

CALHOUN UTILITIES



Development Policies & Specifications for Water and Sanitary Sewer

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Calhoun Utilities

Water & Sewer Line Installation Policies & Specifications

Adopted 2009

POLICIES AND PROCEDURES

100. Purpose

The purpose of this document is to establish guidelines and standards for potable water distribution lines and sanitary sewer collection lines that connect to, and will be owned and operated by, the City of Calhoun. This document is intended to insure that all line extensions comply with federal, state, and local statutes. The City of Calhoun reserves the right to deny or approve any water or sanitary sewer line extension requests, based upon the long-term maintenance requirements associated with the request. The primary purpose of the policy is to protect the economic and structural integrity of the water and sanitary sewer systems of the City of Calhoun.

A. Objectives:

- Provide a clear and concise description of the City of Calhoun water and sanitary sewer standards for water and sanitary sewer system design and construction.
- Provide guidance to developers and their engineers to facilitate compliance with said standards.
- Furnish standards that create development of a quality water and sanitary sewer infrastructure.

B. Service Area:

This policy shall not be subject to political boundaries.

101. General Policies

A. Service Availability

A developer or his authorized representative must request water and/or sanitary sewer service in writing, from the Water & Sewer Director. The request for service must include the proposed location of the development and a topographic map with the property lines shown. The City of Calhoun will review the information and make the decision to approve or deny the request. Should the request be approved, the developer will schedule a pre-engineering meeting with the Water & Sewer Director and Utilities Engineering Manager. The developer must have additional information available for submittal prior to or at the time of the meeting. The additional information is as follows:

A digital site plan drawing, tied to State Plane Coordinates, indicating the site location and the existing contours. The developer must have a State of Georgia licensed professional engineer calculate the amount of water needed for to the development and determine if the existing water supply for the proposed development is sufficient. Fire protection requirements shall also be determined by the developer's engineer and must meet all requirements as outlined under The City of Calhoun Fire Prevention and Protection Ordinance NO.736 or other jurisdictional requirements. The engineer must

then submit a written report, describing the scope of the proposed development, average daily demands and peak demands and certify that the proposed development will not degrade available flows to an unacceptable level. Based on this report, the City may approve, or deny, the request for water service. Sanitary Sewer service requests will include a report that will enable the City to determine if the proposed development is compatible with existing city sanitary sewer infrastructure. The report will include elevations of the proposed development property in relation to existing sanitary sewer lines. Elevations must be tied to mean sea level or National Geodetic Vertical Datum. No assumed elevations will be accepted. Based on this report, the City may approve or deny the request for sanitary sewer service.

If the request for service is approved, the Water & Sewer Director will send a letter to the Developer stating that service is available. Should an extension or upgrade of existing water and/or sanitary sewer mains be required, the project would proceed according to the following guidelines.

B. Extension of Existing Facilities

If an existing water or sewer main must be extended, the engineering for sanitary sewers or water mains off-site will be performed by the City of Calhoun's engineers and consultants. This cost will be a part of the project cost and will be payable in advance of the engineering services being performed.

1. Once the engineering is completed, the City of Calhoun will accept construction bids for the project. You may want your contractor to submit a bid for the construction off-site sanitary sewers or water mains. Bids will be reviewed and the contract awarded to the lowest and best prepared bid.
2. The developer may install both on-site and off-site sanitary sewers and/or water mains; however, this decision must be made prior to the beginning of the bid process. This would require that all materials and construction methods must conform to the above mentioned policy and specifications. The developer must also comply with all federal, state and local government requirements.
3. All cost for the installation of sanitary sewers and /or water mains for both on-site and off-site shall be born by the developer and the developer shall be given an equal amount of sanitary sewer or water connection credits for the off-site portion of the cost. Credits shall only apply to connections to facilities owned and operated by the City of Calhoun. These connection credits must be assigned to lots with legal addresses and the developer is responsible for maintaining a record of the locations and show proof of credit by submitting a copy of the receipt.
4. The Developer shall submit a bond or irrevocable letter-of-credit for 100% of construction bid amount. Once construction is underway, the City will make periodic payments to the Contractor and invoice the Developer for reimbursement. Invoices must be paid within 30 days of the invoice date, or be considered late. Upon the second late payment, the Developer will be in default and forfeit all bond/letter-of-credit monies. Any funds remaining after the successful completion of the construction project shall be released and returned to the Developer.

These extensions of existing facilities can only occur on existing public right-of-ways or existing city owned easements. The City will make all main line tie-ins to existing water and sewer lines unless otherwise approved by the Water and Sewer Director.

The City will make the final decision to allow extension of its facilities and participate in the cost of said extensions. The Utilities General Manager or Mayor and City Council will be responsible for such determination. All projects will be evaluated based on the City of Calhoun's best interest.

C. Easements

All water and sanitary sewer mains through out the development must be installed within the street right of way or on within dedicated easements. Easements must be platted and recorded along with a signed easement agreement wherein the easement plat is incorporated as "Exhibit A". Easements must be a minimum of twenty feet (20') in width for water mains and twenty feet (20') in width for sanitary sewer mains. Dedicated easements for water or sanitary sewer mains are intended for these utilities respectively.

Other utilities scheduled for installation within the easements must be a proved by the City of Calhoun Utilities General Manager. The minimum dimensions for lift station easements shall be 50' X 50', with a minimum of 25' wide easement for access. No structures, fencing, trees, or buildings may be placed within the boundaries of said easements excepting fencing as needed by the City of Calhoun to insure safety and security of sanitary sewer lift stations, water pumping stations, reservoirs, etc.

The developer will be required to grant easements for future extensions of water and sewer lines to adjacent property lines or public right-of-ways. These must be must meet the requirements as stated above.

D. Erosion Control

All developers will be expected to follow the best management practices, as prescribed in the Soil Conservation Service's Manual for Erosion and Sediment Control in Georgia when designing the soil erosion and sedimentation control measures for their development.

E. Inspection and Testing

Inspection and testing of all work performed will be required. Inspections will include a review of materials used, method of installation, thrust blocking, protection and restoration of work area, type of bedding used, grade of pipe, backfilling, compaction, road and railroad bores, workmanship, testing etc. Should the project progress beyond the completion date as shown on the construction schedule additional inspection fees shall be paid by the developer. Any additional inspection fees must be paid prior to acceptance of water mains, sanitary sewer mains and appurtenances.

Water to be used for testing, flushing or other purposes shall be metered as much as practical. Water used for flushing shall be calculated at a rate of 2.5 ft/sec. The developer shall be responsible for purchasing a 1" water service connection for purpose of metering water for testing, flushing or other purposes as needed by the developer or the developer's contractor. This connection shall be available for a period of up to one year. Should it become necessary to extend this time period then the capacity fees associated with a one inch water connection must be paid to the City of Calhoun. Once the capacity fees are paid the connection shall at that time be considered a permanent water connection.

The required tests include hydrostatic testing of water lines, disinfection of water mains, low-pressure testing of sanitary sewer lines and vacuum testing of manholes. The developer, in the presence of the City Inspector, will perform all tests. The developer or contractor shall give a 48-hour notice prior to any testing. These tests are outlined in the specifications for water and sanitary sewer line installation. Taps necessary for testing water mains shall be installed by the developer's contractor. Taps paid for by the developer and to be installed by the City of Calhoun shall not be installed until the water and/or sanitary sewer mains are accepted by the City of Calhoun Utilities Engineering Department. No part of the water and/or sanitary sewer mains shall be put in service prior to final acceptance by the City of Calhoun.

Developers will be required to pay for bacteriological analysis under Section 1; Water Distribution Systems, Part 3, 3.16, F of the Standard Specifications for the Installation of Water and Sanitary Sewers.

F. As-Builts

After construction, the Developer shall request that the City complete digital as-built drawings of all installed water and/or sewer improvements. As-built drawings must have accurate locations (tied to State Plane Coordinates) of water mains, valves, fire hydrants, fittings, service crossings, sanitary sewer manholes, sanitary sewer service lines (plan and profile locations). As-builts must also include the depth of water mains (if < / > than minimum depth as stated in the specifications), sanitary sewer manhole top elevations, invert elevations and % of grade between manholes shown on profile sections.

G. Record Drawings

During the construction period, the Contractor shall maintain a set of prints of approved Construction Plans for project record document purposes. These Drawings shall be marked by the Contractor to indicate the actual installation where the installation varies appreciably from the installation shown originally. The Contractor shall give particular attention to giving the location of all sewer service wyes (recording the distance to the downstream manhole as measured along the main) and to information on other concealed elements which would be difficult to identify or measure and record later.

H. Final Acceptance

Projects shall remain isolated from city systems until the entire project, or approved phase of the project, is deemed acceptable by the City of Calhoun. No connections will be permitted to a City system until all required items for acceptance have been completed.

No water or sanitary sewer mains shall be accepted until the following criteria are met:

- All testing has been completed and approved by the City of Calhoun Engineering Department. If other utilities are installed after initial testing, then the system must be retested, at Developer's cost.
- The Contractor has submitted Record Drawings that have been reviewed and concurred with by the Utilities Engineering Inspector.
- The Developer has submitted a letter indicating the actual cost of installing the water mains and / or sanitary sewer mains within the development. The letter must contain an itemized breakdown of the costs and be approved by the Utilities Engineer.
- All necessary easements have been recorded. Prior to the acceptance of any water mains and / or sanitary sewer mains by the City of Calhoun, the developer shall furnish paper copies (suitable for recording) and digital versions (tied to State Plane Coordinates) of all easement plats along with signed easement agreements (City standard form).
- All fees associated with the review and inspection of the water and sanitary sewer mains have been received by the City of Calhoun.
- A walk through final inspection has been conducted accompanied by the contractor and developer or developer's representative. All items noted during the inspection must be corrected prior to acceptance of the water and/or sanitary sewer mains.
- All conflicts with other utilities are resolved.
- Digital as-built drawings have been completed and approved.
- All utilities improvements, constructed to serve the project, have been deeded to the City.

Approximately three months after final acceptance of sanitary sewer mains, the Developer shall request that the City perform a video camera inspection of the installed pipelines.

I. Warranty

Developers will be responsible for any repairs due to workmanship, materials, or damage caused by other utility installations, for a period of one year after the water and/or sanitary sewer line has been accepted

by the City. The Developer shall submit a bond or irrevocable letter-of-credit for 10% of utilities construction cost for the 1-year warranty period, from the date of official acceptance or completion of all construction, whichever occurs later. The amount of the bond/letter-of-credit shall be established by an itemized invoice from the Contractor for the actual cost of construction, or based on the average cost paid by the City for the same type of performance, whichever is greater.

If the Developer fails to make warranty repairs, the City will make the repairs and invoice the Developer for the cost. Invoices must be paid within 30 days of the invoice date, or be considered late. Upon the second late payment, the City will deem the Developer to be in default of the terms of the warranty and declare that the bond/letter-of-credit is forfeited. Any funds remaining after the successful completion of the warranty period shall be released and returned to the Developer.

At the end of the warranty period, the Developer shall schedule and perform an end-of-warranty inspection of the installed facilities with the Calhoun Utilities Engineer and Contractor. Corrections will then be completed of punch list items found deficient during the end-of-warranty inspection. Upon completion of all outstanding items, to the satisfaction of the Utilities Engineer, the warranty bond/letter-of-credit will be released and the City will assume total responsibility for ownership, operation, and maintenance of the constructed utilities. The City shall not release the bond/letter-of-credit monies if the Developer fails to schedule and perform an end-of-warranty inspection, or to correct found deficiencies.

J. Connection Fees

Developers will also be required to pay water and / or sanitary sewer connection fees based on the current fee schedule of the City of Calhoun.

102. Plan Review Process

A. Plan Submittal

Two sets of paper plans must be submitted to the Calhoun Utilities Engineering Department for the initial review, along with a digital site plan that is tied to State Plane coordinates showing existing and proposed roadways, utilities, and property lines. Plans shall be bound together in a set that includes a title sheet, a vicinity map and a sheet index. Plans shall be submitted on size D drawing sheets (24" x 36") and must carry the stamp of a registered professional engineer. Please insure that all required standards are met prior to submittal. A minimum of two weeks are required for review. Larger projects may require extended review periods. Plans must be submitted for initial review prior to obtaining any grading or land disturbing permits.

Plans must be accompanied by payment of review fee and a transmittal letter that includes the following information: project name, district and land lot of project location, name of contact person for plan review comments, mailing address, telephone number, FAX number, and email address. Incomplete submittal packages will not be reviewed.

In the event a subdivision is developed in phases, the construction plans for water and/or sewer may be submitted in phases. However, at the time the first phase is submitted, the engineer will submit one copy of the preliminary layout of the entire water and/or sewer system. This layout will show all lines required to serve any lots to be developed and any surrounding property that may be served through the property. The site plans for each phase shall contain a location drawing showing the relationship of the phase to the total project and to the surrounding streets and sewer outfalls. Each phase must be submitted and approved separately. After plans have been approved, projects can not be broken into phases unless revised plans are submitted and reviewed through the standard plan review process, including the payment of addition plan review fees.

