

CHAPTER 6 – WATER AND RECLAIMED WATER STANDARDS

6.1 GENERAL INFORMATION

The purpose of this document is to provide guidance and standards for construction of the City of Surprise (city) potable water (distribution and transmission) and reclaimed water systems. The following guidelines and standards are in addition to the Integrated Water Master Plan (IWMP). Any discrepancies between these standards and those in the IWMP shall be brought to the city's attention and resolved by the city. Refer to Chapter 10 for additional information regarding inspection procedures.

1. The potable water system guidelines and standards apply to the City of Surprise water service area only, which is shown online at www.surpriseaz.gov. The reclaimed water system guidelines and standards apply to the City of Surprise water service area only, unless the availability of reclaimed water has been negotiated in a Development Agreement. For development occurring within a service area of another water service provider, contact the appropriate water service provider to obtain their required guidelines and standards.
2. Potable, raw, and reclaimed water lines shall be collectively referred to as water lines unless the type of water is specifically identified. Potable water is water that meets or exceeds the federal drinking water standards. Raw water is water direct from its source prior to any treatment. Reclaimed water is the effluent water that has been treated at a water reclamation facility and meets the state standards for Grade A+ reclaimed water.
3. All water systems shall be designed according to these standards and those of the Maricopa Association of Governments (MAG). These standards shall prevail in the case of any discrepancies between these standards and the MAG standards.
4. Any deviation from these standards and the MAG standards require prior written approval from the City of Surprise following the Engineering Standards Modification Requests explained in Chapter 1 of this document.
5. The city water system lines are categorized into three basic categories: service lines, distribution lines, and transmission mains. A service line is connected to the distribution system and provides potable or reclaimed water to the customer. A distribution line distributes potable or reclaimed water to the service lines. A transmission main conveys raw water from the raw water source to a water treatment facility or reclaimed water from the water reclamation facility to a reclaimed water distribution facility.
6. Public water lines not located in the right-of-way shall be dedicated to the city in an exclusive easement. The minimum width of an easement for a single line shall be 20 feet. Each additional line requires an additional 10 feet in the width of the easement. The line shall be centered in the easement unless otherwise specified by the city.
7. All water lines shall be disinfected and tested as detailed in Engineering's Standard Operating Procedure for Disinfection of New or Repaired Water Connections which is based on ADEQ's Engineering Bulletin #8. City staff will conduct inspections for the operational and testing procedures.

6.2 POTABLE WATER SOURCE

A potable water source is a single point of withdrawal from a well, canal, turnout structure, reservoir, or other related structure. The Water Resource Management Director or designee shall review the potable water source for approval.

6.3 POTABLE WATER QUALITY

Refer to the city's Water and Wastewater Design Guidelines and Standards and Drinking Water Technology Assessment Report for potable water quality requirements.

6.4 FACILITIES

The Water Resource Management Director or designee shall approve the location and specifications for all water supply facilities, booster stations, well and reservoir sites. Site locations shall be level and free from all riverbeds, streambeds, washes, and other features that would diminish the use of the site. See the City of Surprise IWMP and Water and Wastewater Design Guidelines and Standards and Drinking Water Technology Assessment Report for specific design requirements.

6.5 DESIGN CRITERIA

1. Refer to the IWMP for the average day demand for various usages. These water design factors shall serve as a minimum guideline to aid in sizing water infrastructure. If the engineer knows that the facility being designed has unique water demands or that it will require a greater capacity than that determined based on the design factors presented here or in the IWMP, these factors shall be accounted for in the design.
2. Fire flow demands must be considered in the water system design. Refer to the IWMP for the fire flow, storage, pipe sizing, and system pressure requirements related to fire flow demands.
3. A Water Master Plan Report is required to be submitted to the Public Works Department for all residential and commercial developments.
4. A Reclaimed Water Master Plan Report is required to be submitted to the Public Works Department as required in the IWMP.
5. The Water Master Plan Preparation Guide and Reclaimed Water Master Plan Preparation Guide are available on the Engineering Development Services page on the city's website at <http://www.surpriseaz.gov>.
6. All distribution lines and transmission mains shall be designed to meet the design criteria identified in the IWMP.
7. Pressure reducing valves, if necessary, are subject to Water Resource Management Director or designee prior review and approval.
8. Potable water lines and reclaimed lines in major arterial streets shall have a minimum diameter of 16 inches and those in collectors shall have a minimum diameter of 12 inches. Distribution lines in other locations shall have a minimum diameter of 8 inches. These are minimum standards and the city may require larger sizes. All deviations from this standard must be approved by the City of Surprise.

