections have been made. This is to include any and all connections as shown on the plan. The contractor shall perform all tests to assure that the equipment to be used for the test is adequate and in good operating condition and the air in the line has been released before requesting the City to witness the test.

2. A water test for all wet wells in accordance with the manhole water test for gravity sewer shall be required.
3. A mandrill test in accordance with Section 7-17.3(4)H of the Standard Specifications is required.
4. Pump operation, alarms, and electrical inspection of all lift stations is required.

5B GRAVITY SEWER

5B.010 General

All sewers shall be designed as a gravity sewer whenever physically feasible or as outlined in the Comprehensive Sanitary Sewer Plan.

5B.020 Design Standards

The design of any sewer extension/connection shall conform to City Standards, Department of Ecology's "Criteria of Sewage Works Design", 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 of the existing system as determined by the City. See Chapter 1.130 for utility extension information.

New gravity sewer systems shall be designed on the basis of an average daily per capita flow of sewage of not less than 100 gallons per day. See the following DOE table on Design Basis for Sewage. This figure is assumed to cover normal infiltration, but an additional allowance shall be made where conditions are unfavorable. Generally, laterals and submain sewers should be designed to carry, when running full, not less than 400 gallons daily per capita contributions of sewage. When deviations from the foregoing per capita rates are used, a description of the procedure used for sewer design shall be submitted to the Public Work Department for review and approval.

DESIGN BASIS FOR SEWAGE

Discharge Facility	Design Units	Flow* (gpd)	BOD (lb/day)	SS (lb/day)	Flow Duration (hr)
Dwellings	per person	100	0.2	0.2	24
Schools w/ showers & cafeteria	per person	16	.04	.04	8
Schools w/out showers & with cafeteria	per person	10	.025	.025	8
Boarding Schools	per person	75	0.2	0.2	16
Motels @ 65 gal/person (rooms only)	per room	130	0.26	0.26	24
Trailer courts at 3 persons/trailer	per trailer	300	0.6	0.6	24
Restaurants	per seat	50	0.2	0.2	16
Interstate or through highway restaurants	per seat	180	0.7	0.7	16
Interstate rest areas	per person	5	0.01	0.01	24
Service stations	per vehicle serviced	10	0.01	0.01	16
Factories	per person per 8-hr shift	15-35	0.03 - 0.07	0.03 - 0.07	Operating Period
Shopping Centers	per 1,000 sq. ft. of floor space	200 - 300	0.01	0.01	12
Hospitals	per bed	300	0.6	0.6	24
Nursing Homes	per bed	200	0.3	0.3	24
Homes for the aged	per bed	100	0.2	0.2	24
Dr's office in medical center	per 1,000 sq. ft.	500	0.1	0.1	12
Laundromats, 9 - 12 machines	per machine	500	0.3	0.3	16
Community Colleges	per student and faculty	15	0.03	0.03	12
Swimming pools	per swimmer	10	0.001	0.001	12
Theaters, drive-in type	per car	5	0.01	0.01	4
Theaters, auditorium type	per seat	5	0.01	0.01	12
Picnic areas	per person	5	0.01	0.01	12
Resort camps, day & night, w/ limited plumbing	per campsite	50	0.05	0.05	24
Luxury camps w/ flush toilets	per campsite	100	0.1	0.1	24

* Includes Normal Infiltration

The following General Notes shall be included on any plans dealing with sanitary sewer design.

GENERAL NOTES (SANITARY SEWER MAIN INSTALLATION)

1. All workmanship and materials shall be in accordance with City of Airway Heights standards and the most current copy of the State of Washington Standard Specifications for Road, Bridge and Municipal Construction (WSDOT/APWA).
2. City of Airway Heights datum shall be used for all vertical control. A list of benchmarks is available at the Public Works Department.
3. All approvals, permits and easements required by the City of Airway Heights shall be obtained by the contractor prior to the start of construction.
4. If construction is to take place in the County right-of-way, the contractor shall notify the County and obtain all the required approvals and permits.
5. A preconstruction meeting shall be held with the City of Airway Heights Construction Inspector prior to the start of construction.
6. The City of Airway Heights Construction Inspector Public Works Department shall be notified a minimum of 48 hours in advance of a tap connection to an existing main or lateral. The inspector shall be present at the time of the tap. Any material removed in the tap process must be given to the City Inspector at the time of the tap.
7. The contractor shall be fully responsible for the location and protection of all existing utilities. The contractor shall verify all utility locations prior to construction by calling the Underground Locate Line at 1-509-456-8000 a minimum of 48 hours prior to any excavation.
8. Gravity sewer main shall be PVC, ASTM D-3034 SDR 35 or ASTM F-789 with joints and rubber gaskets conforming to ASTM D-3212 and ASTM F-477.
9. Precast manholes shall meet the requirements of ASTM C-478. Manholes shall be Type 1-48" manhole unless otherwise specified on the plans. Joints shall be rubber gasketed conforming to ASTM C-443 and shall be grouted from the inside. Lift holes shall be grouted from the outside and inside of the manhole. (See Note 1.) All manholes used in a STEP System must be properly coated, inside, to prevent hydrogen sulfide corrosion.
10. Side sewer services shall be PVC, ASTM D-3034 SDR 35 with flexible gasketed joints. Side sewer connections shall be made by a tap to an existing main or a wye branch from a new main connected above the springline of the pipe.