Once plans have been reviewed and approved, the Developer shall submit four (4) sets of the approved plans to the City to be stamped "APPROVED". Two of the stamped sets will be returned to the Developer. A set of plans, stamped "APPROVED" by the City, must be kept on the job site at all times during construction.

Failure by the City to notice any deviations from the City's Standards during the plan review process does not alleviate the Developer's responsibility to adhere to the Standards.

B. Plan Review Fees for Subdivision Reviews

The review fee must be paid when plans are submitted. The plans will be reviewed by the City and may be approved or denied. If denied, the plans will be returned to the developer for revision. Should the plans require additional review, a second and/or third review fee must be paid. Plan review fees will be as follows:

Plan review fee for water system	\$275.00
Plan review fee for sanitary sewer system	\$500.00
Combination plan review fee for water and sanitary sewer system	\$750.00
Additional fee for review for sanitary sewer lift station plans	\$1,200.00

* Review fees are not required for simple commercial site plans

C. Plan Approval

1. Plan approval. Plan approval by the City of Calhoun Utilities Engineering Department does not indicate approval of the requirements of other departments, ordinances or other jurisdictional requirements, and does not include or imply approval of the structural, electrical, or mechanical integrity.

2. Deviation from Approval Plans and Specifications. No deviations from approved plans and specifications shall be made during construction unless documentation showing proposed changes has been submitted to and approved by the Utilities Department Engineer.

3. Approval Expiration. Plan approval expires one year from the date of approval. Once approval has expired, plans must be re-submitted to the plan review process.

D. Design Criteria

Design of the development, materials used in the development, and workmanship of water and sanitary sewer lines shall comply with the City of Calhoun's water and sanitary sewer line installation specifications. The design for the development should be sufficient to accommodate the planned development and any future development that may occur on property owned by the developer at this location and future build-out of the drainage basin. All main water lines shall be minimum 6 inches along Public Rights of Ways, excepting cul-de-sacs and all main sewer lines shall be a minimum of 8 inches.

The City reserves the right to upgrade the design to accommodate future development on adjacent properties. The city will reimburse developer for additional cost associated with upgraded pipe sizes, pump stations, tanks, or sewer lift station based on the city's annual bid prices for these items. The Sanitary sewers shall be designed to allow for extending the sanitary sewer along the main drainage or drainages to accommodate future development of the basin. An easement or easements may be required and must be furnished to the City of Calhoun prior to the acceptance of the water and/or sanitary sewers in the development.

Acceptable line sizes for potable water shall be 6" and larger with increasing size increments of 2 inches, excepting Cul-de-Sacs as per detail. A valve must be installed at line size changes. Should 2" water mains be approved, the maximum number of residences, connections or units served by a single 2" water main shall be fifteen (15), this must include connections for irrigation meters. One inch (1") water service may supply up to two (2) apartments or one (1) duplex apartment.

All dead-end water lines are subject to review and approval by the Georgia Environment Protection Division and must be provided with metered flushing devices. The Developer shall bear the cost of all water used to flush dead-end lines for water quality purposes.

Any facility proposed to be connected to the City's potable water system (i.e. booster pump stations, storage tanks, meter pits, etc.) shall comply with standard City specifications and must be approved by the Utilities Engineering Department.

If the request for city water service is approved, the developer will submit to the City two (2) paper copies of the preliminary construction plan set, a disc with an electronic version of the site plan, a copy of the Service Availability Letter from the Water and Sewer Director, and the fee for water plan review. The submitted plans shall show the following:

- a. Street locations with street names;
- b. Property line locations, with North arrow;
- c. Water pipe size and location;
- d. Location and size of gate valves (minimum of two valves per tee and at 1500' intervals between tees), air-release valves;
- e. All bends and tees (Crosses are not acceptable);

- f. Location of all proposed fire hydrants;
- g. Existing water line locations, sizes and types of material;
- h. Detailed drawing of proposed water line tie-in to existing water mains;
- i. Location of proposed service crossings, including sizes;
- j. Total length of the proposed water lines broken out by line sizes;
- k. Nearest existing water line valves;
- l. Lot numbers and assigned street addresses;
- m. Existing and proposed contours;
- n. Storm drains;
- o. The applicable water system service datum for the area of proposed subdivisions. If the proposed finished elevations within a development are above the datum, place a note on the plans that states that the City can not guarantee adequate water pressure to those affected lots.
- p. Standard details complying with the City of Calhoun water and sewer specifications;
- q. Any easements that will be needed for water lines crossing what is now or will be private property must be provided to the City by the developer in the form of a plat and signed agreement, suitable for recording;
- r. All electronic drawings, including As-Built drawings, must be in digital format as a “.dwg” file and must be georeferenced to State Plane Coordinates;
- s. Scale to which plans are drawn; Acceptable scales are: 10, 20, 30, 40, 50, 60.
- t. Match lines with sheet references when plans continue from one page to another;
- u. Soil and erosion control plan for water line connection;
- v. An itemized cost estimate and construction schedule;
- w. Other Utilities: Coordinate with other utility owners to avoid conflicts with water meters, sanitary sewer manholes, sanitary sewer cleanouts, power transformers, light poles and telephone pedestals and junction boxes.
- x. Standard notes by the City of Calhoun.

If the request for sanitary sewer service is approved, the developer will submit to the City two (2) paper copies of the preliminary construction plan set, a disc with an electronic version of the site plan, a copy of the Service Availability Letter from the Water and Sewer Director, and the fee for sewer plan review. The submitted plans shall show the following:

- a. Street locations with Lot numbers and assigned street addresses;
- b. Property line locations with North arrow;
- c. Sanitary sewer pipe size and location (Sanitary sewer lines should not be placed in street, if possible);
- d. Location of Manholes;
- e. The sewer layout plan must include manhole numbers, manhole stations, line designations, flow direction arrows, street names and topography;
- f. Existing and proposed contours;
- g. Storm drains;
- h. Indicate proposed storm drain and water line crossings on profiles;
- i. Detail tie in of proposed lines with existing lines, as to elevation and invert direction;
- j. Manholes with outside drops;
- k. Slope, length and size of lines;
- l. Location in profile of sanitary sewer lines and forcemains (not to exceed 100 feet to the inch for forcemains);
- m. Location of sanitary sewer service lines and main line connections;
- n. Location in profile of streams and storm drains that will be crossed;
- o. Easements must be 60 feet for construction purposes and 20 feet for the permanent easement and must be provided to the City by the developer in the form of a plat and signed agreement, suitable for recording;

- p. Standard Details complying with the City of Calhoun water and sanitary sewer specifications;
- q. All electronic drawings, including As-Built drawings, must be in digital format as a “.dwg” file and must be georeferenced to State Plane Coordinates;
- r. Scale to which plans are drawn; 10, 20, 30, 40, 50, 60.
- s. Match lines with sheet references when plans continue from one page to another;
- t. Soil and erosion control plan for sewer line construction;
- u. An itemized cost estimate and construction schedule;
- v. Main line sanitary sewers shall be sized based on projected flows using 150 gal/day/acre with a peaking factor of 2.5 (Ten States Standard.) Sanitary sewers 16” and larger shall be ductile iron pipe. Sanitary sewers shall be designed and installed so as to maintain a constant velocity of 2.0 feet per second and with a maximum distance 400 feet between manholes.

Sanitary Sewers exceeding 12% slope shall be ductile iron pipe with locking rubber gaskets. Where the slope exceeds 18%, pipe stabilization methods should include a concrete anti-seep collar. Sanitary sewers installed at depths exceeding fifteen feet (15’) shall be ductile iron pipe.

All sanitary sewers requiring water-tight frame and covers must have vents at intervals of 1000’ to 1500’ located at manholes as per detail. The maximum length for sanitary sewer service laterals is 150’, with a maximum of 25’ along road rights-of-ways. Sanitary sewer service laterals shall not be installed into manholes, unless specifically approved by the City Utilities Engineer.

The following table shall be used to determine minimum pipe slope that will be allowed:

8" pipe	0.40% (shown as slope in feet per 10 feet)
10" pipe	0.29%
12" pipe	0.22%
16" pipe	0.16%
18" pipe	0.12%
20" pipe	0.10%
24" pipe	0.08%
30" pipe	0.06%
36" pipe	0.05%

- w. Other Utilities: Coordinate with other utility owners to avoid conflicts with water meters, sanitary sewer manholes, sanitary sewer cleanouts, power transformers, light poles and telephone pedestals and junction boxes.
- x. Standard notes by the City of Calhoun.
- y. Plans for sanitary sewers shall include an overall site plan and plan/profile sheets for all gravity sewers.
- z. Standard Details and Standard Notes by the City of Calhoun (available upon request by the developer or the developer’s engineer).

No water or sewer appurtenance, such as valves, meters, fire hydrants, clean-outs, manholes, etc., shall be installed in ditches or drainage ways; and no mains shall be installed within 10 feet of a building. All similar products on a project shall be furnished by a single manufacturer, unless otherwise approved by the Engineer. For example, all of the PVC pipe on a given project shall come from one manufacturer.

The current version of the GLUMRB Specifications (the Ten State Standards) is hereby adopted by reference. The Ten State Standard are adopted in full as if herein written. Should there be a conflict between the Ten State Standards and these Specifications, these Specifications shall prevail.

E. Construction Permit and Inspection Fees

When the construction plans have been approved by the City, the Developer may apply for a “Water and/or Sanitary Sewer Construction Permit”. The Construction Permit will be issued by the Water and Sewer Director or Utilities Engineer upon receipt from the Developer of proof of payment of Inspection Fees, and any other applicable fee, related to the water and/or sanitary sewer service for the proposed development. Inspection fees for a project are calculated by the Utilities Engineering Department based upon the following rates as set by the City Council:

Construction inspection and as-built survey fee per foot of water main	\$0.90
Construction inspection and as-built survey fee per foot of sewer main	\$1.50
Post-construction video camera inspection fee per foot of sewer main	\$1.00

Any water or sanitary sewer mains installed prior to the issuance of a “Water and/or Sanitary Sewer Construction Permit” within the proposed development or installed on public rights-of-way by the developer’s contractor shall not be accepted by the City of Calhoun.

F. Pre-Construction Meeting

Upon payment of all fees associated with the development and issuance of a Water and/or Sanitary Sewer Construction Permit, the developer will set up a pre-construction meeting with the City and the contractor to be used. All questions related to development policies or specifications should be asked at this meeting. The developer and contractor are required to attest that both parties are familiar with the requirements as stated in the policy and specifications.

A construction schedule for the proposed work will be needed. The construction schedule for work should include the start date; finish date, daily work start times and work stop times. The developer of the project will keep the City aware of all progress made on the job. All work will be coordinated between the developer and the City to ensure proper notification and communication. Construction must start within 90 days of the pre-construction meeting or new meeting must be held. The scope of the work to be performed by the developer or the developer’s contractor shall include the installation and testing of all water mains, valves, valve boxes, valve pads, fire hydrants, reaction blocking, blow-off assemblies, water service tubing, meter setters, meter boxes, sanitary sewer mains, manholes, clean-outs and clean-out pads inside the development.

The developer must furnish documentation that the roadways and shoulders have been constructed to rough-grade (within +/- 0.5’ of finish grade) prior to the installation of water and/or sanitary sewer mains. The developer is responsible for coordinating with all other utilities to avoid conflicts. The work shall be installed to the specifications of the City of Calhoun.

The developer shall furnish his or her own materials and Utility Contractor. All Utility Contractors shall meet the Statutes set forth by the Georgia General Assembly as of June 30, 1994. This will require that contractors installing water or sanitary sewer mains shall hold all necessary licenses as described under O.C.G.A. 43-14-8.2, O.C.G.A. 43-14-8.3, O.C.G.A. 43-14- 8.4. At least one person with a minimum of a Utility Foreman’s License must be present at all times during installation of water mains, sanitary sewer mains, and appurtenances. All materials must meet the requirements as stated in the City of Calhoun Standard Specifications for Water and Sanitary Sewer Installations.

TECHNICAL SPECIFICATIONS

The Standard Specifications for Water and Sanitary Sewer Installations

- (A) *The Standard Specifications for Water and Sanitary Sewer Installations* (the *Specifications*) is subject to revisions and corrections. At the beginning of a project, users should verify that they have the latest edition.
- (B) The Standard Details are complementary to the *Specifications* written herein. If the developer or designer notes any discrepancies or desires an interpretation of a specification, they should submit their question to the City Utilities Engineer in writing for a decision by the City.
- (C) The *Specifications* are intended to convey the general design and construction requirements for a typical project. It also lists specific City of Calhoun requirements relating to plan review, inspection, testing and acceptance of facilities. It is not intended as a substitute for site-specific engineering and construction techniques.
- (D) Failure by the City to notice any deviations from the *Specifications* during the plan review process does not alleviate the Developer's responsibility to adhere to the *Specifications*.
- (E) List Of Commonly Used Terms
 - (1) "City" shall mean the City of Calhoun.
 - (2) "Contractor" shall mean the individual, firm or corporation undertaking the execution of the Work under the terms of the contract and acting through its agents and employees.
 - (3) "Developer" shall mean the individual, firm or corporation financing the execution of the Work.
 - (4) "Engineer" shall refer to the City of Calhoun Utilities Engineer and to his properly authorized agents.
 - (5) "Owner" shall refer to the City of Calhoun.
 - (6) "Plans" shall refer to those drawings that show the character and scope of the work and shall include all drawings identified in the contract documents.
 - (7) "Specifications" and "Standards" shall refer to the City of Calhoun Standard Specifications for Water and Sanitary Sewer Installations.