9. Commercial sites shall be designed as a private water system. It shall be a main line to serve potable, fire, and possibly irrigation demands with at least two points of connection with the offsite potable water system and the proper backflow prevention devices.
10. Public water lines should be located in the street such that they are not under sidewalks and so that they are located a minimum of 2.5 feet from the nearest edge of the curb.
11. Public water lines and infrastructure shall not be located in retention/detention basins.
12. All “dead-end” transmission lines and potable water lines shall be terminated with a flushing pipe according to MAG Standard Detail 390, Type B.
13. All “dead end” reclaimed water lines shall be terminated with a flushing pipe according to City of Surprise Standard Detail 6-23.
14. The restraint system design for joint restraint, bends, and fittings shall be submitted to the city for review and approval. The minimum requirement is conformance with MAG Standard Details 302-1, 302-2, 303-1, 303-2, 380, and 381.

6.6 RECLAIMED WATER SYSTEM

1. Reclaimed water systems shall be designed as pressurized water distribution systems, except where differences are noted in this document, other applicable standards, or in regulations. All reclaimed water lines must meet the requirements of ADEQ Section R18-9-602.
2. Reclaimed lines shall be tested using potable water. The city’s Construction Water Guidelines detail the process for obtaining water. A test plan and diagram demonstrating the required air gap and test procedure will be submitted to and approved by the City of Surprise prior to conducting the test.
3. A direct connection between reclaimed water, potable water, or sewer lines will not exist under any condition. The only approved connection between the systems will be an approved air gap.
4. Reclaimed water lines shall not be placed into service until all applicable reclaimed water permits, approvals, and user agreements are completed and on-site reclaimed as-built plans are received by the City of Surprise. All potable connections must be physically disconnected prior to connection to the reclaimed water system. Reclaimed meters will only be set when an approved backflow preventer is in place and the pipe is installed up to the meter box on both sides of the meter. Valves in the city’s reclaimed water system shall only be operated by City of Surprise Operators.
5. All valves, air relief valves, pressure reducing valves, pumps, pump control valves, meter box lids, meter box interiors, and any other appurtenances for the reclaimed water system shall be painted purple (Pantone No. 512) or have purple color integrated into the material. All mechanical equipment appurtenant to the reclaimed water system shall also be painted purple. All flanged side outlets, drain valve assemblies, blow-off valve assemblies, sampling taps, and air or vacuum release valves shall have an attached sign reading “Reclaimed Water – Do Not Drink.”

6. Signage may be required for areas irrigated by reclaimed water. Specifications and requirements shall be in accordance With Arizona Administrative Code R-18-9-602 and R18-9-704.

6.7 PIPELINE MATERIALS

All standard pipe materials shall comply with MAG standard specifications and details except as modified below:

1. Standard materials and details for all pipes less than 12 inches in diameter shall be, at a minimum, class 200.
2. PVC pipe may be utilized for potable water and reclaimed water mains that are less than 12 inches in diameter as outlined in the most recent version of AWWA C900.
 - a. PVC pipes used for potable water shall be blue in color.
 - b. PVC pipes used for reclaimed water shall be purple (Pantone No. 512) in color.
3. DIP shall be utilized for potable, reclaimed, or transmission water mains that are 12 inches or more in diameter. Other materials may be considered and approved by the Water Resource Management Director or designee.
4. Where ductile iron pipe is used, all pipes shall be polyethylene-wrapped and all fittings shall be encased in a polyethylene tube and installed in accordance with AWWA C105 and C600 unless directed otherwise by the city.
 - a. Polyethylene wrap for potable water lines shall be blue in color and labeled "Caution: Potable Water Line"
 - b. Polyethylene wrap for well transmission lines shall be black in color and labeled "Caution: Raw Water Transmission Main"
 - c. Polyethylene wrap for reclaimed water lines shall be purple (Pantone No. 512) in color and labeled "Caution: Reclaimed Water – Do Not Drink"

6.8 FIRE SERVICES

1. Fire hydrants can only be installed on reclaimed water systems with the approval of the Water Resource Management Director or designee.
2. This section applies to fire hydrants on the potable water system only.
3. Public fire hydrants shall be located outside of street improvements but within the right-of-way. General spacing for fire hydrants is as follows:
 - a. 500 feet maximum in a single-family residential development and not more than 400 feet hose lay from the center of any structure.
 - b. 300 feet maximum in a multi-family residential development.
 - c. 300 feet maximum in commercial/industrial areas.
 - d. 500 feet maximum on arterial streets, parkways, and collector streets without homes fronting the street.

