09.00 PUBLIC WATER DISTRIBUTION SYSTEMS

09.01 DESIGN OF WATER MAINS

09.01.01 PERMITTING

A. The City of Monroe has delegated authority to review and approve the construction of all public water mains that connect to the City's existing water distribution system. The Developer/Design Engineer shall secure a permit in accordance with Chapter 57 of the City of Monroe's Ordinance: Water and Sewer Main Extensions Delegated Permit Authority, Delegated Permit Program and further referenced by 15A NCAC 02T.0306. Any projects involving an environmental assessment shall be permitted through the North Carolina Department of Environmental Quality Division of Water Resources (NCDEQ- DWR).

09.01.02 EXTENSION POLICY

A. The Developer/Design Engineer shall refer to the City of Monroe Extension Policy before proceeding with design of public water facilities.

B. It shall be the City's policy to serve all properties with a land elevation of 640 feet or below from the City's "east" water distribution system pressure zone. This is synonymous with the 763-foot reservoir overflow gradient. Any property above the 640 foot ground elevation contour desiring service from the "east" pressure zone shall obtain the approval from the Director of Water Resources only after demonstrating adequate fire flow and satisfying the minimum requirements set forth herein. A condition shall be recorded on the final plat or building permit(s) of the above mentioned properties requiring the Developer to install pressure boosting equipment on each customer water service if they desire water pressure higher than that supplied from the City system.

C. All private water mains, extensions serving more than one recorded parcel to be owned and maintained by the customer, shall adhere to the City of Monroe's Standard Specifications and Details but shall be submitted to NCDEQ for review and approval. The City of Monroe will review and permit only public water mains connecting to City of Monroe's water distribution system.

D. The City of Monroe Planning Department must approve all Subdivision Plans within the City's Corporate Limits prior to a review of Water Main Extension Plans to serve the Subdivision.

E. All Subdivisions or public improvements outside City of Monroe Corporate Limits, which will be dedicated to the City, shall adhere to the pertinent

clauses and paragraphs and sentences within Section 09. The Developer shall provide bonding or other financial security to guarantee completion of the project in a timely manner, warranty of the project work, and payment of City costs. His/her appointments shall procure and provide insurance(s) conforming to the City insurance requirements and defend, indemnify and hold harmless the City of Monroe from claims arising from their work on the project.

09.01.03 FIRE DEMAND

A. System design should be such that fire flows and facilities are in accordance with the requirements of the State Insurance Services Office. The minimum fire flow shall be 1000 GPM with a minimum residual pressure of 20 PSI for single-family residential subdivisions.

B. Other developments shall use the "ISO Guide for Determination of Required Fire Flow." Where these requirements cannot be met, contact the Director of Water Resources for guidance.

09.01.04 HYDRAULIC DESIGN

A. Water distribution systems shall be designed to provide adequate flow and pressure for both domestic supply and fire protection.

B. When requested, the Design Engineer shall submit calculations of fire requirements and domestic water demands for the project. Information concerning the available water pressures and capacity will be furnished by the City upon request. The water distribution systems and any extensions shall be designed to supply the demands of all customers while maintaining the following minimum pressures and velocity.

1. 40 PSI for maximum daily flow
2. 30 PSI for peak hourly flow
3. 20 PSI for maximum daily flow plus fire flow
4. 4 FPS for flushing

C. The minimum pressure of 20 PSI for maximum daily flow plus fire flow shall be at ground level at all points in the distribution system. Residential and light commercial average daily flow requirements shall be determined by use of AWWA Manual No. M22, latest edition. Actual estimates for site specific commercial and industrial customers shall be used or the Design Engineer's conservative estimate for "Spec" developments.

D. Transmission mains 12-inches and larger shall be designed on the basis of the most recent system wide demand data and hydraulic modeling.

E. Pressure reducing valves shall be installed on the customer side of the meter whenever the maximum system pressure at the service connection is greater than 80 PSI.