11. All sewer mains shall be field staked for grades and alignment by a licensed engineering or surveying firm qualified to perform such work.
12. All plastic pipe and services shall be installed with continuous tracer tape installed 12" to 18" under the proposed finished subgrade. The marker shall be plastic non-biodegradable, metal core or backing marked sewer which can be detected by a standard metal detector. In addition, STEP systems, force mains, and curvilinear sewers shall be installed with 14 gauge coated copper wire wrapped around all plastic pipe, brought up and tied off at valve body. On a curvilinear sewer, the wire shall be brought up, bared and wrapped three times around the manhole ring. Tape shall be Terra Tape "D" or approved equal. The tape and wire shall be furnished by the contractor.
13. All side sewer locations shall be marked on the face of the curb with an embossed "S" 1/4" into the concrete and stub marked with treated 2 x 4 posts with wire.
14. All buried power for STEP systems shall be installed with continuous tracer tape installed 12" above the buried power. The marker shall be plastic non-biodegradable, metal core backing marked "power". Tape shall be furnished by contractor.
15. Bedding of the sewer main and compaction of the backfill material shall be required in accordance with the above mentioned specification (See note 1 above).
16. A 3 foot square x 4 inch thick asphalt or concrete pad shall be installed around all cleanouts that are not in a pavement area.
17. Temporary street patching shall be allowed for as approved by the City engineer. Temporary street patching shall be provided by placement and compaction of 1 inch maximum asphalt concrete cold mix. Contractor shall be responsible for maintenance as required.
18. Erosion control measures shall be taken by the contractor during construction to prevent infiltration of existing and proposed storm drainage facilities and roadways.
19. Provide traffic control plan(s) in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) as required.
20. It shall be the responsibility of the contractor to have a copy of these approved plans, stamped "For Construction" on construction site at all times.
21. Any changes to the design shall first be reviewed and approved by the project engineer and the City of Airway Heights.
22. All lines shall be high velocity cleaned and pressure tested prior to paving in conformance with the above referenced specifications. (See note 1 above). Hydrant

flushing of lines is not an acceptable cleaning method. Testing of the sanitary sewer main shall include TVing (video taping) of the main by the contractor. Immediately prior to TVing, enough water shall be run down the line so it comes out the lower manhole. A copy of the video tape shall be submitted to the City of Airway Heights. Acceptance of the line will be made after the tape has been reviewed and approved by the inspector. A water test of selected manholes in accordance with Airway Heights standards is also required. Testing shall take place after all underground utilities are installed and compaction of the roadway subgrade is completed.

23. All STEP mains shall be hydrostatically tested in conformance with the above-referenced specification for testing water mains. (See note 1above.) In addition, all STEP mains shall be pigged in the presence of the City Inspector prior to placing STEP main in service.
24. Prior to backfill all mains and appurtenances shall be inspected and approved by the City of Airway Heights Construction Inspector. Approval shall not relieve the contractor for correction of any deficiencies and/or failures as determined by subsequent testing and inspections. It shall be the contractor's responsibility to notify the City of Airway Heights for the required inspections.

5B.030 Main Line - Gravity

- A. Size. Sewer mains shall be sized for the ultimate development of the tributary area. Nothing shall preclude the City from requiring the installation of a larger sized main if the City determines a larger size is needed to meet the requirements for future service.

The minimum size for submains and mains shall be 8 inch inside diameter. The minimum size for a lateral shall be 6 inches for commercial, 4 inch for residential. See definitions in Chapter 1.025.

A 6 inch diameter main may be approved if it meets all of the following criteria as outlined in Section 2.311 of the Department of Ecology's "Criteria for Sewage Works Design."

The design is subject to all other design requirements as noted in this Chapter.

- B. Material. Sewer main shall be PVC, ASTM D-3034, SDR 35 or ASTM F-789 with joints and rubber gaskets conforming to ASTM D-3212 and ASTM F-477.
- C. Depth. Gravity sewer will typically have a minimum depth of 5 feet to provide gravity service to adjoining parcels, adequate head room within

manholes for maintenance personnel and vertical clearance between water and sewer lines. Actual depth will be determined by slope, flow, velocity and elevation of existing system.

