SECTION C
MINIMUM REQUIREMENTS FOR WATER SYSTEM CONSTRUCTION

PRESENTED BY

THE BOARD OF DIRECTORS

OF THE

CENTRAL ELMORE WATER & SEWER AUTHORITY

The Central Elmore Water & Sewer Authority Main Office is located at

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PREPARED

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The Board of Directors of the Central Elmore Water & Sewer Authority has adopted the following Minimum Requirements for Water System Construction. These Requirements will be observed by Developer and the Authority.

1.0 SYSTEM DESIGN:

1.1 Minimum Pipe Size, Hydraulic Analysis, & Pressure Requirements:

- The Minimum Pipe Size for principal water mains shall be six (6) inches in diameter or as identified in the Master Plan.

    A. Three (3) inch Class 250 PVC can be used in special circumstances with written authorization from the Authority.

- All water mains, including those not designed to provide fire protection, shall be sized after a Hydraulic Analysis based on flow demands and pressure requirements. The system shall be designed to maintain a minimum pressure of twenty (20) PSI residual ground level at all points in the distribution system under all conditions of flow.

- Wide variations in pressure above the minimum requirement of twenty (20) PSI may be inherent in the design of a distribution system, but pressures no greater than one hundred (100) PSI should be delivered to the customer (unless higher pressures are requested). The one hundred (100) PSI maximum pressure requirement can be met by pressure-reducing valves in each customer's source line or by designing the distribution system to limit the maximum pressure.

- All assumptions and any flow data used must be clearly documented and submitted with a hydraulic analysis. If actual flow data is not available, theoretical calculations shall be based on all storage facilities half-full and the Hazen-Williams friction factor appropriate for type of pipe being used, but in no case greater than 130.

1.2 Pipe Requirements:

- Ductile iron pipe shall meet the current requirements of ANSI / (American Water Works Association) AWWA – CiSi.

- PVC Pipe – Six (6) inch through twelve (12) inch:

    A. PVC pipe meeting the AWWA Standard: C900 (latest edition) will be accepted for those working pressures as designated by class (Note that C900 refers only to six (6) inch through twelve (12) inch pipe).

    B. SDR 21, Class 200 pressure-rated pipe may be used where the working pressure will not exceed one hundred thirty-five (135) PSI. The pipe must meet all the requirements set forth in ASTM Standard: D 2241 for six (6) inch through twelve (12) inch pipe designated SDR 21. The pipe must bear the National Sanitation Foundation Testing Laboratories, Inc. seal of approval for potable water, or an approved equal.

C. **Provision must be made for contraction and expansion at each joint with flexible ring gaskets made from rubber or other suitable material. Gasket materials shall meet the requirements established in ASTM F477.**

D. **Joints for PR 200, pressure-rated pipe (ASTM D2241), shall be manufactured in accordance with ASTM D3139.**

E. **All fittings, such as tees and elbows, using welded joints shall be factory welded and shall meet the same specifications as a welded bell section.**

F. **Lubricants shall be non-toxic and shall not promote biological growth.**

G. **Solvent-cemented joints in the field are not permitted. This policy does not apply to plastic service lines.**

- **High Density Polyethylene (HDPE) Pipe and Fittings – Shall meet the requirements of ASTM and AWWA**

A. **DR 9, Class 250 pressure-rated pipe may be used where the working pressure does not exceed 175 PSI. The pipe must meet all the requirements set forth in ASTM Standard: D 2241 for six (6)-inch through twelve (12) inch pipe designated SDR 21. The pipe must bear the National Sanitation Foundation Testing Laboratories, Inc. seal of approval for potable water, or an approved equal.**
B. **All HDPE pipe shall be DIP size.**
C. **Fittings – The fittings shall meet all of the requirements of the pipe to which they are to be fused. They shall be homogeneous throughout and essentially uniform in color, opacity, density, and other properties. Fittings should also be free of such defects as cuts, cracks, or holes. Fabricated fittings will not be allowed where molded or machined fittings are available. All fittings will be manufactured in accordance with AWWA C906 with a minimum pressure class of 200 PSI. shall be suitable either for electrofusion or butt welding. Fittings shall be rated for internal pressure service at least equal to the full-service pressure rating of the mating pipe.**
D. **Directional drilling methods may be allowed by CEW&SA in certain situations for the installation of new water mains and services. HDPE pipes may be used for road borings when reviewed and approved by the Highway Department. DR-9 HDPE pipe shall be installed in areas with a static water pressure of less than 175 PSI. In areas with a static water pressure of 175 PSI or greater, DR-7 HDPE pipe shall be installed. HDPE to ductile iron transitions shall be done with an approved mechanical joint adapter and mechanical joint. In addition, a tracer wire shall be installed twelve (12) inches above the HDPE pipe and brought to grade every five hundred (500) feet in a standard cast iron valve box. The tracer wire shall be No. 14 A.W.G. copper-clad steel with**