F. Water mains shall be looped whenever practical. Dead-end mains when approved by the City, shall not exceed 1000 feet in length and shall be sized to provide maximum retention time of water in the dead-end section of 24 hours based on 80% of the average daily consumption at full development.

09.01.05 SERVICE LINES AND METERS

A. All water and sewer services shall be installed within 1-foot of the exact center of each lot and have a 2 foot separation with each other. The Developer shall have a licensed surveyor place a stake in the ground to identify the exact location of each lot's centerline and the right of way for construction purposes. Water and sewer services installed under the lot driveway or not within 1-foot of the centerline shall be rejected. If an installed water and/or sewer service is in conflict with a proposed driveway, the service will be required to be relocated at the Developer's expense. Refer to Standard Detail 10.08.01. An exception will be permitted for lots located in cul-de-sacs where water and sewer services shall be installed near the property line to avoid conflicts with the driveway construction.

B. Far side services in new residential subdivisions shall be a minimum of 1-inch in size for the purposes of installing irrigation services at a later date if requested. The split for the domestic line and irrigation line shall be accomplished through the use of an approved Y-Branch fitting. Location and spacing of each meter box shall meet the requirements of these Specifications.

C. All meter types and sizes shall be approved by the Director of Water Resources based upon obtaining the highest degree of accuracy for the patterns and quantities of usage by the specific customer.

D. All water meters shall be installed in accordance with Standard Detail 10.08.00, 10.08.01, and 10.09.00 and meet the current fiscal year specification.

E. Any new or re-developed property that pose a potential risk to the City’s water supply will be required to install a backflow prevention device as determined by the Water Resources Engineering Manager. Refer to Standard Detail 10.10.00 and 10.16.00.

09.01.06 SURVEY REQUIREMENTS

A. All existing underground utilities (water, sewer, gas, storm sewer, telephone, electric, cable, etc.) along the route shall be located horizontally.

B. Vertical control shall be tied to NGS, NCGS or established City control points. Temporary bench marks shall be established at intervals of approximately 1000-feet and tied back to the established vertical control with the maximum error of 0.03'/ M, where M is the number miles in the level loop.

C. Horizontal alignment shall be chosen in coordination with the Design Engineer and referenced to the edge of pavement, right-of-way line, or other identifiable feature. Centerline profile shots shall be taken at 50-foot intervals with closer shots at break points such as culverts, creeks, etc. In cut sections, edge of pavement profile is required also.

D. All water mains 12-inches and greater in diameter shall require a profile on the Design Plans submitted.

E. All physical features such as roads, curbs, ditches, driveways, trees, poles, fences, etc. are to be shown on the Design Plans.

F. Indicate all adjacent property owners and their boundaries, including all property pins located in the field.

G. Indicate existing and proposed final grade.

H. All road boundaries, types of road and driveway (gravel, asphalt, concrete), street names, and ownership (City, State) are to be identified.

I. Identify field survey location of geotechnical test pits as required.

J. All water main extensions requiring a General Public Utility Easements shall be determined in consultation with the Water Resources Engineering Manager and approved by the Director of Water Resources.

K. Any water main extension that is part of an Annexation or Capital Improvement Project (CIP) shall adhere to all Engineering Design and Survey Requirements of the Specific Request for Proposal (RFP) written for the project by the Water Resources Department.

09.01.07 LOCATION AND DEPTH

A. As a general rule, water mains are located only within the limits of a street or highway right-of-way. Where this is not possible because of construction

conditions, underground conflicts, or requirements of the controlling agency, location in private easements may be approved by the City. Insofar as possible, water mains should be located out of existing paved areas and a fixed distance from the edge of pavement or back of curb. Alignment should be chosen so as to minimize conflicts with utilities and underground structures. The Design Engineer in conjunction with the Surveyor is referred to Local Residential Streets Detail contained in Division 08 of the City Standard Specifications and Detail Manual. Where water mains are to be extended along Private Streets a cross sectional detail shall be required showing all horizontal and vertical location of all proposed utilities.