- D. All building sewer connections to the main shall be made with a wye connection. All new mains connecting to existing mains shall require the installation of a new manhole if not made at an existing manhole.

5B.040 Connection to Existing System

- A. At connection to existing system, all new sewer connections shall be physically plugged until all tests have been completed and the City approves the removal of the plug.
- B. Connection of new pipe lines to existing manholes shall be accomplished by using provided knock-outs. Where knock-outs are not available, the manhole shall be core drilled for connection. The transition of connecting channels shall be constructed so as not to interrupt existing flow patterns.
- C. Connection of a pipe line to a system where a manhole is not available shall be accomplished by pouring a concrete base and setting manhole sections. The existing pipe shall not be cut into until approval is received from the City.
- D. Connections to manholes requiring a drop shall follow the criteria as outlined in Section 5B.090
- E. Connections where an existing stub out is not available or where a new building sewer is the same size as the existing main shall be accomplished by the installation of a new manhole.
- F. Taps shall not be allowed to protrude more than 1 inch into the existing main. A City inspector shall be notified 48 hours prior to any tap of a City sewer. A City Inspector shall be present to witness the tap and collect all material from the tap process.

5B.050 Manholes

Precast manholes shall meet the requirements of ASTM C-478 with either a precast base or a cast-in-place base made from 3000 psi structural concrete. Manholes shall be Type 1, 48 inch diameter minimum. The minimum clear opening in the manhole frame shall be 24 inches. Joints shall be rubber gasketed conforming to ASTM C-443 and shall be grouted from the inside. Lift holes shall

be grouted from the outside and inside of the manhole. Manholes constructed of other materials may be approved by the Public Work Director, provided they meet the requirements of 2.318 of Department of Ecology's "Criteria for Sewage Works Design." Material specifications need to be submitted for review before an alternate material will be considered. See Detail Drawings 5-1 and 5-2. All Step System manholes must be coated for hydrogen sulfide protection with polymer modified cementitious coating, as manufactured by Fosroc, Renderoc Brush-Bond, or approved equal.

Eccentric manhole cone shall be offset so as not to be located in the tire track of a traveled lane.

Manhole frames and covers shall be cast iron casting marked "Sewer" conforming to the requirements of ASTM A-30, Class 25, and shall be free of porosity, shrink cavities, cold shuts or cracks, or any surface defects which would impair serviceability. Repairs of defects by welding or by the use of smooth-on or similar material will not be permitted. Manhole rings and covers shall be machine-finished or ground-on seating surfaces so as to assure non-rocking fit in any position and interchangeability. Manholes located in areas subject to inflow shall be equipped with a PRECO sewer guard watertight manhole insert or approved equal.

Where lock-type castings are called for, the casting device shall be such that the cover may be readily released from the ring and all movable parts shall be made of non-corrosive materials and otherwise arranged to avoid possible binding.

All casting shall be coated with a bituminous coating prior to delivery to the job.

All manhole steps must conform to State L&I requirements. Safety steps shall be fabricated of polypropylene conforming to an ASTM D-4101 specification, injection molded around a 1/2 inch ASTM A-615 grade 60 steel reinforcing bar with non-slip drop-type steps, precast into the walls of the manhole. All steps shall project uniformly from the inside wall of the manhole. If an eccentric cone is used on the manhole, all steps in both the cone and manhole must align in a straight vertical line.

Generally, gravity sewers shall be designed with straight alignment between manholes, however, curved alignment may be permitted when conditions warrant.

Manholes shall be provided at a maximum of 300 foot intervals where 6-inch sewer is allowed, 400 foot intervals for 8-inch to 15-inch sewers, 500 foot intervals for 18-inch to 30-inch sewers, at intersections, and at changes in direction, grade or pipe size. (See also Section 5B.080.) Greater spacing may be permitted in larger sewers.

Minimum slope through the manhole shall be 1/10th of one foot from invert in to invert out.

Manhole Sizing shall be determined by the following criteria:

- A. 48" Manhole
 - 1. 2 connecting pipes, 8-inch to 12-inch diameter
 - 2. 3 connecting pipes, 8-inch to 10-inch diameter, perpendicular
 - 3. 4 connecting pipes, 8-inch diameter, perpendicular

- B. 54" Manhole
 - 1. 2 connecting pipes, 8-inch to 12-inch with more than 45° deflection
 - 2. 3 connecting pipes, 10-inch to 12-inch diameter, perpendicular
 - 3. 4 connecting pipes, 10-inch to 12-inch diameter, perpendicular

- C. 72" Manhole
 - 1. 2 connecting pipes, 15-inch to 18-inch diameter with less than 45° deflection
 - 2. 3 connecting pipes, 15-inch diameter, perpendicular
 - 3. 4 connecting pipes, 15-inch diameter, perpendicular

In the above criteria "deflection" refers to the angle between any 2 pipe channels in the manhole.