103. Water Distribution Systems

A. Part 1 – General

1.1 Section Includes:

- A. Furnishing and installing water distribution pipes, valves, fittings, and other appurtenances, including reaction blocking, testing, and disinfection.

1.2 Related Work:

- A. SECTION 108 TRENCHING, BACKFILLING AND COMPACTION
- B. SECTION 104 WATER SERVICE CONNECTIONS

1.3 Reference Standards:

- A. All materials and installation shall conform to requirements of Georgia Rules for Safe Drinking Water Chapter-391-3-5, revised October 16, 1997 and Environmental Protection Division's *Minimum Standards for Public Water Systems*, January, 1998 edition.
- B. Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water (AWWA C104-95).
- C. Ductile-Iron Compact Fittings, 3 In. Through 24 In., for Water Service (AIRWA C153-94)
- D. Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings (AWWA C111-95).
- E. Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids (AWWA C151-96).
- F. Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR Series) (ASTM-D 2241). **(Must be white in color).**
- G. Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds (ASTM D 1784).
- H. Poly (Vinyl Chloride) (PVC) Pressure Pipe, 4 In. Through 12 In. for Water Distribution (AWWA C900-89). **(Must be white in color).**
- I. Metal-Seated Gate Valves for Water Supply Service (AWWA C500-93).
- J. Dry-Barrel Fire Hydrants (AWWA C502-94).
- K. Resilient-Seated Gate Valves for Water Supply Service (AWWA C509-94).
- L. Air Release, Air/Vacuum, and Combination Air Valves for Water Works Service (AWWA C512-92)
- M. Installation of Ductile-Iron Water Mains and Their Appurtenances (AWWA C600-93).
- N. Underground Installation of PVC Pressure Pipe and Fittings for Water (AWWA C605-94).
- O. Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seal (ASTM D 3139).
- P. Elastomeric Seals (Gaskets) for Joining Plastic Pipe (ASTM F 477).
- Q. Disinfecting Water Mains (AWWA C651-92).

1.4 Submittals:

- A. Submit complete descriptions, including manufacturer's catalog data and operation and maintenance instructions, for all products for approval prior to shipment.

- B. Submit manufacturer's certification for all pipe, valves, hydrants, and fittings shipped to the job stating that specified tests have been made and the results thereof comply with applicable specifications.
- C. All similar products on a project shall be furnished by a single manufacturer, unless otherwise approved by the Engineer. For example, all of the PVC pipe on a given project shall come from one manufacturer.

1.5 Delivery, Storage, and Handling:

- A. Properly and safely unload, and store all material furnished until incorporated into the Work and accepted.
- B. Unload pipe, fittings, valves, and hydrants by lifting with hoists or skidding to avoid damage. Do not roll or drop off trucks. Do not skid or roll against pipe already on the ground.
- C. Unload material at the site of the Work near the place where it will be installed. Do not interfere with traffic or create safety hazard. Provide signs, lights, and barricades as necessary to protect the public.
- D. Keep interior of pipe, fittings, valves, hydrants, etc. free of all dirt or foreign matter at all times. Do not store materials in drainage ways or ditches,

1.6 Site Conditions: Reasonable quantities of water for construction, testing, flushing, and disinfection will be furnished by the City through connections to the Cities water system made by the City or the Cities Contractor upon coordination with City. Excessive usage may result in charges for water used.

B. Part 2 – Products

a) 2.1 Ductile Iron Pipe (DIP)

DIP shall manufactured in the USA in conformance with AWWA C151 and cement mortar lined in accordance with AWWA C104, standard thickness, with seal coat.

- A. All water pipelines, with diameters of 4” or greater, shall be Ductile Iron Pipe.
- B. Provide Pressure Class 350 for 4-in to 12-in. dia. pipe.
- C. Unless otherwise specified, the pipe shall have push-on compression type joints conforming to AWWA C111.
- D. Restrained joint (RJ) pipe, where specified, or indicated on drawings, shall consist of push-on compression type joint with a locking gasket with stainless steel locking segments vulcanized into the gasket to grip the pipe to prevent joint separation. Restrained joints shall be Fast Grip Gasket by American Cast Iron Pipe Co. or Field-Lok Gasket by U.S. Pipe Co., or equal approved by the Engineer.
- E. Restraining glands: MEGALUG glands by EBAA Iron Sales, Inc are acceptable for ductile iron pipe; other retainer glands with set screws are not acceptable.

b) 2.2 Plastic Pipe (PVC)

Polyvinyl Chloride (PVC) pipe conforming to all requirements of ASTM D 2241-89. PVC plastic extrusion compound shall meet the requirements of ASTM D 1784 for Class 12454-B (PVC 1120). **(Must be white in color).**

- A. Pipe and fittings shall be Standard Dimension Ratio 21 (SDR 21)
- B. Pipe and couplings shall bear the National Sanitation Foundation Testing Laboratories, Inc. (NSF) seal of approval for potable water use.
- C. Pipe joints shall be integral push-on type complying with ASTM D 3139, designed to provide for the thermal expansion or contraction experienced with a total temperature change of at least 75°F in each length of pipe.
- D. Gaskets shall be vulcanized natural or synthetic rubber conforming to AWWA C111 and ASTM F 477.

c) 2.3 Ductile Iron Fittings

For DIP and PVC pipe shall be ductile iron fittings manufactured in USA. Fittings shall conform to AWWA C153 for diameters through 24 inches Fittings shall be pressure rated 350 psi.

- A. Fittings shall be cement mortar lined in accordance with AWWA C104, standard thickness, with seal coat. *Interior walls shall be smooth and free of defects.*
- B. Fittings shall be mechanical joint (MJ) unless otherwise specified on the Drawings.
- C. Fittings used on restrained joint (RJ) pipe shall be restrained joint fittings with push-on compression type joints equal to those specified for restrained joint ductile iron pipe.
- D. Rubber gasket joints shall conform to AWWA C111.
- E. Gaskets for PVC pipe shall be plain rubber transition type compatible with the type of pipe and fittings used.

d) 2.5 Gate Valves

Resilient Seat type shall conform to AWWA C509 for resilient-seated, iron body, bronze mounted gate valves by Mueller. All 12 inch and smaller valves shall be rated for 200 psi.

- A. Body Type: Mechanical joint unless specified otherwise on the Drawings.
- B. Resilient Seat: Resilient rubber seat ring.
- C. Stem and Seal: Bronze, non-rising stem (NRS), unless shown otherwise on the Drawings; O-ring seals.

- D. Operator: Manual operating nut, 2 inches square, unless shown otherwise on the Drawings; valve to open when turned to the left (counter-clockwise).
- e) 2.6 Small Gate Valves
 Valves smaller than 4 inches shall conform to the level of quality and manufacturing standards established by AWWA Standards. *All small gate valves shall be rated for 200 psi working pressure.*
- A. Two inch valves shall be Stockham Model B-128.
- B. Valves 1-1/2 inch and smaller shall be bronze body, rising stem, solid wedge disc, Crane 428, Jenkins 47, or equal approved by the Engineer.
- f) 2.7 Air Release Valves
 AWWA C512, designed for minimum 200 psi working pressure, ductile iron body, threaded connections, stainless steel float, Buna N seat; with all internal trim stainless steel or bronze by Crispin or approved equal. Size shall be 1" inlet, 1/2" outlet, 3/16" orifice, unless otherwise specified or shown.
- g) 2.8 Fire Hydrants
 Conform to all requirements Of AWWA C502 for dry-barrel fire hydrants, traffic type, with safety flange which allows the valve to remain closed when the hydrant is broken or damaged above or near the grade level. All fire hydrants shall be Mueller Super Centurion A-423.
- A. Size: Hydrant main valve opening 5-1/4 inches. Inlet shall be 6 inch, mechanical joint, with strapping lugs. Fire hydrants located in unincorporated Gordon County or connecting counties must be Mueller Super Centurion A-423 with main valve opening as required by that county.
- B. Bury: Unless otherwise specified, bury shall be 3-1/2 feet, with at least 17 inches from centerline of nozzles to bury line. Use adjustable coupling pipe and/or vertical extensions to bring the hydrant to proper finished grade.
- C. Outlet Nozzles: Two 2-1/2 inch dia.; one 4-1/2 inch dia. Nozzle threads shall conform to those in service where the hydrant is to be installed unless otherwise specified. Provide field replaceable nozzle threads.
- D. Stem Seals: O-ring.
- E. Valve: Compression type closing with pressure. Facings shall be rubber.
- F. Color: To be selected by Owner.
- G. Barrel Drain: Provide integral drain outlet.
- H. Anchoring: (See Detail) Use Fire Hydrant Tees and Anchor Couplings unless otherwise approved.

h) 2.10 Piping Accessories

Any accessories required shall be compatible with pipe and fittings used. Small valves, pipe, and fittings shall conform to AWWA Standard C800-89.

A. Tapping Sleeves for PVC and DIP mains shall be PowerSeal Model 3490 or Robar Model 6606. Tapping sleeves for CIP mains shall be Muller Model H-615. For tapping saddle specifications see Section 104, paragraph B, 2.6 - Service Saddles.

B. When approved for use by the City of Calhoun, Full Circle Repair Clamps shall be PowerSeal model # 3121 or Robar #5606.

C. Couplings for 4-in. and smaller pipe: Dresser Style 38.

i) 2.11 Manhole for air released valves or check valves

Precast concrete conforming to ASTM C478-88, with cast iron cover, NEENAH R-6041A for cast-in-slab, or R-1776 if not cast-in-slab type.

j) 2.12 Water meter box for air-release valve

If air release valves meter box is required in non-traffic area, Quazite 27" Round Box; or similar meter box approved by the Engineer.

k) 2.13 Valve Boxes

Cast iron, 5-1/4 inch diameter, two piece screw type adjustable to suit the depth of bury. Provide extension stem if required so that no operating nut is deeper than 5 feet below the cover. Cover shall be cast iron, marked "WATER."

C. Part 3 - Execution

a) 3.1 Preparation:

A. Perform demolition, clearing and grubbing as required.

B. Install erosion and sediment control measures as required.

C. Strip and stockpile all sod topsoil suitable for reuse in restoration.

D. Remove pavement only as necessary for excavating the trench and installing the pipeline and appurtenances. Cut asphalt pavement in straight, uniform lines by means of a suitable pavement saw. Cut concrete pavements to a depth of at least 2 inches along the cut line with a rotary saw, after which the pavement may be broken with a jack hammer.

E. Provide protection of utilities by notifying all local utility owners and, with an electronic pipe locator and their assistance, locate underground structures, pipes and

utility lines, and mark them in advance of trenching operation. Excavate and expose underground utilities in test pits to verify locations and depths. As excavation approaches the marked areas, digging with extreme care if using conventional trenching machines. Promptly restore utilities or structures damaged by construction activities to their original condition before the damage occurred. Upon Contractor's failure to promptly correct such damage, the City may correct the damage and back-charge the Contractor for costs incurred.

- F. As part of the trenching operations, perform removal, relocation, or relaying of pipes, utility lines, and appurtenances which will obstruct the completed water mains or appurtenances.
- b) 3.2 Trenching, Back filling and Compaction
Conform to requirements of Specification Section 6.
- c) 3.3 Bedding
Bedding shall conform to the individual requirements for the pipe or conduit material being used. Unless otherwise specified or shown on the Drawings, bedding shall be Class D for ductile iron pipe and Class C for Plastic Pipe.
- d) 3.4 Alignment, Grade and Cover:
 - A. Install pipe and appurtenances at the locations, positions, alignments, and grades shown on the Drawings. In the event of conflict, install as directed by the Engineer.
 - B. Provide **36 inches of cover** measured from finished grade to top of pipe barrel unless otherwise shown on drawings. Where obstructions are encountered, the depth may be greater than 36 inches. Depths of cover less than 36 inches may be used only when directed by the Engineer, and do not lay pipe with greater than 48 inches of cover unless specifically approved by the City Engineer.
 - C. Install pipe such that valves and hydrants will be vertical.
 - D. Maintain pipe curvatures with the horizontal or vertical permissible deflection at joints, as specified by the manufacturer or AWWA specification C600.
- e) 3.5 Installing Pipe
Install pipe and appurtenances only when trench conditions are suitable. Trenches must not contain water that can enter open end of pipe. Proper implements, tools, and facilities shall be provided by the Contractor for the safe and convenient performance of the Work.
 - A. Lower all pipe, fittings, valves, and hydrants carefully into the trench piece by piece by means of a derrick, ropes, or other suitable tools or equipment. Prevent damage to water main materials and protective coatings and linings. Do not drop or dump water line materials into the trench.
 - B. Carefully examine all pipe and fittings for cracks and other defects while suspended above the trench immediately before installation in final position. Defective pipe or fittings shall be clearly marked and shall be removed from the site.