B. Depth of water lines shall be set to minimize high and low points and at sufficient depth to prevent freezing. A minimum cover of 36-inches below final grade is required for water mains greater than 2-inches in diameter except where short sections at shallower depth are required to avoid major utility conflicts. In cases where the depth is less than 36-inch, ductile iron shall be used unless otherwise directed by the Water Resources Engineering Manager. Under no circumstance shall water mains be installed with less than 24-inch of cover.

C. A maximum cover of 5 feet or 60-inches shall be required except where greater depths must be obtained in order to avoid conflicts with other utilities or existing structures.

D. Where the centerline of grade is higher than the edge of pavement, the top of the water main shall be 36-inches below the edge of pavement.

09.01.08 PIPE MATERIALS

A. All pipe, fittings, valves, fire hydrants, service materials, and other related appurtenances shall conform to the City Standard Specification Section 09.02.00. An approved list of materials is provided on the Water Resources homepage.

09.01.09 THRUST RESTRAINT REQUIREMENTS

A. Thrust restraint for water mains shall be provided by use of wedge action retainer glands with the option of incorporating thrust blocks.

B. Solid concrete blocking sizing must be supported be subsurface investigations or conservative calculations that define the bearing capacity of the soil at the location of the proposed blocks. The Contractor is referred to Standard Detail 10.02.00.

C. A determination of the restrained pipe length must account for the weight of the soil overburden, water table, coefficient of friction between the soil and pipe, weight of the pipe, and the weight of the contents of the pipe.

D. A minimum safety factor of 1.5 and an assumed test pressure of 200 psi shall be used to determine the length of restrained joints, bearing area of solid concrete blocks, or anchor collars.

E. The following applications require self-restraining pipe and/or use of mechanical joint fittings and retainer glands, where applicable:

1. Fittings and bends
2. Fire hydrant branches
3. Valves as determined by the Water Resources Engineering Manager
4. All water mains used as a carrier pipe inside a steel casing must be restraint joint ductile iron pipe per Section 09.02.00.

09.01.10 VALVING REQUIREMENTS

A. Valves should be located at not more than 1000 foot intervals for distribution mains and 2000 foot intervals for transmission mains 12-inch or larger in diameter unless otherwise directed by the Water Resources Engineering Manager. Where systems serve widely scattered customers and where future development is not expected, the valve spacing shall be as determined by the Water Resources Engineering Manager.

B. Two valves shall be provided at tees and three valves at crosses, with valves located either at road intersection radius points or as close to the fitting as possible. Valves shall be attached directly to tee or crosses with no offset allowed. If the line is a one way feed, the valve should be on the dead-end side of the hydrant branch.

C. Mainline valves shall also be located at changes in pipe diameter.

D. Each fire hydrant shall have a hydrant guard valve between the hydrant and the main.

09.01.11 FIRE HYDRANT LOCATION AND SPACING

A. Fire hydrants shall be located within 1000 feet from the homes in single family residential developments as measured along the nearest City rights-of-way. Fire hydrants located in residential cul-de-sacs shall be with-in 500 feet of the rear setback of the last lot as measured along the street. Fire

hydrants in commercial, industrial or multi-family areas shall be located within 750 feet as measured along the nearest City right-of-ways.

B. All hydrants shall be located as close to the road boundary as possible and in line with property lines between adjacent property owners.

C. All hydrants shall be installed on water mains sized six (6) inches and larger in diameter or greater unless otherwise directed by the Water Resources Engineering Manager.

D. The City of Monroe may require additional hydrants to be installed on private property to meet the facility's requirements. In such case these hydrants shall be considered private and not a part of the City distribution system. All private hydrants shall be painted a metallic silver to differentiate them from City of Monroe Fire Hydrants.