For other pipe configurations, the size of the manhole shall be approved by the City.

The above configurations will provide adequate shelves and room for maintenance and performing TV inspections.

5B.060 Slope

All sewers shall be designed and constructed to give mean velocities, when flowing full, of not less than 2.0 feet per second based on Manning's formula using an "n" value of 0.013. Use of other practical "n" values may be permitted by the City if deemed justifiable on the basis of research or field data submitted. The following minimum slopes should be provided; however, slopes greater than these are desirable.

Sewer Size	Minimum % Slope
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(Inches)	% (Feet per 100')
6	1.00 (0.0100 Ft/Ft)
8	0.40 (0.0040 Ft/Ft)
10	0.28 (0.0028 Ft/Ft)
12	0.22 (0.0022 Ft/Ft)
14	0.17 (0.0017 Ft/Ft)
15	0.15 (0.0015 Ft/Ft)
16	0.14 (0.0014 Ft/Ft)
18	0.12 (0.0012 Ft/Ft)
21	0.10 (0.0010 Ft/Ft)
24	0.08 (0.0008 Ft/Ft)
27	0.07 (0.0007 Ft/Ft)
30	0.06 (0.0006 Ft/Ft)
36	0.05 (0.0005 Ft/Ft)

Under special conditions, slopes slightly less than those required for the 2.0 feet per second velocity may be permitted by the Public Work Director. Such decreased slopes will only be considered where the depth of flow will be 0.3 of the diameter or greater for design average flow. Whenever such decreased slopes are proposed, the design engineer shall furnish with the plans the computations of the depths of flow in such pipes at minimum, average, and daily or hourly rates of flow. Larger pipe size shall not be allowed to achieve lesser slopes. Sewers shall be laid with uniform slope between manholes.

5B.070 Increasing Size

Manholes shall be provided where pipe size changes occur.

Where a smaller sewer joins a larger one, the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient. An approximate method for securing these results is to place the 0.8 depth point of both sewers at the same elevation.

5B.080 High Velocity Protection

Where velocities greater than 15 feet per second are expected, special provisions such as thrust blocking and piping materials shall be made to protect against displacement by erosion and shock.

5B.090 Drops

Straight grades between invert out of last manhole and connection to existing are preferred over drops whenever possible. Care must be taken when designing

steep grades or sweeps so as not to create a situation of excessive velocity or excavation. Grade changes associated with "sweeps" shall not be allowed unless otherwise approved by the Public Work Director.

An outside drop connection shall be provided for a sewer entering a manhole at an elevation of 24 inches or more above the manhole invert. Where the difference in elevation between the incoming sewer and the manhole invert is less than 24 inches, the invert shall be filleted to prevent solids deposition.

An inside drop connection will not be allowed by the City unless otherwise approved by the Public Work Director.

Outside drop structures shall be constructed per Detail Drawing 5-04A.

5B.100 Cleanouts

Cleanouts are not an acceptable substitute for manholes, however, they may be used in lieu of manholes at the end of 6 or 8 inch diameter lines of not more than 100 feet in length. This does not include a 6 inch building sewer to serve one or two single-family dwellings. Location of cleanouts for building sewers is governed by the Uniform Plumbing Code as adopted by the City.

All cleanouts in City right-of-way shall be extended to grade and a 3-foot-square by 4-inch concrete pad shall be installed around all cleanouts that are not in a pavement area. See Detail Drawing 5-04.

5B.110 Building Sewer

A building or side sewer refers to the extension from a building sewer beginning two feet outside the outer foundation wall at the structure to the sanitary sewer main. Building sewers from the lateral to the right-of-way line shall be minimum 4-inch diameter. Maintenance of the building sewer is the responsibility of the property owner. Prior to connection of a building sewer to the public sewer a connection permit must be obtained from the City. Materials and design criteria for a building sewer are covered by the Uniform Plumbing Code (UPC) as adopted by AHMC 15.06. Inspection of the building sewer is the responsibility of the Public Works Department.

5C LIFT STATIONS

5C.010 General

All lift stations will be designed to serve the appropriate basin as identified in the Airway Heights "Comprehensive Sanitary Sewer Plan."