- C. Clean the interior and bell and spigot ends of each piece of pipe thoroughly before the pipe is laid.
- D. Prevent foreign material from entering the pipe while it is being placed in the line. If necessary, provide protective covering for the ends of the pipe until the connection is to be made to the adjacent pipe. During laying operations, no debris, tools, clothing, or other materials shall be placed in the pipe.
- E. As each length of pipe is placed in the trench, center the spigot end in the bell, force the pipe home and bring to correct line and grade. Secure the pipe in place with approved backfill material tamped around it. Take precautions to prevent dirt from entering the joint space.
- F. At times when pipe laying is not in progress, close the open ends of pipe with a watertight plug. Buckets, tape, etc. are not acceptable. Maintain plug in place until the trench is pumped completely dry.
- G. Lay pipe with bell ends facing in the direction of laying, unless directed otherwise by the Engineer. Where pipe is laid on a grade of 10 percent or greater, start the laying at the bottom and shall proceed upward with the bell ends of the pipe upgrade.

f) 3.6 Cutting Pipe

Use pipe-cutter for inserting valves, fittings, or closure pieces in a neat and workmanlike manner without damage to the pipe or lining. Cut at right angles to the axis of the pipe.

g) 3.7 Tracing Wire Installation

- A. Install one continuous strand of tracer wire over all water mains (of all pipe materials).
- B. Place the tracing wire directly on the pipe and secure it to the pipe with tape every 8-10 feet to insure that the wire remains adjacent to the pipe. The tracer wire shall be securely bonded together at all wire joints with approved watertight connectors to provide electrical continuity.
- C. The wire shall be #12 AWG Copper Clad Steel (.0808" diameter) high strength tracer wire, and insulated with a 30 mil high density polyethylene blue jacket complying with ASTM-D-1248 (Copperhead Reinforced Tracer Wire or approved equal).
- D. Proper connectors, which protect from moisture and corrosion, are required. Wire splices shall be connected using Copperhead SnakeBite or 3M DBR connectors. Do not tape the wire together.
- E. Install test stations to access the trace wire at intervals of no more than five-hundred (500) feet. Each valve, with valve box, shall serve as a trace wire access point by pulling the wire up into valve box to within 2 inches of top of valve.

Where valves are not available for use as an access point, an access point station shall be created by coiling 3 feet of wire into a standard plastic meter box. Trace wire access points shall be within public right-of-way or public utility easements.

- F. For boring installations, tracing wire shall be installed inside the casing, with the pipe, and connected at both ends of the bore with an approved watertight connector. An access point station shall be installed within 50 feet of both ends of a bored roadway or railway crossing.
- G. The Contractor shall perform a continuity test on all trace wire in the presence of the Engineer or the Engineers' representative. Introducing a small electrical charge to the tracing system during testing will enhance the test results. If the trace wire is found to be not continuous after testing, the Contractor shall repair or replace the failed segment of the wire.

h) 3.8 Jointing

Provide jointing of all pipe, fittings, valves, and hydrants in strict compliance with manufacturer's instructions.

- A. Mechanical Joints: Tighten all nuts with torque limiting wrench. Nuts space 180 degrees apart shall be tightened alternately in order to produce equal pressure.
- B. Push-on Joints: Furnish and install adaptor as required to join bells and spigots of different sizes. Complete joint by forcing the plain end to the bottom of the socket with a forked tool or jack-type tool.
- C. Restrained Joints: Follow same procedure as for push-on joints and manufacturer's procedure for type of restrained joint installed.

i) 3.9 Setting of Valves--and Fittings:

- A. Set valves plumb. Tamp backfill around valves carefully in 6 inch layers for the full depth of trench with valve box in place. All pipe nipples between valves and fittings shall be Ductile Iron.
- B. Provide a valve box and C.I. lid for every valve. For valves in areas that will not be paved, use 6" PVC pipe riser in lieu of C.I. box. The valve box or riser shall not transmit shock or stress to the valve, with the box cover flush with the surface of the finished pavement or such other level as may be directed. Provide an extension stem on any operating nut that is greater than 5 feet below the valve box lid. Provide a precast (circular) concrete collar for all valves.
- C. Provide a concrete valve marker to locate valve only if directed by the City's Representative. This is not required within the development.

j) 3.10 Setting of Hydrants

Set all hydrants plumb with small nozzles parallel with the street and pumper nozzle facing the street, unless otherwise specified. Provide anchoring fittings, valve, and coupling pipe. All materials from the tee to the fire hydrant shall be ductile iron. Rotate

coupling pipe for proper bury of hydrant. If additional adjustment is required to match the "bury line" with finished grade after backfill, use vertical fire hydrant extension.

k) 3.11 Thrust (Reaction) Blocking

Provide blocking for all plugs, caps, tees, bends, hydrants, etc. unless otherwise specified.

- A. Blocking shall be purchased Ready-Mix concrete having a compressive strength of not less than 3,000 psi at 28 days. Place blocking between solid, unexcavated earth and the fitting to be anchored. The area of bearing on the pipe and on the ground in each instance shall withstand thrust forces created by the specified test pressure. In no instance shall the bearing area be smaller than shown on the Drawings for firm, dry clay (3000 lb. per sq. ft.). Where soils of lesser bearing capacity are encountered, increase bearing area dimensions as necessary. All blocking shall be placed such that the joints will be accessible for repair, unless otherwise shown or directed
- B. Metal harnesses, tie rods, or clamps may not be used except in special situations specifically approved by the Engineer.

l) 3.12 Connection to Existing Mains:

- A. Coordinate connections to existing water facilities with the City of Calhoun Water Construction Department and do not make connections to existing mains without specific approval of time of day and allowable duration of service disruption.
- B. All connections to existing main will be done by City of Calhoun unless otherwise approved.

m) 3.13 Stream and Utility Crossings

Where indicated on the Drawings, or required by conditions encountered, place pipe beneath stream beds or ditches, around, over, or under storm sewers, culverts, gas mains, telephone ducts, buried cables, other water mains, or other structures.

- A. Do not pass pipe through any structure, drainage pipe, culvert, sewer, or manhole, etc.
- B. Provide minimum cover of 36 inches under bottom of stream beds or ditches, except that required cover at stream crossings in rock may be reduced to 18 inches where approved by the Engineer. Perennial stream crossings shall be reviewed on an individual basis, ductile iron pipe or river crossing pipe may be required.
- C. Provide minimum of 6 inch cushion of earth or sand between proposed water line and any other utility or structure.
- D. If practical, provide at least 10 feet horizontal and 18 inches clear vertical separation at all structures and other utilities. Where it is not possible to obtain at least 18 inches of vertical separation from other utilities, use an 18 ft. joint of DIP centered at the point of crossing.

n) 3.14 Sanitary Sewer Separation:

Use special precautions to maintain minimum separation distances between water main and any existing or proposed gravity, or pressure, sanitary sewer.

- A. Where practical, maintain a minimum vertical separation of 18 inches between the outside of the water main and the outside of any sanitary sewer. Arrange the crossing so that the water main joints will be equidistant and as far as possible from the sewer joints. Where a water pipe must cross a sewer, provide adequate structural support and protection for the sewer to prevent damage.
- B. To the maximum extent practical, maintain at least ten (10) feet of horizontal separation between the water main and any existing or proposed sanitary sewer. Under no circumstances shall the sanitary sewer and a water main be laid in the same trench.
- C. Notify City's Representative immediately upon encountering field conditions that do not allow at least 18 inch vertical between the water main and any existing or proposed sanitary sewer. Where it is not possible to obtain at least 18 inch vertical separation, use 18 ft. length of DIP, or copper pipe, for the water main centered on the sanitary sewer at the point of crossing.

o) 3.15 Hydrostatic Test

Perform pressure and leakage tests on each section of the pipe between valves in accordance with AWWA C600. When a section of pipe of a length deemed adequate by the Engineer is ready for testing; the pipe shall be thoroughly blown free of air and prepared for testing. Test must be witnessed by the City of Calhoun Engineering Inspection Department. A 48 hour notice must be given prior to testing. **Testing shall be done after all other utilities are installed.**

- A. Furnish and install corporation stops at all high points on the pipe to release air as pipe is slowly filled with test water. Air must be removed prior to testing. **Prolonged flushing of water to remove air will not be allowed.**
- B. Furnish suitable test pump, connections, pressure gages, and all necessary apparatus including means for accurately measuring water introduced into the pipe during testing. Taps for testing shall be installed by the developer's contractor. Water for testing, flushing or other purposes must be metered (See Fee Schedule). Water amounts used for flushing shall be determined by calculating the flows at 2.5 feet/sec. Neither the contractor nor the developer shall be allowed to open, throttle or operate any water valve attached to the City of Calhoun Water Distribution System.
- C. Maintain full test pressure for a **minimum of 2 hours**. Maintain 200 pounds per square inch (psi) for pipe 16-in. and smaller; maintain 150 psi for pipe larger than 16-in. Pressure shall not vary by more than 5 psi during the test.
- D. The length of pipe included in a pressure test shall be limited to reasonable segments of pipe as directed by the Engineer because of topography or other

conditions which might prevent a valid test. **Maximum lengths shall be from main line valve to main line valve.**

- E. Concurrently with the pressure tests, conduct leakage tests on all pipe. Maximum allowable leakage shall be 12 gallons per mile of pipe per inch of nominal diameter per day.
- F. Locate, remove, and replace all defective pipe, valves, fittings, or hydrants. Clamps or other repair devices shall not be used.
- G. Repeat pressure and leakage tests until results are satisfactory to the Engineer.

p) 3.16 Disinfection

Thoroughly clean, flush, disinfect, and drain all installed pipe, fittings, valves, and appurtenances or other facilities exposed to contamination by the construction. Disinfect strictly in accordance with AWWA Specification C651. **Disinfection shall be done after all other utilities are installed.**

- A. Prior to disinfection, coordinate with the City of Calhoun Engineering Inspection Department for providing connections to a source of clean water. The contractor shall provide adequate outlet pipe for disposal and dechlorination of flush water. Provide adequate backflow protection as approved by the Engineer. Distribution valves shall be operated by City of Calhoun personnel. Thoroughly flush the pipe lines, producing a minimum velocity of 2.5 feet per second in pipe for as long as necessary to clean out all silt and debris (See Fee Schedule). Flushing shall be done in presence of City's Representative.
- B. After flushing has been completed and accepted, disinfect pipe using liquid chlorine or hypochlorite to produce a dosage of 50/mg/L for a 24 hour contact period. Contractor shall dispose of chlorinated water as per requirements set forth by The Georgia Department of Natural Resources, Environmental Protection Division.
- C. Open and close each valves within the test segment of pipe several times during disinfection period.
- D. After at least 24 hour retention period, flush chlorinated water from the line until chlorine concentration of water leaving the main is no higher than that generally prevailing in the existing system, or less than 1.0 mg/l. Contractor shall dispose of chlorinated water as per requirements set forth by The Georgia Department of Natural Resources, Environmental Protection Division.
- E. Provide corporation stop or similar connection and obtain samples for bacteriological analysis by City.
- F. Repeat disinfection procedure until bacteriological analysis results are acceptable to the City and the local Health Department.

END OF SECTION

104. Water Service Connections

A. Part 1 – General

1.1 Section Includes:

- A. Furnishing and installing materials and making service connections to the water system.
- B. **SPECIAL NOTE:** Unless otherwise noted the City of Calhoun will furnish and install all water service connections. Contractor shall be required to install sleeves as per specifications and detail.

1.2 Reference Standards:

- A. Underground Service Line Valves and Fittings (AWWA C800-89).
- B. Polyethylene Plastic Pipe Based on Controlled Outside Diameter (ASTM D3035-15).
- C. Cast Copper Alloy Solder Joint Pressure Fittings (ANSI/ASME B16.18).
- D. Cold-Water Meters - Displacement Type (AWWA C700-95).