polyethylene installation. Training and experience are essential to the success of an HDPE pipe installation. Installers must be able to provide documentation of training and experience consistent with that recommended by the Alliance for PE Pipe prior to beginning construction of any HDPE project.

E. HDPE must be designed so that the ID matches the connector piping ID.

1.3 Pipe Manufacturer Standards & Alternative Standards:

- **The pipe selected shall have been manufactured in conformity with the current standards issued by the American Water Works Association (AWWA)**
- **Pipe meeting applicable ASTM and ANSI criteria and approved by the Authority may be selected as an alternative.**

1.4 Previously Used Water Main Piping:

- **<u>Previously Used Water Main Pipe</u> meeting AWWA, ASTM, ANSI, and/or the Authority's standards may be used in lieu of new pipe. Approval for use is conditional on the pipe being thoroughly inspected, cleaned, and restored as close as possible to its original condition.**

1.5 Pipe Joints /Packing & Jointing Material:

- **<u>Mechanical Joints or Slip-On Joints</u> with rubber gaskets are preferred. Packing and jointing materials used in the joints of pipe shall meet the standards of the AWWA and/or the Authority.**
- **All water main joints inside protective casing shall be restrained. The Authority may require rubber gaskets that include stainless grips and other forms for restraining pipe joints.**

1.6 Water Main & Valve Markers:

- **<u>Water Main and Valve Markers</u> shall be installed as directed by the Authority.**

1.7 Gate Valve Standards & Locations:

- **<u>Gate Valves</u> shall meet the current AWWA Standard: C500 and be rated at 250 PSI. Valves shall be located at all intersections of water mains, but no greater than two thousand (2,000) feet apart.**

1.8 Air Relief in Water Mains:

- **At high points in water mains, where air can accumulate, provisions shall be made to remove the air by means of hydrants or air relief valves. Automatic air relief valves shall not be used in situations where flooding of the manhole access or chamber may occur.**

1.9 Standard Hydrants / Post Hydrants:

- **Standard hydrants and post hydrants shall meet the current AWWA Standard: C502.**

- **The water system distribution system is not designed, nor is it capable of providing fire protection. However, Standard hydrants shall be located at certain points within the system for operational and maintenance purposes.**

- **A minimum pipe diameter of six (6)-inches is required for connection with a Standard Hydrant.**

- **Standard Hydrants shall not be connected to water mains incapable of a flow rate of five hundred (500) GPM at twenty (20) PSI residual pressure.**

- **Post Hydrants shall be connected to water mains for the purpose of flushing dead-end lines as well as other points along the line. These flushing hydrants can be utilized to drain lines or bleed off air as needed for operational and maintenance purposes.**

1.10 Dead-End Mains:

- **Dead-end mains shall be minimized.**

- **Where dead-end mains occur, they should be provided with a post hydrant for flushing purposes. No flushing device shall be directly connected to any sewer or be subject to flooding or plugging.**

1.11 Instantaneous Peak Demand:

- **Water mains and the distribution systems should be sized for an instantaneous peak demand. An instantaneous flow curve as specified by the Alabama Department of Environmental Management (ADEM) shall be included for use in determining flow demand.**

2.0 INSTALLATION OF MAINS:

2.1 Emergency Contacts:

- **Prior to the commencement of construction, the Developer or Group shall submit to the Authority's General Manager a listing of the names, addresses, and daytime / nighttime phone numbers of all construction personnel contracted or subcontracted for the proposed project (i.e., construction foreman, inspector, subcontractors, etc.) for emergency contact purposes.**

2.2 Water Distribution Construction Standards:

- **All water distribution system construction shall meet or exceed the standards of the ADEM.**

2.3 Pipe Bedding:

- **Adequate support shall be provided for all pipes. Continuous and**

uniform pipe bedding shall be provided in the trench for all buried pipe.