E. Location and spacing requirements shall meet the approval of the City of Monroe Fire Department.

09.01.12 TESTING AND DISINFECTION

A. Provisions for testing and disinfection is covered under the Specification 09.03.00.

09.01.13 AIR RELEASE, AIR RELIEF, VACUUM VALVES AND BLOWOFFS

A. Fire hydrants shall be located at high points on all mains as directed by the Water Resources Engineering Manager. Automatic air release valves shall also be required where there is an elevation change of 10 feet or greater from a high point in the water main alignment and the upstream and downstream elevations.

B. On pumped lines or in any other application where the potential for water column separation exists, the Design Engineer shall evaluate the need for automatic air relief and vacuum valves and shall recommend specific valve configurations for approval by the Director of Water Resources.

C. All transmission mains 12-inches and larger shall be designed in such a manner that they can be de-watered completely within 4-hours through blowoffs and fire hydrants.

D. Dead-end mains 2-inch through 10-inch shall be terminated with a 2-inch blowoff in accordance with Standard Detail 10.12.00. Blowoffs on mains greater than 12-inch shall be designed in order to achieve a minimum scour velocity of 2.5-3 feet per second.

09.01.14 MINIMUM PIPE SIZE AND LIMITATIONS OF SMALL DIAMETER MAINS

A. The minimum diameter for distribution system mains providing fire flow shall be 8-inches for new mains as part of a public improvement, major or minor subdivision, or site improvement. Provision for fire protection on existing 6-inch mains shall be made provided that it satisfies the requirements in 09.01.03 and 09.01.04 and approved by the Water Resources Engineering Manager. Larger size mains may be required if necessary to allow the withdrawal of the required fire flow while maintaining the minimum residual pressure as described in Sections 09.01.03 and 09.01.04.

B. 2-inch diameter lines may be used in residential subdivisions only for a maximum length of 500 feet, where fire flow requirements and minimum hydrant spacing is provided by 6-inch and larger mains. No more than 20 residential customers may be served from a dead-end 2-inch main and no more than 40 customers may be served from a looped 2-inch main.

C. Commercial or industrial developments shall have a water mains sized to provide for fire line connections to all parcels of suitable size to meet the proposed fire flow needs as determined by the City of Monroe Fire Department and the Design Engineer.

09.01.15 SEPARATION DISTANCES

A. Sewer Mains

1. Water mains crossing sewers shall be laid to provide a minimum vertical distance of 18-inches between the outside diameter of the water main and the diameter outside of the sewer. This shall be the case where the water main is either above or below the sewer.

2. Whenever it is necessary for a sewer main to cross under a water main with less than 18-inches of vertical separation, the water main shall be constructed of ductile iron pipe for a distance of 10 feet on each side of the point of crossing by use of a single piece of pipe unless an exception is granted by the Water Resources Engineering Manager or their authorized representative.

3. Whenever it is necessary for a sewer main to cross over a water main, both mains shall be constructed of ductile iron pipe with one full length of pipe (min. 20 feet) installed so both joints will be equidistant from the utility.

4. Water mains shall be laid at least 10 feet horizontally from existing or proposed sewer mains unless local conditions or barriers prevent a 10-foot horizontal separation. In that case, the sewer main will be laid in a separate trench, with the elevation of the bottom of the water main at least 18-inches above the top of the sewer. When these conditions are not met, both mains shall be ductile iron pipe.

5. Sewer lines shall be installed at least 100 feet from potable water wells. Where this separation is not possible the sewer line shall be ductile iron pipe. Sewer lines shall not be installed within 25 feet of any private well or within 50 feet of any community well.

B. Gas, Electrical and Telephone Duct Banks

1. When crossing gas mains, electrical or telephone duct banks, a vertical clearance of 18-inches shall be maintained. Whenever the 18-inch clearance requirement is not met, ductile iron pipe shall be used. Separation distances and type of pipe material may deviate from above as authorized by the City of Monroe Energy Services Gas Manager.