B. Part 2 – Products

a) 2.1 General

The following materials must be supplied by the developer.

b) 2.2 Service Tubing

Furnished and installed by the Contractor, 3/4 inch or 1 inch diameter DR-9 HDPE copper tube size tubing, ASTM D3035-15.

c) 2.3 Meter Setters

Furnished and installed by the Contractor. Ford VHH72-7W for 5/8" x 3/4" meter. Provide 3/4" yoke nut, Ford 9880 Union Nut and 3/4" Compression fit Male x Comp, Ford C84-339.

d) 2.4 Meter Boxes

Furnished and installed by Contractor, plastic body, and ASTM A48, Class 30 Gray Iron lid marked "WATER METER" with hole for touch read meter. Minimum dimensions 9 5/8" x 19" long x 12" deep.

e) 2.5 Corporation Stops

Furnish and install Plug Corporation Stop AWWA x CTS, in conformance with AWWA Standard C800 and City standard practice using Ford or Mueller brass products approved by City.

f) Curb Stops

Furnish and install ball curb stop in conformance with AWWA Standard C800 and City standard practice using Ford or Mueller brass products approved by City.

g) 2.5 Accessories

Furnish and install all required accessories conformance with AWWA Standard C800 and City standard practice using Ford or Mueller brass products approved by City.

h) 2.7 Small Valve Box

Furnish and install 7" minimum diameter plastic valve box for customer side cut-off valve. Orbit NDS, or approved equal.

i) Customer Cut-off Valves

Furnish and install by Contractor. MATCO 503LF or approved equal.

j) 2.6 Service Saddles

For pipe 8 inches and smaller: Power Seal Type 3401 Bronze Strap. For pipe larger than 8 inches: Dresser 291, double strap; 3/4 inch tap size. Ductile Iron Main, 6-in and larger may be direct tapped.

k) 2.7 Water Meters

City will furnish and install water meters, which will be 5/8 in. x 3/4 in. positive displacement type, frost-proof design, meeting AWWA Standard C700.

l) 2.8 PVC Sleeves:

The developer or contractor shall furnish and install two inch (2") PVC sleeves for long side services as per the detail drawing herein. Sleeves must be installed prior to any paving of streets. Curbs on each side shall be marked with "W" at each crossing location. Install, with sleeve, one continuous strand of No. #12 AWG Copper Clad Steel high strength tracer wire, and insulated with a 30 mil high density polyethylene blue jacket complying with ASTM-D-1248 (Copperhead Reinforced Tracer Wire or approved equal).

C. Part 3 – Execution

a) 3.1 General:

- A. Install service tubing and connections in the same manner as water distribution mains;
- B. Make service connections at locations directed by the City Engineer.
- C. Place meter boxes within the public right-of-way at the property line in an accessible location, unless otherwise directed by the City.

- b) 3.2 Installation:
- A. Make all service connections in accordance with the Standard Service Connection detail on the Drawings.
 - B. Install 2 inch PVC sleeves under pavement prior to paving (see Detail). Sleeves shall meet the same requirements for 2 inch water mains. Pavement cutting will not be permitted for service tubing installation. **Mark curbs at sleeve locations with “W” in concrete curb. The developer shall be responsible for the condition of the sleeves until they are put into use by the City of Calhoun.**
 - C. Install 2 inch SDR 21 PVC sleeves with at least 36 inch cover (sleeves installed on DOT right-of-way shall have 48 inches minimum cover). Backfill all trenches in accordance with Section 5. Mark each end with a section of 2 inch PVC pipe equal to the same material as the sleeve for the crossing.
 - D. Set meter box level, on well compacted earth, and such that stormwater will not accumulate on or in the meter box.
 - E. Securely cap the installed tubing and prevent damage to ends.
 - F. Mark each installed service at the end of tubing or at meter box. Mark in the same manner as required under B and C above.
 - G. Upon completion and acceptance of Contractor's Service Connection installation, the City will set meter and activate the service, after the water tap fee has been paid.
 - H. Install one continuous strand of #12 AWG Copper Clad Steel high strength tracer wire, and insulated with a 30 mil high density polyethylene blue jacket complying with ASTM-D-1248 (Copperhead Reinforced Tracer Wire or approved equal) directly under the pipe. Pull wire up equal with the end of the service tubing. Wire splices shall be mechanically connected by approved methods. Do not tape the wire together.

END OF SECTION

105. Gravity Sanitary Sewers

A. Part 1 – General

a) 1.1 Section Includes:

- A. Furnishing, installing, and testing gravity sanitary sewers and service laterals. Unless otherwise specified or indicated on the Drawings, only smooth-wall PVC pipe shall be used. Ductile iron pipe or steel pipe shall be used only in special applications as indicated on Drawings, or as directed by the Engineer.

b) 1.2 Related Work:

- A. SECTION 106 – MANHOLES AND ACCESSORIES
B. SECTION 108 – TRENCHING, BACKFILLING AND COMPACTION

c) 1.3 Reference Standards:

- A. Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings (ASTM D 3034-89).
- B. Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications, (ASTM D 2321-89).
- C. Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals (ASTM D 3212-92).
- D. Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe (ASTM F 477-90).
- E. Standard Specification for Poly(Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings (ASTM F 679-89)
- F. Standard Specification for Ductile Iron Gravity Sewer Pipe (ASTM A 746-86).

d) 1.4 Submittals:

- A. Submit manufacturer's certifications for all pipe and related materials shipped to the job site stating that all specified tests have been made and the results thereof comply with the requirements of this Specification. Each certificate shall be signed for the manufacturer by a person having legal authority to bind the manufacturer.
- B. All similar products on a project shall be furnished by a single manufacturer, unless otherwise approved by the Engineer. For example, all of the PVC pipe on a given project shall come from one manufacturer.

e) 1.5 Delivery, Storage, and Handling:

- A. Inspect pipe prior to acceptance of delivery for dimensions and to ensure the absence of fractures, cracks damaged ends, markings and other defects.
- B. Deliver pipe and joint materials to the job site and store in accordance with the manufacturer's recommendations. Make whatever special arrangements are necessary to provide such storage.
- C. Take special care to avoid deformation or compression of PVC pipe ends. Store pipe in unit packages provided by the manufacturer.

B. Part 2 - Products

a) 2.1 Smooth Wall Poly Vinyl Chloride (PVC) Pipe and Fittings

Type PSM Pipe which is 12" or less in diameter shall conform to requirements of ASTM D 3034 for SDR 26. Sewer pipe 16" or larger shall conform to Section 2.2.

- A. Nominal length 13 ft.
- B. Integral bell and spigot "O" ring joints conforming to ASTM D 3212-92 with gaskets conforming to ASTM F 477-90.
- C. Sanitary sewer PVC pipe shall be solid green in color.
- D. Fittings for PVC sewer pipe shall be PVC push-on type manufactured in accordance with the same specifications as pipe and pipe joints.

b) 2.2 Ductile Iron Pipe (DIP)

DIP sewer pipe shall conform to the requirements of ASTM A 746 for Thickness Class 50, unless otherwise specified or shown on the Drawings, cement-mortar interior lining and bitumastic coating on the outside. Nominal laying length 18 to 20 ft.

- A. Fittings may be cast or ductile iron manufactured in accordance with AWWA C153 or C110.
- B. Joints shall be push-on joint with lubricated rubber gaskets provided by the pipe manufacturer in accordance with AWWA C111.
- C. Transition from Ductile Iron Pipe to PVC Pipe shall be accomplished with a Harco Fitting.

c) 2.3 Service Laterals Pipe and Fittings:

- A. Service laterals and fittings, excepting clean-out caps which must be of brass construction, shall be of the same material and conform to the same specifications as the main sewer to which they are connected, unless otherwise shown on the Drawings, or otherwise required by local plumbing code. Local plumbing code shall govern those sewer services outside of the public rights-of-way or easements only.
- B. Wyes, Tee-Wyes or Combination Tee-Wyes may be used. Standard tees are not acceptable (except when used for a vertical riser).

- C. Service laterals shall be 4 inches (4") or 6 inches (6") diameter (I.D.) as shown on the Drawings, or as directed by the Engineer.
- D. Sewer service laterals shall not extend past the right-of-way.
- E. A riser from the sewer service cleanout should be stubbed up approximately three (3') above finished grade.
- F. Service lines shall be DIP if installed at a depth of 15' or greater. Once a depth of less than 15' is achieved, the pipeline material can be transitioned to PVC by using a HARCO coupling.

C. Part 3 - Execution

a) 3.1 Preparation:

- A. Prepare trenches in accordance with Section 5 and the pipe manufacturer's recommendations.
- B. Provide construction stake-out and verify inverts.
- C. Examine all pipe and fittings. Mark damaged pipe and fittings in such a manner that identification is permanent and easily recognizable, and immediately remove such pipe from the job site.
- D. Clean all pipe of all debris prior to placing in the trench and jointing.

b) 3.2 Trenching, Back filling, and Compaction

Conform to Specification Section 5.

c) 3.3 Bedding

Provide bedding appropriate for the pipe material being used and the site conditions encountered. Specific bedding requirements are as follows:

- A. Smooth Wall PVC: Install and bed PVC sewer in accordance with ASTM Practice D 2321. Provide Class B "Modified" bedding using crushed stone, or approved granular material, from 4 inches below the pipe up to 6" above the top of the pipe.
- B. DIP: Install Ductile Iron Sewer in Class C bedding, unless directed otherwise by the Engineer. Class D bedding is not acceptable.
- C. Carefully excavate areas under bells sleeves, etc. for all types of pipe and backfill to ensure uniform bedding and for support for the entire length of pipe.
- D. Compaction test shall be required for sanitary sewers to be installed in areas where subgrade is in a fill section. Sub-grade shall be compacted to a minimum of 95% Standard Proctor Density. Test shall be conducted by a licensed testing lab and results shall be

submitted to the City of Calhoun Engineering Department prior to any installation of sanitary sewers in areas as described herein.

d) 3.4 Installation of Pipe and fittings:

- A. Unload, store, lay, joint, and backfill all pipes and fittings pipe in strict accordance with the manufacturer's printed instructions and recommendations.
- B. Carefully examine all pipe and fittings for cracks or other defects before being lowered into the trench. Remove all damaged pipe or fittings from the site immediately.
- C. Carefully grade the bottom of the trench and excavate bell holes. Lay each pipe to the line and grade shown on the Drawings, or as directed by the Engineer. Accuracy of the finished line and grade of the pipe shall be obtained in the preparation of the trench bottom. Do not lay on blocking of any kind. Where finished work does not conform to the specified grades and inverts, adjust the grades as required.
- D. Lay pipe only in dry trenches.
- E. Gravity sewer pipe shall be installed from downstream to upstream, unless specific permission is granted by the City Utilities Engineer. Lay the pipe segments with the bell end upstream and the spigot end pointing downstream. All sewers shall be laid in a straight alignment and show a uniform grade between manholes.
- G. Take special care that each spigot is properly centered in the bell of the preceding pipe and that each pipe is solidly bedded so that settlement does not occur. Thoroughly clean the pipe. Apply jointing material as recommended by the manufacturer. After each joint is made, check for proper position prior to installation of the next length of pipe.
- H. Keep the interior of the pipe clear of all dirt and superfluous material of every description as the work progresses.
- I. When the pipe laying is suspended, either at night or at other times, close the end of the pipe with a water-tight cover.
- J. Provide testing data for all areas where sanitary sewer mains or service laterals are scheduled to be installed on fill sections. Testing shall be conducted at a minimum of one test per one- hundred linear feet and one foot vertical. The fill shall be compacted to 95% Standard Proctor Density. Submit all test data prior to installing sanitary sewer mains or laterals.

e) 3.5 Sewer Installation at Streams, Drainage Structures, and other Utility Crossings

Where indicated on the Drawings, or required by field conditions, install sewer beneath stream beds or ditches. Install sewer around, over or under other sewers, culverts, gas mains, electrical conduits, telephone ducts/cables, or other similar structures.

- A. All sewer mains are to be buried with a minimum of three feet of cover unless otherwise approved in writing by the Utilities Engineering Department Manager.

- B. If a minimum cover of 36 inches cannot be maintained for sewers passing under streams or drainage ditches, the Engineering Manager can approve the use of ductile iron pipe for the sewer.
 - C. Do not extend the sewer through any drainage pipe, culvert, or other structure.
 - D. Provide minimum of 6 inch thickness of earth or sand cushion between proposed sewer and any other pipe or structure.
- f) 3.7 Water Main Separation

Use special precautions to maintain minimum separation distances between sewer and any existing or proposed water main.

- A. Where practical, maintain a minimum vertical separation of 18 inches between the outside of any water main and the outside of the sewer. Arrange the crossing so that the sewer joints will be equidistant and as far as possible from the water main joints. Where a sewer pipe must cross a water main, provide adequate structural support and protection for the water main to prevent damage.
- B. To the maximum extent practical, maintain at least ten (10) feet of horizontal separation between the sewer and any existing or proposed water main. Under no circumstances shall the sewer and a water main be laid in the same trench.
- C. Where proposed sewer unavoidably conflicts with an existing water main, relocate the water main to maintain at least 18 inches of vertical separation under or over the sewer. Reconstruct the conflicting water main with ductile iron pipe or copper pipe, 18 ft. minimum length, centered at the sewer. Coordinate all water main relocation with the City and perform all water main reconstruction in strict conformance with water system requirements.
- D. Notify the City Engineer immediately upon encountering field conditions that do not allow at least 18 inch vertical and/or 10 ft. horizontal separation between sewer and any existing or proposed water main. Where it is not possible to obtain at least 18 inch vertical separation, use 18 ft. length of DIP pipe for the sewer centered on the water main and designed and pressure tested as a water main; or as an alternate, encase the sewer in concrete.

g) 3.8 Installation of Service Laterals

(Applies to laterals in the street and to laterals on private property or easements).