- e. 500 feet maximum (250' staggered on each side of the roadway) for divided arterial streets, parkways, and collector streets without homes fronting the street.
 - f. Fire hydrants shall not be installed on any portion of a dead end line that is more than 400 feet from its supply source.
 - g. Fire hydrants shall be located between one foot and six feet from the back of curb on all streets.
 - h. All fire hydrant locations for land uses other than single family residential shall match the approved site plan.
4. Arizona Department of Environmental Quality (ADEQ) Bulletin 10 shall apply to all city water lines.
 5. The only acceptable Dry Barrel fire hydrant models and manufacturers per City Water Resource Management Department are: Mueller "Centurian", Clow "Medallion", Waterous "Pacer WB67-250", and Watermaster "5CD250" with the typical "T" design and two 2 ½" National Standard Thread (NST) orifices and one 4 ½" NST orifice, installed with either a horizontal or vertical shoe. The only acceptable Wet Barrel fire hydrant model and manufacturer is Clow "800 Series" with two 2 ½" National Standard Thread (NST) orifices and one 4 ½" NST orifice.
 6. Fire hydrants shall be painted yellow. (Enduratone, Series 1029, Safety Yellow or approved equal)
 7. Fire hydrants located outside of city right-of-way shall be private and shall follow the same guidelines as public fire hydrants.
 8. Blue retro-reflective pavement markers shall be used as a method of identifying fire hydrant locations. Retro-reflective pavement markers shall be 911A-blue, Fire Lite, Amerace Corporation, Signal Products Division, or approved equal. For proper placement, refer to MAG Standard Detail 122.
 9. Service taps are prohibited on any waterline that is designed primarily to service fire sprinklers and/or fire hydrants.
 10. Fire sprinkler lines shall be located such that maintenance activity will not disrupt normal access to the community. The owner shall be responsible for the sprinkler line up to and including the tap and sleeve coming off of the city main. Backflow prevention assemblies are required per Section 6.15.
 11. Fire sprinkler system shall be installed if fire flows do not meet the requirements per the IWMP or as required by applicable building codes.
 12. A City of Surprise Civil Permit is required for the installation of underground fire lines and all inspections and testing must be performed by the Water Resource Management Director or designee.
 13. Private fire lines shall be marked with blue #12 AWG locate wire located one foot above the top of pipe from the fire line backflow preventer to the building riser.

6.9 DEPTH AND SEPARATION OF POTABLE AND RECLAIMED LINES

1. Minimum cover over top of the pipe shall be consistent with MAG Standard 610; 36 inches deep for all potable and reclaimed water lines smaller than 12 inches and 48 inches deep for lines 12 inches and larger and for mains located in major streets. In the City of Surprise water service area, this depth shall be measured from top of pipe to top of finished grade.
2. The proposed depth shall be noted clearly on each plan sheet. Any changes in depth required to avoid conflicting utilities, etc., shall be noted.
3. Reclaimed water lines that are in conflict with potable water lines shall dip below the potable water line and shall comply with the separation and protection criteria in MAG Standard Details 404-1, 404-2, and 404-3 and Sections 610.5, 615.3, and 616.3 of the MAG Standard Specifications. See City of Surprise Details 3-01 through 3-07 for standard cross sections and utility locations.

6.10 AIR RELEASE

1. Air release valves, vacuum release valves, or other suitable means of air control shall be installed at the high points in a line or where extensive changes in line slope are present. Metal cages, lockboxes, or an approved equal shall be installed for all air relief valves.
2. All air relief assemblies and cages on the reclaimed water system shall be painted purple (Pantone No. 512), and the valve shall be labeled "Reclaimed Water-Do Not Drink."
3. Refer to City of Surprise Details 6-21 and 6-22 for air/vacuum valve assembly details.