C. Underground Cables

1. Electric, telephone, and communication lines may be crossed with a minimum clearance of 12-inches and a horizontal separation of 2-feet.

09.01.16 BORING AND JACKING

A. Steel casing pipe shall be required for all water mains crossing railroads, major City streets, highways owned by the NCDOT, and commercial/industrial property and facilities as deemed appropriate by the Water Resources Engineering Manager. Minor City streets and roads owned by the NCDOT may be open cut only upon written approval from either the Water Resources Engineering Manager or NCDOT District Engineer, respectively. The Developer shall abide by all additional requirements laid out in the permit issued by the agency having jurisdiction over said facilities.

B. Installation of the steel casing pipe shall be performed either by boring and/or jacking method. The Developer is responsible for proper line and grade at each crossing.

C. The Developer is referred to Section 09.03.07 – Casing Pipe Installation, Specification 09.02 – Water Main Materials and Standard Detail 10.20.00.

09.01.17 STREAM CROSSINGS

A. Water mains crossing steams shall be restrained-joint ductile iron pipe conforming to Specification Section 09.02 – Water Main Materials.

B. The pipe shall be buried at sufficient depth to provide a minimum of two (2) feet of cover between the top of the pipe and the streambed. The pipe and joints shall be protected against streambed erosion, unstable subsoil conditions, and any other anticipated horizontal or vertical loading. Consideration shall also be given to protect the pipe against floatation. The Design Engineer shall submit calculations, details, and plans for design.

C. The Developer shall comply in all respects with the requirements of the applicable permits issued for the project.

D. When crossing water crosses which are greater than 15 feet in width, the following shall be provided:

1. The pipe shall be restrained-joint ductile iron pipe as specified above and extend a minimum of 10-feet beyond each side of the crossing.

2. Valves shall be provided at both ends of the water crossing so that the section can be isolated for testing or repairs; the valves shall be easily accessible, and not subject to flooding; and the valve closest to the supply source shall be in a manhole.

3. Permanent taps shall be made on each side of the valve within the manhole to allow insertion of a small meter to determine leakage and for sampling purposes.

09.01.18 EROSION AND SEDIMENT CONTROL MEASURES

A. All necessary precautions shall be taken to prevent soil erosion and sedimentation of streams and drainage ways. The erosion and sediment control component of all water main Design Plans shall conform to and be implemented in a manner consistent with the NCDEQ Erosion and Sediment Control Planning and Design Manual and the City of Monroe Erosion Control Code Ordinance.

09.01.19 ENGINEERING PLAN SUBMITTAL REQUIREMENTS

A. Sealing Plans

1. All plans submitted for review by the City of Monroe Water Resources Department must be stamped, signed and dated by a Licensed North Carolina Professional Engineer with expertise in the design of water mains. The Professional Engineer shall be in good standing with the North Carolina State Board of Registration and shall be in responsible charge of the project.

B. Drafting/Design Requirements

1. A legend of symbols is required with each set of construction plans and where additional symbols are required, they shall be clearly defined and included in the legend.

2. The standard scale for City Of Monroe construction drawings is 1" = 40' or 1" = 50' in plan view and 1" = 4' or 1" = 5' in profile, respectively. Expanded detail drawings should be used whenever needed to clearly convey design details. Standard sheet size shall be 24" x 36" for construction plans. Please note, that 42" x 30" sheets will not be permitted. Standard sheet size shall be 8-1/2" x 14" for any NCDOT encroachment maps. All sheets must contain the standard City of Monroe title block format, City of Monroe Erosion Control Detail Sheets and Water and Sewer Details Sheets, where appropriate.

3. Elevations must be shown at the left side of the profile section. Station numbering should increase from left to right and should be approximately above the corresponding plan view stationing. Both plan and profile must be shown on the same sheet.