- A. Install laterals in the same manner as sewer main with the same bedding and backfill.
- B. Install wyes and laterals in the street, or in easements, at the same time that the main sewer is installed. Install street laterals to the edge of right-of-way or edge of easement, or 4 feet from main sewer, whichever is greater. **Mark curb with “S” on concrete at service laterals.****

- C. Temporarily plug street laterals when pressure testing the main. Install clean-outs as per the detail and include an "O" ring gasket, if necessary, to seal lateral. Clean-outs are to be located at the right-of way line or the edge of the sanitary sewer easement, as applicable.
- D. Lay all laterals to a uniform line and at grades no less than ¼ of an inch per foot of fall. No service lateral shall be covered until it has been inspected by the City.
- E. For service laterals in street rights-of-way or in easements: Provide non-degradable plastic tape 6" x .004" with the words "Caution Sewer Pipe" placed not less than 18 inches above the pipe and not less than 12 inches below grade. Provide #12 AWG Copper Clad Steel high strength tracer wire, and insulated with a 30 mil high density polyethylene green jacket complying with ASTM-D-1248 (Copperhead Reinforced Tracer Wire or approved equal) under pipe from main line to rights-of-way. Service laterals must not be installed less than forty-five degrees to tangent of the sewer main. Service laterals may not be installed parallel along rights-of -ways in order to shorten main sewer.
- F. Install wyes at 45 degrees from the horizontal except where the Engineer directs otherwise.
- G. In trenches eight feet or more in depth use a tee with a vertical riser as shown on the Drawings and 45 degree or less bends in all cases. No 90 degree bends will be permitted.
- H. For service laterals on private property: Provide clean-outs at each change of grade or direction, at the edge of rights-of-way, as detailed on the Drawings, and as required by local plumbing code.
- I. Service laterals shall not be installed into manholes except where approved in writing by the Calhoun Utilities Engineer.

h) 3.9 Inspection and Tests:

- A. All material and work shall be subject to inspection by the City's representative at any time. All inadequate, defective, or improper work or materials will be rejected and the Contractor will be required to replace or reconstruct the work.
- B. Before calling for inspection of the installed pipe, flush clean of all water, sand, dirt, debris, or other obstructions. A 48 hour notice must be given prior to testing.
- C. Provide labor, supplies, and equipment for lamping the completed sewers in the presence of the Engineer. Inspect each section of sewer by lamping from manhole to manhole. Any section of sewer which does not exhibit a smooth, straight, "full-moon" bore will be rejected.
- D. Conduct deflection tests on PVC sewers in the presence of the Engineer. Tests shall consist of free passage of a properly sized mandrel or sewer ball. Maximum deflection shall be 5%.
- E. Conduct tests of all gravity flow pipelines, main sewers, and laterals for water-tightness in the presence of the Engineer. Laterals shall be installed to the edge of the right-of-way and temporarily plugged prior to testing. (However, laterals may be installed to the point of tie-in, at the Contractor's option.) Temporary restraints may be required for clean-outs and plugs for testing. Perform both of the following tests:

- (1) Infiltration Testing: The pipeline shall not leak under exterior groundwater pressure. The pipeline shall be considered a dry line before acceptance.
 - (2) Air Testing: Also perform low pressure air testing in accordance with ASTM C 828 for all pipes. Allowable leakage will be based on an allowable loss of 0.003 ft.³/min. /ft.² of surface area using an initial pressure of 3.5 psi.
- F. Gravity flow pipelines which fail water-tightness tests shall be repaired, or replaced if directed by the Engineer, and re-tested.
- i) 3.10 Clean-up and Restoration

Remove any and all material not used (including excess excavation) and rubbish of every character from the job site. Restore all fences and other private or public facilities and structures disturbed in essentially as good condition as existed before the work was done. Replace or repair any subsequent settlement of pavement or backfill, or erosion, over or in the trenches and bring the surface to grade. Take special precautions to prevent stormwater erosion of trenching. Keep stormwater culverts and structures cleaned of mud, debris, and silt caused by the construction. Restore any and all items disturbed by the construction to their original condition as soon as possible after disturbance and maintain the site until final acceptance.

END OF SECTION

106. Manholes and Accessories

A. Part 1 - General

a) 1.1 Section includes:

- A. Furnishing all labor, materials, supplies, and equipment necessary for the construction of manholes and manhole accessories for water distribution systems, sanitary or storm sewers.

b) 1.2 Related Work:

- A. SECTION 108 - TRENCHING, BACKFILLING AND COMPACTION
B. SECTION 105 - GRAVITY SANITARY SEWERS

c) 1.3 Reference Standards:

- A. Standard specification for Precast Reinforced Concrete Manhole Sections (ASTM C 478-90b).
B. Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures (ASTM C 890-85).
C. Standard Practice for Installation of Underground Precast Concrete Utility Structures (ASTM C 891-90)
D. Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipe and Lateral (ASTM C 923-89).

d) 1.4 Submittals:

- A. Submit Shop Drawings for precast sections, steps, pipe joint seals, and frames and covers before placing orders to suppliers for the job.
B. Provide manufacturer's certifications that all manholes and accessories have been manufactured in accordance with this Specification and that they meet all the criteria referenced herein. Provide certified test results for manhole steps.

e) 1.5 Delivery, Storage and Handling

Inspect manholes and accessories immediately upon delivery to ensure that no damaged or unsatisfactory materials are allowed on the job.

B. Part 2 - Products

a) 2.1 Precast Manholes

Manufactured in accordance with ASTM C 478. All manhole sections shall be precast (wet-cast manholes only) and furnished by the same manufacturer, unless otherwise approved by the Engineer.

- A. Riser Sections: 4, 5 or 6 feet in diameter as required, with reducer rings for base sections of diameter greater than 4 feet. Riser sections less than eighteen inches in height shall not be accepted.

- B. Top Sections: Eccentric cone or concentric top sections for manholes deeper than 5.5 feet; and flat slab tops for manholes 5.5 feet or less in depth. Flat slab tops to be reinforced concrete, designed for HS-20 traffic loading in accordance with ASTM C890, with eccentric manhole opening.
- C. Base Sections: 4, 5 or 6 feet in diameter as required by the Drawings; monolithically cast wall and bottom slab for all new sewers. Use precast "dog-house" section with poured-in-place bottom for manholes on existing sewers. There are to be no lift holes that go through structures.
- D. Doghouse Manholes are not allowed without written permission from the Utilities Engineering Department Manager.
- E. Steps within manholes are not allowed.

b) 2.2 Frames and Covers

- A. Standard: Solid lid with "SANITARY SEWER" lettering and concealed pick holes. Manhole ring and cover to be Model R-1776 by Neenah Foundry Co., Neenah, Wis.; USF 362CK by U.S. Foundry & Mfg. Corp.; V-1480-1 by EJ Group, Inc., or approved equal. Regardless of frame and cover type used above or approved equal, they must come from the manufacturer with 4-5/16" anchor holes in the frame on a 24 1/2" diameter bolt pattern.
- B. Vented: Identical to those provided for standard frames and covers except that they shall have six, equally spaced, drilled holes 1/2 inch in diameter.
- C. Waterproof: Solid lid with stainless steel bolts, gasketed with specified lettering on the lid and equal to USF 362 CK-BWT by U.S. Foundry & Mfg. Corp.; Model R-1915-E2, Type P with bolted cover, by Neenah Foundry Company; or V2480-1 by EJ Group, Inc.
- D. Flat Slab Tops and Manholes in Unpaved Areas: Shall have the frame precast in the top slab.
- E. All manhole frames and covers for the project shall be furnished by a single manufacturer.

c) 2.3 Joints

- A. Riser Section Internal Seals: Butyl rubber rope equal to Ram-Nek, ConSeal CS-30R, or Kent-Seal No. 2 joint sealer.
- B. Riser Section External Seals: Flat butyl rubber sheet not less than 1/16" thick and 6" wide applied to the outside perimeter of the joint, Polywrap by RuVan Inc. or equal approved by Engineer.
- C. Pipe-to-Manhole Connectors: Kor-N-Seal as manufactured by NPC Systems, Inc., or equal approved by the Engineer.

d) 2.4 Grout

Embeco 167 Mortar, or equal approved by the Engineer.

C. Part 3 – Execution

a) 3.1 General:

- A. Construct and set all manholes in accordance with the details shown on the Drawings and in accordance with special notes provided for particular manholes. Manholes must be installed at all grade changes, pipe line size changes, turns, etc., and may be spaced 300 foot to 400 foot apart.
- B. Provide standard frames and covers unless otherwise noted on the Drawings.
- C. Where no special instructions are provided on the Drawings or in the field by the Engineer, set the top of manholes as follows:
 - (1) Outside of roads or streets, set top level at grade of surrounding landscape. Tolerance shall be + or – 0.2' maximum.
 - (2) In roads, streets, road shoulders, sidewalks, and lawns set the tops flush with the proposed finished surface. On sloped surfaces, angle the tops of manholes as necessary to conform to slope or gradient of the proposed finished surface or pavement. Tolerance shall be + or – 0.05' maximum.
- D. The minimum drop across manholes between the “in” and “out” pipe inverts shall be 0.1'.

b) 3.2 Preparation:

- A. Excavate strictly in accordance with a applicable OSHA regulations and requirements and maintain a safe work area at all times.
- B. Dewater excavation so that manholes will be installed in dry holes. Do not install manholes in water or on fluid soil.
- C. Prepare an unyielding foundation of crushed stone, 6 inch minimum thickness, as shown on the Drawings.

c) 3.3 Installation:

- A. Set the bottom as near practical to the required grade to ensure that a properly grouted channel can be provided. Manholes must be vertical. Do not extend main line sewer into manhole more than 2” beyond inside wall.
- B. Whenever the difference in elevation between the inlet and outlet sewer inverts exceeds 24 inches provide an outside drop connection in accordance with the detail shown on the Drawings.
- C. Carefully assemble manhole sections and sewer entrance using gasketed joints installed in accordance with the manufacturer's recommendations to ensure a tight and permanent fit. **Grout will not be permitted in horizontal manhole joints.**

- D. Grout all lift holes from outside the structures. No structure will be accepted with lift holes that fully penetrate the structure walls.
- E. Manhole steps are not allowed.
- F. Construct invert channels as shown on the Drawings with 1:2 (cement: sand) mortar to provide smooth channel through pipe inlets to true line and grade as shown on the Drawings. Concrete blocks or bricks may be used for fill in deep base sections under mortar; mortar depth over blocks or bricks must be three-inch (3") minimum.
- G. Provide brick leveling courses as required at top of conical section. Plaster inside and out with mortar equal to that used for sewer entrances. Maximum height of leveling course shall be 6 inches.
- H. Align any eccentric manhole openings longitudinally over the main sewer, unless otherwise directed by the Engineer.
- I. Anchor frame to manhole cone using stainless steel anchor bolts, unless frames are cast into cones.

d) 3.4 Coating

(Only if coating is designated on the Drawings or otherwise specified.) Field coat exterior of manhole (including leveling courses and base of frame) with coal tar bitumastic coating in accordance with coating manufacturer's directions. If coating is brushed (rather than sprayed) take care to thoroughly coat all surface irregularities and joints. Allow time for coating to dry completely before leakage testing and back-filling. **DO NOT APPLY COATING TO "GREEN", UNCURED CONCRETE.**

e) 3.5 Backfilling:

- A. Use crushed stone for backfilling around any manhole in streets, paved areas, or areas to be paved.
- B. Backfill using clean native soil containing no rock or debris for manholes located outside of paved areas.
- C. It is the Contractor's option to vacuum test manholes with permanent backfill in place around the structures. However, if a manhole fails the test, it must be dug out and repaired from the outside.

f) 3.6 Inspection and Tests:

- A. Conduct a vacuum leakage test on each complete sanitary sewer manhole. Place a vacuum of 10" Hg on the manhole as measured by an approved vacuum gauge. Maximum allowable vacuum loss shall be 1 inch of Hg in 60 seconds for 4 ft. diameter manhole, 75 seconds for 5 ft. diameter manhole, or 90 seconds for 6 ft. diameter manhole. **Conduct test with frame and cover in place.**

B. Repair or reconstruct any sanitary sewer manhole that fails the leakage test and re-test until satisfactory results are obtained.

END OF SECTION

107. Erosion Control

A. Part 1 - General

a) 1.1 Section Includes:

- A. Providing adequate protection against erosion and sediment transport off the property during the execution of the Work, including but not be limited to those features specifically shown on the Drawings and/or approved Erosion and Sediment Control Plan.
- B. The requirements specified in SECTION 101, GENERAL POLICIES, apply to this Section.

b) 1.2 Reference Standards:

- A. "Manual for Erosion and Sediment Control in Georgia', Fourth Edition, revised 1996, prepared by the Georgia Soil and Water Conservation Commission.
- B. "Standard Specifications, Construction of Roads and Bridges", Georgia Department of Transportation, 1993 Edition, sections of which are referenced herein.

c) 1.3 Site Conditions:

- A. Protect all adjacent public and private property from siltation and other damage due to construction activities.
- B. Confirm that applicable Land Disturbing Permit has been obtained. Comply with approved Erosion and Sediment Control Plan (if applicable) and all local and state regulations relating to erosion and sediment control.
- C. Maintain all temporary controls until permanent grassing or landscaping has been complete.
- D. Provide supplementary erosion and run-off control measures whenever it becomes apparent that additional problems exist.