- **Pipe bedding material shall be approved by the Authority prior to application.**

2.4 Rock Excavation:

- **Rock or stones excavated during trenching operations shall be removed to a depth of at least six (6) inches to the sides and the bottom of the pipe.**

- **See 2.3 Pipe Bedding for requirements**

2.5 Distribution Main Cover Depth:

- **All distribution mains shall be provided with sufficient earth or other suitable cover to prevent freezing. Main cover depth shall not be less than thirty-six (36) inches measured from the top of the pipe.**

- **When the pipe is installed, detection wire or other acceptable means of detection shall be installed.**

2.6 Hydrostatic Testing of Mains:

- **Pressure and leakage tests shall be performed in accordance with current AWWA Standard C600 and/or the manufacturer's installation procedures, and/or the Authority's procedures.**

- **The test pressure of the installed pipe shall be a minimum of 150 PSI or 1.5 times the working pressure, whichever is greater. Test duration shall be a minimum of two (2) hours.**

- **No installation shall be accepted if the leakage is greater than that determined by the following formula:**

$$L = \frac{ND\sqrt{P}}{7400}$$

L = Allowable Leakage in Gallons per Hour (GPH)
N = Number of Joints in the Length of Pipeline Tested
D = Nominal Diameter of the Pipe in Inches
P = Average Test Pressure during the Leakage Test (PSIG)

- **Leakage is defined as: the quantity of water that must be supplied into the newly laid pipe or any valved section thereof, to maintain pressure within five (5) PSI.**
- **All pressure tests shall be documented by a chart for the entire duration of the test and submitted to the Authority.**

2.7 Clearing Sediment & De-Watering Mains:

- **Sediment accumulations in mains may be removed through a standard**

or post hydrant using compressed air. Pumping may be used for dewatering mains through hydrants.

2.8 Chambers / Pits:

- **Chambers or pits containing valves, blow-offs, meters, or other such appurtenances to a distribution system shall not be connected directly to any storm drain or sanitary sewer. Blow-offs or air-relief valves shall not be connected directly to any sewer. Chambers or pits shall be drained to the surface of the ground where they are not subject to flooding by surface water or underground absorption pits.**

- **See standard drawings for clarification of pit designs.**

2.9 Disinfection of New Water Mains:

- **The specifications shall include detailed procedures for the adequate flushing, disinfection, and total coliform bacteriological testing of all new water mains. Disinfection as described in the current AWWA Standard C601 will be accepted. Test results must be submitted to the Authority.**

2.10 Disinfection of Existing Mains:

- **Disinfection of existing mains shall be performed when the mains are totally or partially dewatered.**

- **Disinfection shall adhere to current AWWA Standard: C601 including trench treatment, swabbing with hypochlorite solution, flushing, and/or slug chlorination.**

- **Bacteriological testing shall be done after repairs are complete. The water main may be returned to service prior to the completion of testing to minimize the time that customers are without water service. Test results must be submitted to the Authority.**

- **Leaks or breaks repaired with clamping devices, while mains are full of water and under pressure, require no disinfection.**

2.11 Development Water Usage During Construction:

- **Developments shall use a hydrant meter during construction and shall be charged for all water usage during testing of water mains.**

2.12 Plumbing, Building Codes, & Health Department Regulations:

- **Water services and plumbing shall conform to relevant local and/or State plumbing and building codes and to County Health Department regulations.**

2.13 Service Line, Meter / Meter Box Installation:

- **All service connections, lines, and meter boxes shall be installed for the development. Meters, couplings, double-check valves, and, if required,**

pressure regulators shall be delivered to the Redland Facility located at 6545 Redland Road, Wetumpka, AL 36093.