6.11 VALVES

1. All gate valves shall be resilient seated AWWA C509 solid wedge gate, and they shall open left.
2. All valves shall be located per City of Surprise Detail 6-01 if installed at an intersection. If in a mid-block location, they shall be in line with the property line extension.
3. Butterfly valves shall not be permitted on lines less than 24 inches in diameter without the written approval of the Water Resource Management Director or designee. Manholes are to be installed at all butterfly valve locations per City of Surprise Standard Detail 6-03, and they shall be labeled "Water" for potable water valves, "Reclaimed" for reclaimed water valves, and "Raw Water" for well transmission lines. All valves on reclaimed water lines shall be painted purple (Pantone No. 512).
4. Valve boxes for potable water valves shall be installed per MAG Standard Detail 391-1, Type C only.
5. Valve boxes for reclaimed water lines shall be square. Lids shall have the words "Reclaimed Water" on the top in raised 1-inch letters. See City of Surprise Standard Detail 6-24.

6. Valve boxes for raw water transmission mains and non-potable water lines shall be round and in accordance with MAG Standard Detail 391-1, but with the writing on the cover reading "WATER" replaced with "NON POTABLE WATER." The letters of the writing shall be 1 inch high and shall be raised by 1/8 inch.
7. Debris caps shall be installed per MAG Standard Detail 392. Debris caps shall be colored blue for potable water lines, black for raw water transmission lines, and purple (Pantone No. 512) for reclaimed water lines.
8. Debris caps shall be locking debris caps for both potable water and reclaimed water valves.
9. The maximum spacing of valves on potable and reclaimed water lines in industrial, commercial, and multi-family districts shall be 500 feet. In single-family residential districts, the maximum spacing shall be 800 feet. Refer to City of Surprise Detail 6-01 for valve placement locations.
10. All valves located outside of paved areas shall be identified by a Carsonite continuous glass fiber and a resin-reinforced CUM-375 Composite Marker or approved equal installed ten feet offset from the valve centerline, but not outside of the dedicated right-of-way or easement limits. The marker shall be colored blue for potable water valves, black for raw water transmission valves, and purple (Pantone No. 512) for reclaimed water valves. The installation of the marker in an alternate location shall follow the Engineering Standards Modification Requests found in Chapter 1 and be approved in writing by the Public Works Department.

6.12 SERVICE LINES AND METERS

1. The following applies to both potable and reclaimed water systems:
 - a. The water meter make, model, and manufacturer shall be determined by the City of Surprise and shall meet the requirements specified in Standard Details 6-05 and 6-07.
 - b. For installations with multiple meters, volume and pressure behind the meters shall equal volume and pressure before the meters, as required for the structure.
 - c. Service lines shall be made of Type K copper with a minimum diameter of one inch from within the right-of-way to the meter. There shall be one meter per service line.
 - d. Irrigation systems, excluding systems on single family residential lots, shall have a separate service line and meter.
 - e. All irrigation lines, 1 inch or greater, within the right-of-way shall be shown on the water plans.
 - f. The developer shall install water services except the setting of the meters.
 - g. Meters shall be located within the right-of-way. The city shall be responsible for the water service line up to and including meters in the right-of-way.

- h. Cross-access easements shall be granted to the city as necessary for maintenance purposes and reading of meters on private water systems.
 - i. Meters shall not be located in parking lots, service driveways, residential driveways, or in areas of concrete or asphalt paving.
 - j. Meters shall not be fenced in or enclosed and must be accessible at all times. If a meter is to be installed in a landscaped area, the meter service shall be installed so that any runoff flows away from the meter installation.
 - k. Only brass compression fittings shall be used when joining water service pipes. Sweated joints shall not be allowed within the city right-of-way.
 - l. Only double-strap brass saddles are to be used for water service connections to the main line.
 - m. Both wet taps and dry taps are permitted within the city; however, size-on-size wet taps are not permitted.
 - n. A minimum horizontal separation of three feet is required between all taps.
 - o. Locate water service at least 3 feet from property line of lot. Location should not conflict with driveways or sewer tap. Curb stop to be 18 inches behind and 8 inches below finished sidewalk.
 - p. In cases where driveways may conflict with normal placements of water and/or sewer services, developers may propose alternative locations. However, in no case will the water services be closer than 3 feet or the sewer services closer than 6 feet to the property lines.
2. The following applies to reclaimed water systems only:
- a. Reclaimed meters will not be installed without the complete removal of all connections, including temporary connections, to the potable water system. As-built plans and all required permits and inspections also shall be completed and submitted to the city prior to the installation of the meter.
 - b. Sampling/flushing taps must be installed once every mile on reclaimed water lines. The associated sample station shall be a Safety-Guard Technologies sample station or approved equal. The sampling station shall be tapped directly into the main line. See City of Surprise Detail 6-17A.
 - c. For reclaimed water service lines, the copper pipe shall be wrapped with purple (Pantone No. 512) polyethylene tape and labeled "Reclaimed Water – Do Not Drink."
 - d. Reclaimed water meter lids and box interiors shall be purple (Pantone No. 512) in color and have a meter tag attached to the meter reading "Reclaimed Water – Do Not Drink."
3. The following applies to potable water systems only:
- a. There shall be one service line and one meter per residential lot and commercial building and/or individual owner, including multi-family housing. Certain uses will require separate meters.