4. Structures and appurtenances, (vaults, manholes, hydrants, valves, etc.) should be labeled in plan and profile with station number and standard detail reference if applicable.

5. Sewer taps shall be located from the nearest downstream manhole and the offset of the clean-out taken from the center of the sewer main and shown on the plans. Only indicate cleanout location distance from manhole for all taps that are into manholes.

6. Water meters shall be located from the nearest property corner with an offset from the main and shall be indicated on the as-built drawings.

7. All underground utilities are to be shown on both plan and profile (if applicable). If profile is not provided then a note indicating the vertical separation of underground utilities shall be indicated on the plan.

8. Subdivision plans shall include sewer lateral locations only to show how each lot will be served. It shall be noted on the plans that exact sewer lateral locations are determined during construction, and that exact locations are required for as-built records. Water service connections shall not be shown on plans but exact installed locations are required for as-built records.

9. The Design Engineer shall state on the plans that "All work shall conform to the current City of Monroe's Water Resources Department Standard Specifications and Details. Any discrepancies between the plans and specifications shall be subject to the decision of the Water Resources Engineering Manager or their authorized representative.

C. Plan Submittals and Permitting Process

1. All information called for on the checklist included in at the end of this Section shall be used as a reference for the design of water main projects.

2. The Engineer shall submit two (2) sets of Plans for each review until approval has been granted.

3. Upon approval of the construction plans, the Developer shall submit three (3) sets of plans along with a completed Water Distribution Extension Permit Application and a check in the amount of the prevailing City's fee schedule made payable to City of Monroe.

4. Plans shall be considered approved for construction after the City has stamped "approved" on the Cover Sheet and has issued Water Distribution System Authorization to Construct Certificate.

5. For projects requiring approval from the NCDOT, the Design Engineer shall provide the City with a cover sheet stamped with the NCDOT permit number. The City will place their approval stamp on that cover sheet in order to create a Master Cover Sheet, thereby covering both permits and eliminating multiple sets of plans required on the project site. The City will send the Master Cover Sheet to the Design Engineer for the printing and distribution of plans.

D. Encroachments

1. The Developer shall secure permits from the following, but not limited to, agencies for work within their jurisdiction: NCDOT, Duke Energy/Union Power Cooperative, Railroad (CSX, Amtrak,

Norfolk), and Army Corps of Engineers. The Developer shall abide by all submittal requirements per each agency.

E. Easements

1. Temporary construction easements and permanent easements shall be obtained where needed and shall be shown on the Design Plans. A legal description and map shall be prepared by a licensed surveyor in the State of North Carolina and submitted to the City of Monroe for review.

2. All water mains installed outside of a dedicated public right-of-way shall have a 20-foot General Public Utility Easement (GPUE) centered on the main. Water mains can share a GPUE with other utilities provided adequate horizontal and vertical separation between utilities as discussed in Section 09.01.15 and existing GPUE width. Variances may be granted by the Director of Water Resources on a case by case project.

3. Easements shall be recorded and copies of the documents shall be provided to the Water Resources Department.

F. Shop Drawings and Submittals

1. Shop drawing and submittal requirements are covered in Section 09.02.00.

G. Record Drawings and Engineering Certification

1. Upon satisfactory completion of all work, including final punch list items, the Design Engineer shall sign and seal the Certification of Completion as provided in the Water Main Distribution Extension Application Permit. No system shall be activated nor Certificate of Operation be issued until the Engineer's Certification is received.

2. The Design Engineer shall then submit 2 copies, 1 digital (PDF file) and 1 hard copy on 0.3 mm Mylar dated, sealed, and clearly marked, of as-builts or record documents.

09.01.20 ENVIRONMENTAL IMPACT ASSESSMENT

A. An Environmental Assessment shall be prepared, submitted, and permitted through NCDEQ for any construction activities exceeding the minimum criteria referenced by 15A NCAC 01C.0408.