- **Check Valves shall be model 710-U2.**
- **Meters shall be Neptune Mach 10 Ultrasonic R-900I.**
- **Pex /Copper services shall be encased under roadways where required.**

2.14 Installation of Water Mains on Private Property:

- **The Authority reserves the right to deny the installation of infrastructure on private property or behind gates that could facilitate anything other than unobstructed access.**

3.0 SEPARATION OF WATER MAINS AND SEWERS:

3.1 Pertinent Factors in Providing Adequate Separation of Services:

- **Materials and joint types for water mains and sewer lines.**
- **Soil conditions.**
- **Service and branch connections into the water main and sewer line.**
- **Compensating variations in the horizontal and vertical separation of the water main or sewer line.**
- **Adequate space for the repair or alteration of the water main and sewer line.**
- **The off-setting of the water main around manholes or culverts.**
- **Water mains, sanitary, or storm sewers shall not be installed in the same trench.**

3.2 Parallel Installation of Services:

- **Under normal conditions, water mains shall be installed a minimum of five (5) feet horizontally from any sanitary sewer, storm sewer, sewer manhole, or culvert. The distance shall be measured from edge-to-edge.**
- **Under unusual conditions, when routing circumstances prevent a minimum horizontal separation of five (5) feet, a water main may be installed closer to a storm or sanitary sewer line. In this case, the bottom of the water main must be located a minimum of 18 inches vertically above the top of the sewer line.**
- **Where a minimum of an eighteen (18) inch vertical separation cannot be maintained, the sewer line shall be constructed of materials and joints that are equivalent to water main standards of construction. The sewer line shall be pressure tested to assure water tightness prior to**

backfilling. In addition, a casing pipe extending at least two pipe lengths on either side of the crossing point shall be incorporated for either the water line or sewer line.

3.3 Sewer Service Crossings:

- **When a water and sewer main crossing is necessary, a continuous casing shall be installed around one of the mains to allow for a minimum of five-foot separation between each end of the cased and uncased main.**

- **<u>Under normal conditions</u>, water mains crossing over house sewer connections, storm sewers, or sanitary sewers shall be installed to provide a minimum vertical separation of eighteen (18) inches between the bottom of the water main and the top of the service line crossed.**

- **<u>Under unusual conditions</u>, when routing circumstances prevent a minimum vertical separation of eighteen (18) inches, the following construction shall be used:**

  1. **The service line crossed shall be constructed of materials and joints that are equivalent to water main standards of construction. The service line shall be pressure tested to assure water tightness prior to backfilling. In addition, a casing pipe extending at least two pipe lengths on either side of the crossing point shall be incorporated for the water line.**

- **Water mains crossing under house sewer connections, storm sewers, or sanitary sewers shall be protected by:**

  1. **A minimum vertical separation of eighteen (18) inches between the bottom of the crossing service line and the top of the water main.**

  2. **Adequate structural support for the crossing service line to prevent excessive deflection of joints, settling on, and the breaking of the water main.**

  3. **Locating the center of the water main pipe section at the point of the crossing of the service line to allow the water main pipe section joints to be equidistant from the point of crossing.**

3.4 Sewer Manholes:

- **No water line shall pass through or come into contact with any part of a sewer or sewer manhole.**

4.0 <u>SURFACE WATER CROSSINGS:</u>

Surface water crossings, either above or below water, present special problems. <u>These type crossings shall be discussed with Authority before final plans and specifications are prepared.</u>

4.1 Crossings Above Water – Water Main Pipe Shall Be:

- **Adequately supported to prevent deflection of joints and the breaking of the water main. An acceptable method would be the use of H-piles with concrete silo tubes supporting each joint. The method and frequency of support shall be reviewed and approved by the Authority's Engineer prior to any installation.**

- **Protected from damage and freezing.**

- **Accessible for repair or replacement.**

4.2 Crossings Below Water - Greater Than Fifteen (15) Feet Wide:

- **The pipe shall be of special construction, having flexible, watertight joints.**

- **Valves shall be provided at both ends of the below-water crossing to allow the crossing section to be isolated for test or repair. The valves shall be easily accessible and not subject to flooding.**

- **Sampling taps shall be required at each end of the crossing. Permanent taps shall be required for testing and locating leaks.**

- **Water mains may be required to be encased within a steel casing pipe, encased in concrete, or may require special anchoring to prevent deflection should the main become empty.**

5.0 CROSS CONNECTIONS:

5.1 There shall be no physical cross connection between the distribution system and any pipes, pumps, hydrants, or tanks whereby unsafe water and other contaminating materials may be discharged or drawn into the system. No steam condensate, cooling water from engine jackets, or flow from other heat exchange devices shall be returned to the potable water system.