- b. A water quality sampling station shall be installed from a separate service line in each quarter (1/4) section of new developments and shall be a Safety-Guard Technologies sample station or approved equal. Refer to Detail 6-17B. Sampling stations shall be placed within the City right-of-way or in a water/public utility easement. Location shall be approved by the City prior to installation. Sampling stations and easements shall not be placed on private residential property or connected to a residential unit service line. Sampling stations may be installed within a landscape tract within a water/public utility easement or right of way.

6.13 PIPE BEDDING, BACKFILL, AND MARKER BALL REQUIREMENTS

1. All pipe installed within the city must be properly bedded. The bedding shall extend from the bottom of the excavation to one foot above the pipe. The bedding shall consist of Aggregate Base Coarse (ABC).
2. All pipes having a diameter of 12 inches or greater require initial bedding under the pipe. Initial bedding under the pipe is required in all cases where rocks larger than 1½ inches in diameter are encountered on the trench bottom.
3. Refer to MAG Section 601.4 and MAG Detail 200-1 for trench excavation, backfilling, and compaction specifications.
4. In cases where Controlled Low Strength Material (CLSM) backfill is used to backfill a trench, all service lines that may cross the trench shall be encased in a conduit. The size of the conduit shall be two times greater than the diameter of the service line. Conduit material shall be SDR 40 PVC.
5. Marker balls shall be installed on all potable water, reclaimed water, and transmission main lines at all fittings and every 100 feet if the distance between fittings is greater than 100 feet. Marker balls shall be tested prior to installation. Potable and transmission marker balls shall be blue. Reclaimed water marker balls shall be purple. Refer to the City of Surprise Standard Detail 6-25.
6. All lines shall be marked with blue #12 AWG locate wire located one foot above the top of pipe.
7. All lines shall be marked with marking tape located one foot above the top of the pipe.
 - a. Marking tape for potable water lines shall be blue in color and labeled "Caution: Potable Water Line"
 - b. Marking tape for well transmission lines shall be red in color and labeled "Caution: Raw Water Transmission Main"
 - c. Marking tape for reclaimed water lines shall be purple (Pantone No. 512) in color and labeled "Caution: Reclaimed Water – Do Not Drink"

6.14 CONSTRUCTION WATER

The city issues potable and non-potable construction water use permits. Refer to the City of Surprise Construction Water Guidelines available online at <http://www.surpriseaz.gov>.

6.15 BACKFLOW PREVENTION DEVICES

1. All potable services and reclaimed water irrigation services require city approved backflow prevention devices to be installed as near to the public system as practical.
2. On any premises where reclaimed water is used, all potable water supplies shall be equipped with a RP backflow preventer.
3. Backflow prevention devices shall be installed directly downstream of the water meter.
4. For private water or reclaimed systems, RP backflow preventers shall be installed at the entrance to the private system.
5. Backflow preventers on the reclaimed system shall be tested using equipment dedicated to reclaimed water only. The same equipment cannot be used on backflow preventers on the potable water system. All reclaimed backflow preventers shall be painted purple and shall have a sign affixed stating "Reclaimed Water – Do Not Drink."
6. Backflow prevention assembly shall be protected by cages, screen walls, or guard posts as specified in City of Surprise Engineering Development Standard Details 6-14 and 6-16, and MAG Detail 140.
7. A backflow prevention assembly will be required on fire service lines as shown in City of Surprise Standard Detail 6-11 and the USC Manual of Cross Connection Control. The maximum length without a backflow prevention assembly shall be 50 feet from the tap to the riser.
8. All Proposed backflow devices shall meet new EPA low-lead standards and shall be on the approved list by the University of Southern California, Foundation for Cross-Connection Control and Hydraulic Research (USC-FCCCHR).