5C.020 Design Standards

The design of any lift station shall conform to City standards, Department of Ecology's "Criteria of Sewage Works Design" and applicable standards as set forth herein and in Sections 5B.020 and 5B.040. In addition, the plans shall include the following:

1. An overall site drawing of the lift station showing the location of all components including elevations;
2. Service size, voltage and enclosure type and location in relation to the pump station;
3. A list of specific materials used including quantity description and manufacturer name;
4. A schematic and line diagram of the service and motor control center and lift station;
5. The electrical shall be designed to meet state and local electrical code requirements;
6. The plans shall show all applicable telemetry installations with schematics; and
7. An operation and maintenance manual from the lift station manufacturer shall be supplied.

A design report shall be submitted with each lift station demonstration its conformance with the standards as outlined above and shall address the following items:

Pump Data	-----	- Size and type - horsepower - pump curves - head capacity - velocity
Motor	-----	- size and type - cycle length - type of mount
Controls	-----	- type

Telemetry	-----	- alarm system (must be compatible with City system by S&B, Inc.)
Housing	-----	- size and type - ventilation - humidity control - interior lighting - access
Auxiliary Power	----	- All lift stations must be furnished with auxiliary-powered generators.
Well Sizing	-----	- type - storage capacity
Maintenance	-----	- warranty - for two years - tools and equipment required
Electrical Service	----	- size and type - source
Corrosion Protection	----	- type of materials - coatings - linings - maintenance
Site Layout	-----	- location of lift station on property
Testing	-----	- operational pressure
Piping and Valves	----	- Size and type - Bypass

See Chapter 5D, Pressure Sewer for additional information regarding force mains.

5D PRESSURE SEWER (FORCE MAIN)

5D.010 General

Low pressure systems, i.e., force mains, may be considered for situations where high ground water table or topography make gravity sewer impractical. STEP systems are addressed by the Department of Health who have jurisdiction. The City of Airway Heights recognizes this fact, hence there are no specific standards set forth by the City separately in Chapter 5E.

5D.020 Design Standards

The design of any sewer extension/connection shall conform to City standards, Department of Ecology's "Criteria of Sewage Works Design," 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 of the existing system as determined by the City. In addition, main extensions shall be extended to and through the side of the affected property fronting the main.

The system shall be designed at full depth of flow on the basis of an average daily per capita flow as shown on the table in Section 5B.020. A friction factor of 0.013 shall be used for Manning's "n" value.

New sewer systems shall be designed by methods in conjunction with the basis of per capita flow rates. Methods shall include the use of peaking factors for the contributing area, allowances for future commercial and industrial areas, and modification of per capita flow rates based on specific data. Documentation of the alternative method used shall be provided along with plans.

The applicable General Notes in section 5B.020 shall be included on any plans dealing with pressure sanitary sewer design.

5D.030 Force Main

- A. Material. Force mains for sizes up to 12 inches shall be ductile iron AWWA C-151 Class 52 or PVC C-900 with ductile iron fittings and gasketed joints. For 14- to 24-inch mains, pipe shall be ductile iron AWWA C-151 Class 50 or PVC C-905 with ductile iron fittings and gasketed joints. A more rigid pipe may be required where unlimited trench widths occur. All ductile iron pipe and fittings shall be epoxy-coated or PE-lined and designed for use with corrosive materials.
- B. Depth. Force mains shall have a minimum 36 inches of cover to top of pipe. See Chapter 4.130 for sanitary sewer/water main crossing requirements.
- C. Velocity. The minimum velocity allowed is 2 feet per second (fps) at average Dry Weather Flow. 2 fps is required to maintain solids in suspension although 3 fps is desired to scour settled solids. Maximum velocity allowed shall be 8 fps.

5D.040 Surge Protection

PVC is subject to fatigue failure due to cyclic surge pressures. This shall be constructed to minimize rapid changes in velocities and a properly sized surge tank.

5D.050 Air/Vacuum Valves

Air release valves and air/vacuum valves shall be located at the high points of the line within a standard 48-inch manhole or a comparable sized, approved vault. Air release valves shall be fitted with an activated carbon canister to absorb compounds with disagreeable odors prior to releasing the air to the surrounding area. Grades shall be designed to minimize the need for air/vacuum valves when practical. Vehicular access to valve is required for maintenance.

5D.060 Force Main Drain

Provisions to drain a force main to facilitate repairs or to temporarily remove force main from service shall be provided. This may be accomplished through the use of a valved tee connected to a drain line at the low point of the line. A manhole shall be set over the force main at the valved tee.

5D.070 Thrust Blocking

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

See standard Detail Drawings 4-19 and 4-20 in water section. Designed and approved restraining joint systems may be allowed in lieu of thrust blocking. Restraining joint brand, type, and size shall be specified on the plans.