5.2 The approval of the Authority shall be obtained for interconnections between potable water supplies.

6.0 HIGHWAY CROSSINGS:

6.1 All mains crossing State and County highways shall be jack and bored with a steel casing installed unless approved otherwise.

6.2 The inside diameter (ID) of the steel casing shall be a minimum of six (6) inches larger than the outside diameter of the pipe joint. The steel casing shall have a minimum wall thickness of a quarter (0.25) inch.

6.3 Roads, driveways, etc., which water mains must cross do not require jack and bore. These crossings shall be backfilled entirely with crushed stone or an approved equal.

7.0 SUBMITTALS FOR CLOSE-OUT:

7.1 Warranty / Guarantee of Materials, Equipment, & Work Performed:

- **The Developer shall guarantee all materials, equipment furnished, and work performed for a period of one (1) year from the date of "Substantial Completion" (Appendix A).**

- **The Developer shall provide the Authority with documentation of the cost of materials for the development prior to the submittal of the Developer's warranty and guarantee.**

- **Necessary repairs may be made in the development by the Authority with the actual cost to be charged to the Developer during the warranty period.**

7.2 Final Payment Guarantee:

- **The developer shall guarantee final payment for all materials, equipment furnished, and work done to any and all suppliers, subcontractors, and/or laborers as governed by the law. An original copy of the *Developer's Guarantee of Final Payment* shall be submitted and remain in full force indefinitely (Appendix A).**

- **Under absolutely no circumstances shall the Authority be held financially responsible for any and all debts incurred as a direct result of the construction of this project.**

7.3 Additional Submittals

- **Stamped as-built drawings of the development (two (2) copies) – complete with all dimensions noted (Distances from lot corners to meters, Distances of mains from EOP or curb, Sewer infrastructure, etc.)**

- **Provide E911 addresses for each service in the development.**

APPENDIX A

- **Developer's Warranty and Guarantee**
- **Developer's Guarantee of Final Payment**

DEVELOPER'S WARRANTY AND GUARANTEE

The DEVELOPER: _____

warrants and guarantees for a period of one (1) year from the date of SUBSTAN TIAL COMPLETION of the system that the completed system is free from all defects due to faulty materials or workmanship and the DEVELOPER shall promptly make such corrections as may be necessary by reason of such defects including the repairs of any damage to other parts of the system resulting from such defects. The AUTHORITY will give notice of observed defects with reasonable promptness. In the event that the DEVELOPER should fail to make such repairs, adjustments, or other WORK that may be made necessary by such defects, the AUTHORITY may do so and charge the DEVELOPER the cost thereby incurred. A Performance BOND or approved equal shall be submitted and shall remain in full force and effect through the guarantee period. The Performance BOND shall be for the full value of the water utility construction project.

CERTIFIED TO ON THIS_____DAY OF_____, 20___

DEVELOPER SIGNATURE:_____TITLE:_____

WITNESS SIGNATURE:_____TITLE:_____

DEVELOPER'S GUARANTEE OF FINAL PAYMENT

I, _____, the duly qualified and authorized agent of the Developer known as _____, for the subdivision hereinafter referred to as _____ do hereby guarantee and certify that we have performed all of the Work set forth in strict accordance with the Contract Documents; local, State, and Federal laws; and ordinances applicable thereto, and do further guarantee and certify that all materials and equipment listed herein have been paid for in full as allowed on all prior estimates or payments and, if requested to do so, we will show evidence of payment for same in writing. We further certify that the written amount of _____here under is considered compensation and final payment in full for all work performed under the Contract, including any amendments thereto, and do hereby release the Owner hereafter known as the Central Elmore Water & Sewer Authority, its employees, agents, and representatives in accordance with Authority's current Rules and Regulations.

CERTIFIED TO FOR PAYMENT ON THIS_____DAY OF_____, 20___

DEVELOPER SIGNATURE:_____TITLE:_____

WITNESS SIGNATURE:_____TITLE:_____