6.16 SITE WATER MODEL REQUIREMENTS

For individual sites, a water model must be submitted for review and approval by the City of Surprise. All water models must meet the requirements of the Water Model Report Format Guidelines found in Appendix 6-1 of this document.

6.17 NEW OR REPAIRED WATER LINE/SYSTEM TESTING

The contractor shall request the sampling and/or testing no later than 48 hours prior to the time when test or samples are to be taken. After the line/system is constructed and tested, it shall not sit idle no longer than two weeks from approval without written approval by the city or all new testing and sampling shall be required.

1. Pressure Test
 - a. All water mains must conform to MAG SECTION 611.1 for pressure and water tightness testing.
2. Chlorination And Bacteriological Test
 - a. All disinfecting of water mains must conform to MAG SECTION 611 unless noted otherwise below.
 - b. Preliminary Flush and Chlorine Residual:

- i. Following the pressure test, all mains 12 inches and smaller shall be flushed prior to chlorination with water pressure and outlets available.
 - ii. It is the contactors responsibility to provide the appropriate dosage greater than 50 ppm and the city to verify it. Means and method to obtain this level is solely upon the contactor.
 - iii. All mains shall be chlorinated so that a chlorine residual of not less than 25 ppm remains in the water after 24 hours standing in the pipe.
- c. Flush:
 - i. Following chlorination all treated water shall be flushed until the replacement water throughout the pipeline can be proved, by laboratory testing, comparable to the water served from the existing system. Prior to sampling for laboratory testing the residual chlorine throughout the length of the pipeline shall be reduced to 2.0 ppm or less.
- d. Sampling and Testing:
 - i. City shall take a bacteriological sample at each sampling riser as specified by MAG 611.2.11 once it is determined that the residual chlorine is 2.0 ppm or less.
 - ii. City shall take a second bacteriological sample after the water line has sat undisturbed for 24 hours.
 - iii. Satisfactory water quality shall continue for a period of one day (24 hours) as noted by laboratory examination of these samples.
- e. The original chlorination procedure shall be repeated until satisfactory results are obtained.

APPENDIX 6-1

WATER MODEL

REPORT FORMAT GUIDELINES

WATER MODEL REPORT FORMAT GUIDELINES

1. Describe model used.
2. Assumptions
 - a. Pump curves obtained from fire flow tests. (*Flow tests are to have been performed within the previous six months from date of report*)
 - b. Criteria used in the model and fire flow requirement (provided by COS Fire Department)
 - c. Results/Discussion – proposed facilities are adequate to serve development based on hydraulics, etc...
3. Summary/Conclusions
 - a. Discuss how the objective of the report has been met. (i.e. Proposed facilities will serve the proposed development in accordance with established criteria.)
 - b. List all major facilities required and phasing as applicable.
4. Appendices
 - a. Water modeling results organized by:
 - i. Average Day
 - ii. Maximum Day
 - iii. Peak Hour
 - iv. Maximum Day plus Fire Flow
 - b. The following information is to be included for the above scenarios:
 - i. Junction/Node Report – node label, elevation, demand, hydraulic grade line in feet and pressure in (lbs./in²).
 - ii. Pipe Report – pipe label, nodes, length, diameter, Hazen-Williams “C” value, discharge, velocity, headloss and headloss gradient.
 - iii. Pump Report – pump label, elevation, discharge, discharge pump grade and pump head.
 - iv. Valve Report – valve label, elevation, diameter, valve status, discharge and hydraulic grade line.
 - v. Reservoir Report – reservoir label, elevation, hydraulic grade line and outflow.
 - vi. A separate fire flow report for the maximum day plus fire flow scenario to be submitted. The fire flow report is to show the following information for all nodes: node label, satisfies fire flow constraint, needed fire flow, available fire flow, total flow available, residual pressure, minimum system pressure and minimum system pressure node.
5. Exhibit for peak hour, average day and maximum day exhibits are required. Exhibits to include the following:

- a. Pipes and nodes labeled
 - b. Pressure at nodes
 - c. Major Roadways labeled
 - d. Pipe size shown
 - e. Major contour lines shown
6. Figures, exhibits, tables and spreadsheet tabulations to be placed in the body of the report.