5D.080 Force Main Termination

Hydrogen sulfide odors (H_2S) and the buildup of sulfuric acid (H_2SO_4) occur in the operation of a force main. To mitigate these conditions some type of control method(s) shall be used. This may include chemical addition at the pump station and/or the reaeration of the waste water at or near the terminus. Reaeration may include the following:

1. Construction of a vault housing an aspiration assembly.
2. The use of hydraulic fall (vertical siphon) within the terminal manhole.
3. High velocity discharge with smooth transition so as to not cause splashing of force main into the downstream gravity sewer.

These methods would all require an adequate source of fresh air at the vault or

manhole. At a minimum, the manhole at the terminus and the first manhole downstream of the terminus shall be coated with an epoxy resistant to sulfuric acid.

5E STEP ON-SITE SYSTEM

5E.010 Septic Tanks

General

When City sewer is unavailable owners shall be allowed to install septic tank Based on criteria required by the Department of Health. Refer to Department of Health for standard requirements. The City does require Sizing based of occupant loads.

Construction Requirements

It shall be the contractor's responsibility to verify the location and the elevation of all existing sewer lines prior to installing the individual tank.

It is anticipated that existing utility lines will be encountered during installation of the STEP tank and appurtenances. Prior to starting construction, the contractor will notify the proper utility for underground locations and also contact the property owner to determine location of foundation drains, electrical lines, etc.

The contractor shall be responsible to obtain all necessary permits for work on public right-of-way such as street opening permit available at City hall. All cost for permits will be the contractor's responsibility.

Excavations for all tanks shall be sufficient to leave 18 inches of clear space between their outer surfaces and the earth bank.

All septic tanks shall be installed on a leveling course of a minimum of 6 inches of bedding. Fiberglass and polyethylene tanks will receive additional bedding to the spring line of the tank as denoted on the contract plans.

All excess excavated material not used for backfill will be removed from the site and disposed of at an approved dump site. Location of the site will be submitted to the Engineer upon request. Upon request by the property owner, the contractor may leave the excess material on site.

All tank installations which involve interruption to sewer service shall be installed

as follows:

1. The homeowner shall be notified 48 hours in advance that sewer service will be interrupted for a maximum of 24 hours. Immediate notice will be given before disconnecting the existing sewer line.
2. All excavation and backfill of tanks shall conform to standard specifications. Compaction for non-traffic areas shall be 85 percent of maximum density. Compaction for traffic areas shall be 95 percent of maximum density.
3. The contractor shall be responsible on a daily basis for providing ingress and egress for both pedestrian and vehicle traffic on all work sites. The contractor shall clean up his work area on a daily basis to avoid inconvenience to the property owner.
4. The contractor shall safeguard his work on a daily basis to prevent possible injuries. The contractor shall submit to the City his method of safeguarding his work prior to beginning any construction.

5E.020 Pipe

All pipe less than 2 inches shall meet the following requirements:

Schedule 40 PVC pipe shall be designed for solvent weld joints and shall comply with ASTM D-2665.

All pipe 2 inches and above shall meet the following requirements:

PVC 1120 Pipe: PVC 1120 pipe shall have rubber ring gasket joints, shall comply with ASTM D-1784 and have a working pressure rating of 200 psi, SDR 21.

Bedding

1. Bedding shall be crushed or granular material passing 3/8" square sieve as per Section 9-03.16 of the WSDOT 1994 Standard Specifications.
2. Bedding shall be installed as shown on the construction details.

Joints

1. Solvent Weld Joints: Solvent cements and primer for joining PVC pipe and fittings shall comply with ASTM D-2564 and be as recommended by the pipe and fitting manufacturers.

2. Rubber Ring Gasket Fittings: Rubber ring gasket fittings for pipe 2 inches and larger shall be PVC 1120 complying with ASTM D-1784, as manufactured by Head Manufacturing Co., Preston, Idaho; Gault Fabrication Company, Stockton, California; Spears Fabrication, Stockton, California; or approved equal.

Fittings

All fittings shall have a minimum working pressure equal to the pipe with which they are connected.

1. Solvent Weld Fittings: Solvent weld fittings for pipe less than 2 inches shall be socket type, Schedule 40 fittings and shall comply with ASTM D-1784 and ASTM D-2466.
2. Rubber Ring Gasket Fittings: Rubber ring gasket fittings for pipe 2 inches and larger shall be PVC 1120 complying with ASTM D-1784, as manufactured by Head Manufacturing Co., Preston, Idaho; Gault Fabrication Company, Stockton, California; Spears Fabrication, Stockton, California; or approved equal.

Grade and Alignment

Service lines shall be placed at a minimum of 18 inches of cover within private property. Deeper excavation may be required due to localized breaks in grade such as curbs, retaining walls, and terraced ground. Where shown on the Detail Drawings, the pipeline shall be laid to the profile or elevation shown, regardless of depth. Minimum cover of any mainline within public right-of-way or easement shall be 30".