B. Part 2 - Products

a) 2.1 Hay or Straw Bales

Are not acceptable except as approved by the City of Calhoun Utilities Engineer.

b) 2.2 Silt Fence

Type A (36 inch width) woven or non-woven fabric as listed on Georgia D.O.T. Qualified Products List #36.

c) 2.3 Stakes

1.5" x 1.51 x 481 hardwood, or 211 x 411 x 481 soft wood, or 1.3 lb/ft. steel posts. Maximum 6 ft. spacing.

d) 2.4 Seed

Select plants appropriate to the season and site conditions from Appendix A of "On-site Erosion Control."

Temporary grass shall be a quick growing species such as millet, rye grass, Italian rye grass, or cereal grasses suitable to the area providing a temporary cover which will not later compete with grasses sown for permanent cover. Seed shall meet the requirements of the Georgia Seed Law and Rules and Regulations.

e) 2.5 Lime

Agricultural grade ground or pulverized limestone.

f) 2.6 Fertilizer

Standard commercial grade, either 4-12-12, 6-12-12, or 5-10-15.

g) 2.6 Corrugated Metal Pipe

16 gauge, type I or II culvert pipe conforming to AASHTO M36.

h) 2.8 Stone for Construction Exit/Entrance Pad

National Stone Association R-2 (1-1/2 inch to 3-1/2 inch stone), or Georgia D.O.T. Section 800, Size No. 3 (1 inch to 2 1/2 inch).

i) 2.9 Riprap

Conforming to Georgia Department of Transportation Standard Specification Section 805.01, Stone Dumped Riprap, Type 3 (or Type 1 if noted on Drawings).

C. Part 3 - Execution

a) 3.1 Inspection

Prior to clearing the site, inspect site and determine all preliminary erosion control measures that will be required to prevent erosion and sedimentation problems and comply with any applicable Erosion Control Plans approved by local and/or state authorities.

b) 3.2 Preparation

Provide all necessary materials at the site prior to clearing and/or grading.

c) 3.3 Installation:

A. Where applicable, provide temporary stone exit/entrance pad located at points of vehicular ingress and egress to the site and maintain in service until pavement is placed. Minimum pad thickness shall be 6 inches; minimum width shall be 20 feet; minimum length shall be 50 feet. Maintain in a condition that will prevent tracking or flow of mud onto public roads.

B. Provide erosion and sediment control barriers as shown on the Drawings, required by the approved Erosion Control Plan, or as needed for the proposed construction methods and procedures to detain sediment on site.

C. If impoundments or sediment traps are required, construct immediately after necessary clearing.

- D. When permanent site drainage facilities are included in the Work, install as early as practical in the construction process. Where practical without creating erosion problems, divert runoff into permanent facilities.
- E. Provide temporary sediment barriers around drainage structures and all grading areas and excavations where sub grades are being prepared.
- F. Provide diversion berms or dikes at top of all slopes and abrupt changes in slope. Diversion dikes or berms to be minimum 2 feet in width and 18 inches in height. Machine compact and provide temporary seeding immediately after construction.
- G. Provide temporary drains where necessary to convey water down slopes. Drains may consist of pipes, filter cloth, rubble, concrete, asphalt, or plastic sheets. Inspect for damage after each rainfall event. Repair as required.
- H. Provide riprap or other protection at all drainage discharge points to prevent scour at these points. Provide 4 inch filter material under riprap.
- I. As soon as practical following grading of areas to be paved, apply an initial base course of stone of at least 4 inch thickness and maintain by periodic top dressing until final base course and pavement are installed.
- J. Provide temporary seeding immediately on all disturbed areas which will not receive final grading or landscaping within 30 days.
- K. Where no specific controls are called for on the Drawings for drainage leaving the site, provide check dams to create ponding for sediment deposition and collection of debris. Maximum height shall be 4 feet and the impounded area shall be kept clean as much as practical.

d) 3.4 Maintenance

Inspect for damage after each rainfall event. Clear all debris and accumulated sediment from behind barriers, check dams, etc. so that the functional capacity of these items is not significantly reduced throughout the construction period.

e) 3.5 Clean-Up

Following completion of permanent site drainage and landscaping, remove all temporary erosion control facilities and dispose of all accumulated waste in a manner approved by the Engineer. Landscape any resulting disturbed areas to conform to and blend with the remainder of the site landscaping.

END OF SECTION

108. Trenching, Backfilling and Compaction

A. Part 1 – General

a) 1.1 Section includes:

- A. Trenching, excavation of all materials encountered including rock and unsuitable materials; disposal of excess materials; sheeting and shoring; pumping and dewatering; bedding; backfilling; and compaction for installation of pipe, piped utilities, underground conduits, and appurtenances thereto, which are 5 feet outside building lines.

b) 1.2 Quality Assurance:

- A. Developer shall schedule required quality control testing, cooperate with all testing personnel, and provide equipment and labor required for all sampling, preparation of samples, field testing, and transport of samples to the testing laboratory.
- B. Two signed copies of all field and laboratory testing reports shall be sent to the Owner and Engineer immediately upon completion.

c) 1.3 Reference Standards:

- A. ASTM D 422-63 (R 1990) Test Method for Particle-Size Analysis of Soils.
- B. ASTM D 1556-90, Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
- C. ASTM D 698-91, Test Method for Moisture-Density Relations of Soils and Soil-Aggregate Mixture Using 5.5 lb. (2.49 kg) Rammer and 12 inch (305-mm) Drop (Standard Proctor).
- D. ASTM D 2167-84, (R1990) Test Method for Density and Unit Weight of Soil in Place by the Rubber -Balloon Method.
- E. ASTM D 2487-90, Test Method Classification of Soils for Engineering Purposes.
- F. ASTM D 4318-84, Test Method for Liquid Limit, Plastic Limit, and Plasticity of Soils.
- G. NEPA 495, Code for the Manufacture, Transportation, Storage and Use of Explosive.

d) 1.4 Site Conditions:

- A. All work under this Section shall conform fully to applicable OSHA rules and regulations.
- B. Maintain access to the existing facilities and private property at all times.
- C. Perform operations with special care in the vicinity of existing facilities. Protect above or below-ground utilities which are to remain. If any damage is done to these facilities, repair immediately.

- D. Conduct all work required on public right-of-way in strict conformance with rules and regulations of governing bodies having jurisdiction over the work.
- E. Provide traffic protection by means of suitable signs, barricades and lights.
- F. Protect existing underground and overhead utility pipes, poles, lines, services, structures, etc. from damage or interruption of service by the conduct of construction operations. Furnish and have available at all times an electronic pipe detector in working order, and use to survey the proposed path of trenching prior to excavation. Location and protection of all underground and overhead utilities and structures in the construction area is the responsibility of the Contractor.

B. Part 2 - Products:

- a) 2.1 Bedding and Backfill Approval
All bedding and backfill material shall be subject to approval of the Engineer. For approval of imported backfill or bedding material, give at least five (5) working day's advance notice of intent to import material and designate the proposed borrow area. Allow the owner's testing laboratory to sample as necessary from the borrow area for the purpose of making acceptance tests to prove the quality of the material.
- b) 2.2 Native Material Suitable for Backfill
Excavated on site soils which do not contain "Unsuitable Material" as defined herein. Excessively wet or dry soils may not be used until moisture is adjusted to optimum level to permit proper compaction.
- c) 2.3 Granular Material for Bedding
A granular soil, sand, chert, crushed stone, or mixture of these, all of which meets the requirements of ASTM C33 for coarse aggregate, Grading Size No. 57, free of organic matter, debris, and unsuitable material.
- d) 2.4 Stone for Stabilization or Backfill
Sound, durable gravel or "crusher run" rock, all of which passes a 1 1/2 inch sieve, free of organic matter, debris, and unsuitable material.
- e) 2.5 Unsuitable Material
Any Class IVAR IVB, or V soil per ASTM D 2321, topsoil, roots, vegetable matter, trash, debris, asphalt, frozen or excessively wet soil, or stone or gravel larger than 2-1/2 inch in maximum dimension.
- f) 2.6 Rock Definition for Trenching
Any material which cannot be excavated with a backhoe having a bucket curling force rated at not less than 33,010 pounds (Caterpillar 225B or equivalent).

C. Part 3 - Execution

- a) 3.1 Preparation:
 - A. Perform demolition, clearing and grubbing as required.

- B. Install erosion and sediment control measures as required.
 - C. Strip and stockpile all sod and topsoil suitable for reuse in restoration.
 - D. Remove pavement only as necessary for excavating the trench and installing the pipeline and appurtenances. Cut all asphalt pavement in straight, uniform lines by means of a jack hammer or suitable pavement cutter. Cut all concrete pavements to a depth of at least 2 inches along the cut line with a rotary saw, after which the pavement may be broken with a jack hammer or suitable pavement cutter.
 - E. Provide protection of utilities as follows:
 - (1) Contact all local utility owners, and with an electronic pipe locator and their assistance, locate underground structures, pipes and utility lines, and mark them in advance of trenching operations. Excavate and expose underground utilities in test pits to verify locations and depths. As excavation approaches the marked areas, digging by conventional trenching machines shall be done with extreme care.
 - (2) Promptly correct damage to utilities or structures, to promptly restore service, and provide a condition at least equal to the original condition before the damage occurred. Should the Contractor fail to promptly restore service or correct the damage, the City may correct the damage and back-charge the Contractor for costs incurred for the corrective work.
 - (3) Perform removal, relocation, or relaying of pipes, utility lines, and appurtenances which will obstruct the completed pipelines as part of the trenching work.
 - (4) Where existing storm drains are damaged or destroyed by removal to facilitate construction, replace the drains with new reinforced concrete pipe meeting the requirements of ASTM Designation C-76, Class II. Pipe size shall be equal to that removed except sizes smaller than 12 inches which shall be replaced with 12 inch pipe. Existing storm drains which are damaged shall be replaced at the contractor's own expense.
- b) 3.2 Trench Excavation:
- A. Excavate all subsurface material within the trenching limits specified regardless of the material encountered, including rock. Excavated materials satisfying the requirements of this Section for Native Material may be used for backfill.
 - B. Excavate the banks of trenches vertical from bottom of trench to 1 foot above the top of the pipe or conduit.
 - C. Keep the trench width within the limits specified below, However OSHA safety requirements shall supersede the requirements stated herein whenever applicable:
 - (1) Maximum Width at top of pipe = Pipe outside diameter (O.D.) plus 24 inches. If the maximum trench width is exceeded, the required bedding must be upgraded

to the next higher class at contractor's expense, for that part of trench that exceeds the maximum allowable width.

(2) Minimum width of trench = O.D. of bell or coupling plus 15 inches. (This minimum applies to all trenches including those in rock excavation.)

- D. Place excavated material (spoil) sufficiently back from the edge of trench to prevent caving of the trench wall and to permit safe access along the trench. Provide at least 3 ft. clear from toe of spoil bank on at least one side of trench for access.
- E. Unless prior approval is obtained from the City, limit the length of open trench to that which can be completed in one working day. Do not leave trenches open overnight unless there are extenuating circumstances and unless the open trench is fully protected by safe and effective barricades and lights.
- F. Where necessary, and as required by OSHA regulations, provide and install sufficient and suitably sized movable shields, sheeting, shoring and bracing which shall remain in place until the backfill has proceeded to a point where it can be removed safely. When damage is liable to result from withdrawing sheeting, it shall remain in place. Movable shields, sheeting, shoring, bracing, etc. are considered as an integral part of the excavation work and no extra payment will be allowed for this work.
- G. Remove rock encountered in trench excavation for the overall width of the trench and to a depth of 6 inches below the invert of the pipe.
- H. Apply for and obtain all required permits for handling explosives and performing blasting. Conduct blasting operations in strict accordance with all existing ordinances and regulations and only with the prior approval of the City. Carefully protect all exposed structures from the effects of blast and cover all blasts with heavy timbers, mats or other suitable protection. Blasting shall be done only by experienced workers. Use very light charges to prevent damage to adjacent structures. Promptly repair any damage. Store all blasting supplies in accordance with local ordinances. In no case shall caps or other explosives be kept at the place where dynamite or other explosives are stored.

c) 3.3 Bedding:

- A. Bedding shall conform to the individual requirements for the pipe or conduit material being used. Unless otherwise specified or shown on the Drawings, bedding shall be Class B "Modified" for PVC sanitary sewer pipe and Class C for ductile iron sewer pipe and RCP/CMP culverts.
- B. Grade the trench bottom firm, uniform and continuous to allow bearing all along the entire length of the barrel of the pipe. Excavate bell holes so that the pipe bells or couplings do not support any load. When excavation is carried below or beyond that required, fill the over excavated space with suitable, compacted Granular Material.
- C. In areas of rock excavation, and where needed in other areas, provide Crushed Stone cushion across the full width of the excavation to a minimum 6 inch depth under the pipe.