Design Review Checklist for Water Main Extensions

Subdivision or Project Name: _____

First Review By: _____ Date: _____

Second Review By: _____ Date: _____

Third Review By: _____ Date: _____

PRE-DESIGN REQUIREMENTS

_____ Notification to North Carolina One Call of Intent to Design a Water Main
_____ Field verification of all utilities:
-Telephone
-Gas
-Electric
-Fiber optic
-Cable
-Water Mains
_____ Coordination of Gravity Sewer Main Location with Off-Site Utilities

Check-off each of the requirements in the appropriate column as each requirement is approved. Do not check-off a listed requirement where revisions are required as result of review. Revision requirements should be noted in response to designer. Enter "N/A" under First Review if a requirement is not applicable to project of specific review.

GENERAL REQUIREMENTS

First Review	Second Review	Third Review	
_____	_____	_____	Plans Sealed and Signed by Registered Professional Engineer
_____	_____	_____	Scale of All Plan Sheets Labeled
_____	_____	_____	Date of Plans and Each Revision Shown
_____	_____	_____	If Major Subdivision, Preliminary Plat Approved by Planning Director
_____	_____	_____	If Major Subdivision, Streets and Lots Conform to Approved Preliminary Plat
_____	_____	_____	If Multi-Unit Development, Approved by Planning Director
_____	_____	_____	If Multi-Unit Development, Site Plan Conforms to Planning Approval
_____	_____	_____	Survey for Design Tied to City Monument or N C Grid Coordinates

WATER MAIN DESIGN

_____ _____ _____ Water Main Sizes Conform to City Water System Plan
_____ _____ _____ Water Main Sizes Adequate to Provide Sufficient Fire Flow (Attach Calculations)
_____ _____ _____ Water Main Sizes Adequate to Achieve Water Quality Objectives
_____ _____ _____ Water Main Sizes and Material Labeled
_____ _____ _____ Fire Hydrant Spacing Correct
_____ _____ _____ Fire Hydrant within 200' of FDC on the Building (If Commercial)
_____ _____ _____ Fire Hydrant Locations Correct (At Intersections or Property Lines When Appropriate)
_____ _____ _____ Main Line Valve Spacing Correct
_____ _____ _____ Main Line Valve Locations Correct
_____ _____ _____ Water Mains Located in Street R/W or Approved Exception
_____ _____ _____ Water Main Locations in R/W Conform to Street Section Details
_____ _____ _____ On-Site Necessary Easements Shown on Approved Plat or Recorded
_____ _____ _____ Off-Site Necessary Easements Obtained and Recorded
_____ _____ _____ Easement Widths Meet Current Standards for all New Water Mains
_____ _____ _____ Blow-Off or Fire Hydrant at All Dead Ends
_____ _____ _____ Water Tap Stub-Out and Meter Shown to Each Lot
_____ _____ _____ Water Meter Location in Front of Each Lot or Exception Acceptable to Customer Svc
_____ _____ _____ 10 Ft Horizontal Separation from all Parallel Sewer Mains; or DIP if Not Achievable
_____ _____ _____ 18 Inches Vertical Separation at All Water Main Crossings Over Sewer; or DIP if Not Achievable
_____ _____ _____ Water Main Profile Provided or Depth of Bury Note with Finish Grade Shown on Utility Plans
_____ _____ _____ All Existing Facilities and Utilities are Shown
_____ _____ _____ 12 Inches Vertical Separation Over All Storm Sewer Crossing or DIP
_____ _____ _____ All Required Jack and Bore Casing Shown
_____ _____ _____ Plans Require DIP Restrained Joint Through All Casing
_____ _____ _____ Pipe Class Defined on Plans
_____ _____ _____ Sewer Main at Least 4 Ft Deep Where All Water Service Line Cross Over
_____ _____ _____ All 12-inch and Larger Water Lines Stationed With Profile
_____ _____ _____ All High Points are Indicated and Have Air Releases Shown