Trench Excavation and Backfill

Trench widths for pipes from 1 inch to 4 inches in diameter shall not exceed 14 inches wide at the top of the trench.

Native material from trenches and excavations may be considered unsuitable for trench backfill. The City of Airway Heights shall determine the suitability of native material for trench backfill. If the native material is deemed unsuitable by the City, "Bank Run Gravel for Trench Backfill" shall be used. Bank run gravel shall be equal to Section 9-03.19 of the 1994 WSDOT Standard Specifications.

The Contractor has the option of jacking or boring pressure sewer lines under existing improvements. The Contractor's proposed method of construction and material type shall be submitted for the City's approval prior to commencing

work. Pipeline material shall be approved by the manufacturer for jacking or boring application. No jacking operation shall exceed 40 feet unless authorized by the City.

At locations where paved or graveled streets, shoulders, alleys, parking lots, driveways, patios, and sidewalks will be reconstructed over the trench, the backfill shall be spread in layers not exceeding 8 inches in loose thickness and be compacted by mechanical tampers to 95 percent of maximum density. At locations where lawn, landscaping, and unimproved surfaces will be reconstructed over the trench, the backfill shall be spread in layers not exceeding 12 inches in loose thickness and be compacted by mechanical tampers to 90 percent of maximum density.

Maximum density and optimum moisture content shall be determined using the modified Proctor maximum dry density procedure 9AASHTO:T 180 or ASTM D 1557). In place density shall be determined using the Washington Densimeter method or Nuclear Gauge as outlined in the WSDOT Construction Manual.

Detectable Marking Tape

Fourteen-gauge insulated copper toning wire shall be placed directly over all non-metallic pressure sewer lines and service lines. The Contractor shall bring the toning wire to the surface of the valve box and service boxes for purposes of attaching a utility detection device. All connection of the toning wire for service connections shall be stripped of insulation and attached to the copper portion of the main line toning wire. The connection point shall be wrapped with heat shrink tape acceptable for direct bury in accordance with manufacturer's recommendations.

Hydrostatic Pressure Test

All sewer mains, service lines, and appurtenances shall be tested in sections of convenient length under a hydrostatic pressure equal to 75 psi. All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test shall be furnished and operated by the Contractor. Gauges and meters used in the test shall be accompanied with certifications of accuracy from a laboratory approved by the City. Service lines shall hold pressure for 15 minutes without a reduction of pressure of over 3 psi. Main line testing shall conform to Section 7-11.3(11) of the WSDOT 1994 Standard Specifications.

5E.030 Valves

Ball Valves

One-inch ball valves shall be PVC ball valves with pre-loaded EPDM stem seals according to U.S. Patent No. 4,665,937 which increases the life of the stem seal, ABS impact resistant handle, precision molded micro-finished PVC ball, self-adjusting polyethylene ball seat seals to compensate for wear, and shall comply with ASTM D-2846. It shall be designed for use with corrosive fluids, for low torque manual operation, and for a working pressure of 150 psi. The PVC material shall be Type 1 (NSF). The valve shall be Model No. LT-1000-S as manufactured by KBI (King Brothers Industries), or equal approved by the City.

Valve Boxes

The word Sewer shall be cast into the lid. The top section shall be made of cast iron conforming to the following specifications: ASTM A-4876; WWP 401; and CS-88. It shall be slip type with top flange, weight 40 pounds or more, be 10 inches in length, have an inside diameter sufficient to house the bottom section, and have an average material tensile strength of 30,000 psi. It shall be Rich Model 910 heavy duty, or equal approved by the City. The bottom section of the valve box shall be 6-inch PVC pipe (ASTM 3034), white in color. The entire valve box top and bottom shall perform as a unit that has the ability to extend.

5E.040 Service Connections

This work consists of installing the service line and appurtenances. The service connection at the sewer main includes a check valve and ball valve, without valve boxes, and a saddle or tee at the sewer main.

The locations of service lines and appurtenances are approximately shown on the Drawings. The City will stake their location at the time of construction. If a self-tapping saddle is used at the sewer main, the ball valve at the sewer main can be deleted. Location of service line and service box for use for interim onsite disposal until public sewer is available is shown on attached drawings.

Saddles

Standard saddles shall be band-type saddles designed for use on PVC pipe. The material shall be UNS 30400 stainless steel for the shell, bolts, washers, nuts, and tapped outlet. Gaskets shall be NBR compounded rubber complying with ASTM D-2000-343K515-E34. Saddles shall be Style 304, manufactured by Romac Industries, Inc., or equal approved by the City.

Self-tapping saddles shall have a PVC body and be secured in place by four stainless steel bolts and nuts. After tapping, the tapping mechanism shall retain the coupon from the pipe and serve as a shut-off valve. The tapping mechanism

shall be operated by a 5/8" allen head wrench and have a PVC cover to prevent fouling of the mechanism when not in use. The saddle shall have an O-ring seal glued in place by the manufacturer.

Standard Service Box

The Standard Service Box shall be made from a structural plastic, have extensions as required, and have a bolt down cover. It shall be Model No. 1419, as manufactured by Carson Industries, Inc., or equal approved by the City.

Traffic Bearing Service Boxes

Traffic Bearing Service Boxes shall conform to Section III.B - "Valve Boxes for Ball Valves."

5E.050 Sewer Cleanouts

Gravity Service Cleanouts

Two-way cleanouts shall also be installed at the inlet to the STEP tank as staked by the City or owner. All two way cleanouts and valve boxes shall be set flush with ground surface. The ground surfaces and other improvements around the cleanouts shall be restored in accordance with restoration specifications.

5E.060 Restoration

Description

This work shall consist of various types of surface restoration. If required by the owner for private property and as required by the City of Airway Heights for all work on public right-of-way, all surfaces and surface improvements effected by the Contractors operations shall be restored to conditions equal to or better than preconstruction conditions. The City shall be the sole judge as to the equality of materials and work when comparing post-construction conditions to pre-construction conditions.

Cement concrete sidewalk and driveway repair shall conform to the Standard Specifications except that the finish, dimensions, and joints shall be the same as the original work. Cement concrete driveways shall be defined so as to include cement concrete alleys and parking lots.

Crushed Surfacing

Shoulders, driveways, and other graveled or crushed surfaced areas which are disturbed by the contractor's operations shall be resurfaced with 2 inches of crushed surfacing. All work and material shall conform to the requirements of the Standard Specifications.

5E.070 Side Sewers

Minimum slope for any 4" or 3" gravity side-sewer lines shall be no less than 2 percent or 1/4 inch of rise to 1 foot of run. Slopes less than 2 percent will only be allowed if approved by the City or owner. Installation of gravity clean-outs shall meet the requirements of the City of Airway Heights, the Uniform Plumbing Code, or, in the case of interim onsite installation, Spokane County Health Department. At a minimum, a gravity clean-out will be required two feet from the foundation of the structure.

Grade stakes will not be provide by the City for side sewers. It shall be the contractor's responsibility to determine the differential in elevation between the invert to the STEP tank and the invert at the building side sewer. Based on that information, the contractor shall determine the percent of fall between the STEP tank and the connection point at the side sewer.

5E.080 Drawings

The supplier of the pump system shall provide detailed drawings to the septic tank manufacturers that indicate required openings, location of inserts, etc., to insure a compatible septic tank pump assembly package. The supplier shall also provide the tank manufacturer with all necessary inserts or fittings so they can be cast in the walls prior to testing of the tanks.

Curb repair shall conform to the Standard Specifications, except that the finish, dimensions, and joint shall be the same as the original work.

5E.090 Grease Traps/Interceptors

When, in the judgment of the Public Work Director, waste pretreatment is required, a grease trap shall be installed in the waste line leading from sinks, drains, and other fixtures or equipment in establishments such as restaurants, cafes, car washes, lunch counters, cafeterias, bars, and clubs, hotel, hospital, sanitarium, factory, prison, or school kitchens, or other establishments where grease may be introduced into the drainage or sewage system in quantities that can effect line stoppage or hinder sewage treatment or private sewage disposal. The grease trap installed shall comply with the provisions of section 7 of the

Uniform Plumbing Code, and shall result in the discharge of no more than 100 mg grease per liter from the drainage system. A grease trap is not required for individual dwelling units.

Car washing facilities and/or other businesses which handle liquid wastes containing grease, flammable wastes, sand, solids, acid or alkaline substances, or other ingredients harmful to sewage/drainage systems of the City, are required to install Industrial Interceptors (Clarifiers) and Separators.

See Appendix E, for detailed requirements for Grease Interceptor requirements, Grease Interceptor Checklist, and Requirements for Car Washing Facilities.

LIST OF DRAWINGS

CHAPTER 5 - SEWER

<u>TITLE</u>	<u>DRAWING</u>
Type 1 Manhole	5-01
Shallow Manhole	5-02
Manhole Collar	5-03
Clean-Out	5-04
Outside Drop Inlet	5-04A
Air Release Assembly	5-05
Pig Port	5-06
Terminus Pig Launch Port	5-07
6" Pressure Sustaining Device	5-08
L.S. Emergency Bypass Connection	5-09
Typical Side-Sewer Connection	5-10