- D. Whenever the subgrade is unstable or too soft to provide a satisfactory foundation for any pipe, dewater and undercut the trench as necessary and stabilize with crushed Stone. Compact and bring the trench bottom to proper grade to create a firm, unyielding stabilized subgrade for bedding material and/or pipe.
- d) 3.4 Backfill:
- A. Backfill and compact all trenches and excavations immediately after the pipe or appurtenance has been installed. Unless otherwise specified or shown on the Drawings, use suitable excavated Native Material for pipe trench backfill. If sufficient suitable Native Material is not available on site, furnish sufficient and suitable borrow material for backfill.
- B. Initial Backfill - Place select backfill beginning 6 inches above the pipe to a depth not to exceed 12 inches loose. Use no stone larger than 3/4 inches maximum dimension in the initial backfill. Compact firmly and evenly, utilizing an approved method. Compaction shall meet the requirements for the specific location and application as listed below.
- C. Remaining Backfill - Place backfill in the remainder of the trench from top of Initial Backfill, as follows:
- (1) **Trenches in areas to be paved, in ditch lines or other areas subject to erosion, and in areas beneath proposed structures:** Backfill trench line with crusher run or Stone suitable for backfill. Trench line shall be defined as outlined under Section 3.2, C, (1) and (2). Place to achieve 6 inch compacted to 95% Standard Proctor Density. Use mechanical power tampers to achieve required compaction. Rock no larger than 6 inches in maximum dimension may be placed in the upper layer of backfill unless otherwise approved by the Engineer. In areas to be paved, also installed and compact pavement base material to the thickness specified. Install a temporary surface at grade consisting of 2 inches of crushed stone. Leave backfilled trench open to traffic and maintain the surface at grade by refilling with stone and re-compacting as necessary to remedy any settlement. Continue such maintenance, including dust control, until paving is authorized by the City Street Superintendent or appropriate county official.
 - (2) **Trenches in areas to be grassed or landscaped:** Unless otherwise specified, backfill with Native Material and compact in layers by methods of Contractor's choice to achieve minimum 85% Standard Proctor Density. If the trench is on DOT or Railroad right-of-way, compact to density specified in the applicable permit. Refill and re-compact as often as necessary to maintain the trench surface at the required finished grade.
 - (3) **Excavated areas outside of trench lines as defined under Section 3.2, C, (1) and (2):** Backfill material and compaction shall be as specified by governing bodies or any existing ordinances for city streets or county roads respectively.

- e) 3.5 Field Quality Control:
 - A. Perform routine quality control compaction testing at a frequency sufficient to ensure adequate compaction throughout the trenching.
 - B. In areas to be paved, perform compaction testing prior to placing base material.**
 - C. Notify the testing laboratory and the City of Calhoun Engineering Department 24 hours prior to need for testing. When any tests indicate the density or moisture content does not meet requirements specified herein, as determined by the Engineer, rework until the required density has been obtained.

END OF SECTION

109. Sanitary Sewerage Lift Stations

A. Part 1 General

a) 1.1 Section Includes:

- A. Furnishing and installing a submersible sanitary sewerage pump system within a concrete wetwell and valve pit with all equipment, stand-by power and controls in accordance with the requirements as listed within these specifications.
- B. The design criteria for the lift station shall require minimum run cycles based on wet well storage volume. The volume between “lead pump on” elevation and “pumps off” elevation shall equal or exceed the volume one pump can discharge in 2.5 minutes with no flow entering the wet well.
- C. The requirements specified under Sections 103, 105, 106, 107, and 108 (excepting Section 103, part 3.16 - DISINFECTION) apply to this section.

b) 1.2 Reference Standards:

- A. Hydraulic Institute Standards, 14th Edition.

c) 1.3 Submittals:

- A. Prior to fabrication submit for City Utilities Engineer’s approval:
 - 1. Dimensioned drawings of pump mounting plates, pump spacing in wetwell, wetwell detail with elevations for Mercury Float Switches (high level, lag, lead and low level), influent pipe elevations and access hatch location and dimensions.
 - 2. Manufacturer’s certified shop drawings and catalog information showing the performance curves for the pump including flow, head, efficiency, and brake horsepower over the full operating range of the pump.
 - 3. Manufacturer’s recommended list of spare parts and part numbers.
 - 4. Details of manufacturer’s warranty, 5 year minimum.
- B. After City Engineer’s approval of submittals and contractor’s installation but prior to start-up supply 4 copies of operation and maintenance data. In addition, provide 4 computer disks (CD or DVD) containing a searchable PDF of the Operator’s Manual.
- C. After start-up submit certified test results and reports of the field start-up testing specified herein.

B. Part 2 Products

2.1 General:

- A. The lift station shall include a minimum of two (2) submersible non-clog pumps, pump guide rails, stainless steel guide rail mounting plates with discharge elbow and rail supports, access frame and covers, guide rail supports, stainless steel lifting chains or stainless steel lifting cables, stainless steel clevises, power and control cables, electrical panel, stand-by generator,

float switches, precast wetwell, valve pit, discharge piping and valves and other items for a complete and properly operating lift station.

- B. The electrical supply and equipment for sanitary sewer lift stations shall be 480 volts, three phase, unless otherwise approved in writing by the City Utilities Engineer.

2.2 Submersible Pumps and Associated Equipment

- A. Acceptable Manufacturers: The pump vendor shall furnish submersible pumps as manufactured by Flygt Pump Company, Yeomans, Homa Pump Technology or approved equal. Pumps shall be as shown on the drawings and in accordance with the following:
- B. Discharge Connection: A sliding bracket shall be an integral part of the pump unit. The volute casing shall have a machined discharge flange to automatically and firmly connect with the cast iron discharge connection, which when bolted to the floor of the sump and discharge line, will receive the pump discharge connecting flange without the need of adjustment, fasteners, clamps or similar devices. Installation of the pump unit to the discharge connection shall be the result of a simple linear downward motion of the pump unit guided by no less than two (2) guide bars.
Cable guides will not be accepted.
- C. Guide Bars: Lower guide bar holders shall be integral with the discharge connection. Two (2) guide bars shall be installed for each pump, to permit raising and lowering the pump. Guide bars shall be of two inch (2") 304 stainless steel, three inch (3") 304 stainless steel, or single stainless steel T-bar type structural shape of sufficient length to extend from the lower guide holders on the pump discharge connection to the upper guide holders, as shown on the Drawings. **All guide bars shall be furnished by the pump supplier.**
- D. Motor: The pump motor shall be housed in an air-filled watertight casing and shall have moisture resistant Class F 155 degree C insulation, NEMA Design B and designed for continuous duty or shall be a U.L. listed submersible motor designed for Class 1, Group D, Division 1 hazardous locations. Furnish not less than two thermal sensors embedded in the stator windings to automatically de-energize the motor if the winding temperature exceeds 150 degrees C, or a lower temperature if recommended by the manufacturer. Use sensors that automatically reset after temperature decreases and allow pump to restart automatically. Provide thermal sensors in addition to the external motor over-current protection. Extend sensor electrical conductors to the instrument control panel for connection in pump control circuit. The pump motors shall operate at a maximum allowable speed of 1800 RPM (unless otherwise approved by the City Utilities Engineer) and shall be non-overloading throughout the entire range of the pump curve.
- E. Motor Cable: The pump motor cable shall be suitable for submersible pump applications. Cable sizing shall conform to NEC Specifications for pump motors and shall be of adequate size to allow motor conversion without replacing the cable. The cable entry water seal design shall be such that precludes specific torque requirements to insure a watertight and submersible seal. The cable entry junction box and motor shall be separated by a stator lead sealing gland or terminal board which shall isolate the motor interior from foreign materials gaining access through the pump top.
- F. Cooling System: Each unit shall be provided with an adequately designed cooling system. Thermal radiators integral to the stator housing cast in one unit are acceptable. Where water jackets alone or in conjunction with radiators are used, separate circulation shall be provided.

Cooling media channels and ports shall be non-clinging by virtue of their dimensions. Provision for external cooling and flushing shall be provided.

- G. Pump Design: The pumps shall be capable of handling raw, unscreened sewage and must be capable of passing a solid 3” sphere. The design shall be such that the pump unit will be automatically and firmly connected to discharge piping when lowered into place on its mating discharge connection, permanently installed in the wet well. The pump shall be easily removable for inspection or service, requiring no bolts, nuts, or other fastenings to be disconnected. For this purpose, they shall be fitted with a stainless steel chain of adequate strength and length to permit raising and lowering the pump for inspection or removal. A safety chain clevis shall be provided for attachment of the chain to the access door frame. The pump, with its appurtenances and cable, shall be capable of continuous submergence under water without loss of watertight integrity to a depth of 65 feet. All major parts, such as the stator casing, oil casing, sliding bracket, volute and impeller shall be of gray iron. Provide an accessible tap and plug at oil chamber for draining and inspecting oil.
- H. Impeller: The impeller shall be gray cast iron of non-clogging design capable of handling solids, fibrous material, heavy sludge and matter found in normal sewage applications. The impeller shall be constructed with a long throughlet without acute turns. The impeller shall be dynamically balanced. Static and dynamic balancing operation shall not deform or weaken it. The impeller shall be a slip fit to the shaft and key driven. Non-corroding fasteners shall be used.
- I. Seals: Each pump shall be provided with a mechanical rotating shaft seal system running in an oil reservoir having a separate, constantly hydro-dynamically lubricated lapped seal faces. The upper seal unit between the pump and oil chamber shall contain one (1) stationary tungsten-carbide seal ring or chrome steel on and one (1) positively driven rotating carbon or ceramic ring. Bottom seal shall be one (1) stationary silicon-carbide seal ring and one (1) rotating silicon-carbide seal ring. Each interface shall be held in contact by its own spring system supplemented by external liquid pressures. The seal shall require neither maintenance nor adjustment, but shall be easily inspected and replaceable. No seal damage shall result from operating the pumping unit out of its liquid environment. The seal system shall not rely upon pumped media for lubrication.

2.3 Lift Station Control Panel and Miscellaneous Equipment:

- A. Lift Station Control Panel: The pump vendor shall furnish an automatic control center equipped for the voltage and service required complete with circuit breaker combination, across-the-line magnetic starters, 3 phase, overload protection, electrical alternator, automatic transfer to non-operating pump in event of overload in the operating pump, overload switch, run indication lights, elapsed time meters, 24 volt control circuit transformer, and a ground fault interrupter type convenience outlet with main power disconnect breaker, breakers for security lighting and 150 volt outlet with 20 amp breaker. Provide a sensor electrode, panel indicator light, and conductors to the control or instrument panel to energize an indicator light upon detection of water in the oil chamber. All components shall be housed in a corrosion resistant 316 stainless steel NEMA 4X enclosure. Within the enclosure, furnish a continuously hinged, steel or aluminum panel with white enamel finish near the enclosure door for locating panel mounted operating controls. Furnish three position selector switch to override automatic feature and permit manual selection of either unit as lead pump. Furnish surge protection arrestors and capacitors on the line side of the control center circuit protectors. Furnish power monitor to prevent pump operation when phase loss, single phasing, under-voltage or phase reversal occurs. Furnish thermostatically controlled space heater of approximately 100 watts to prevent moisture from condensation. Furnish blue lens push-to-test indicator light for each pump to energize when associated pump

motor annunciates thermal overload trip. Furnish Hand-Off-Auto selector switch for each pump. Furnish red alarm light with protective cover, located at top of control panel. Provide reset push-button for alarm light to be located on the interior of the control panel.

B. Provide the following additional contacts to the terminal block for integrating the Mission Control SCADA:

- (1). A Normally Closed (NC) contact held open by power on
- (2). A Normally Closed (NC) Low Level Float held open by water at normal levels
- (3). A Normally Open (NO) contact that closes when pump # 1 runs
- (4). A Normally Open (NO) contact that closes when pump # 2 runs
- (5). A Normally Open (NO) High Level Float that closes when water rises above the normal level

C. Provide a main disconnect on the control panel side of the meter base, equipped with properly sized breaker, meeting National Electrical Code requirements and inside a weather resistant 3R housing.

D. In the event that dual power feed is not available, submittals for an on-site stand-by generator with an automatic transfer switch must be submitted for approval. Generators are to be mounted on 12" thick concrete slabs (the bottom 6" of the slab is to be below grade). City standard specifications for generator sets are available upon request.

E. Mount the pump control panel, automatic transfer switch and main disconnect on a tubular stainless steel (Type 304) frame set in a 6" thick concrete slab.

F. All conduits from control panel to wet well shall be sealed at both ends with spray foam to prevent sewer gases from seeping into control panel.

G. Miscellaneous Equipment: The pump vendor shall furnish Four (4) sealed float type Mercury level switches (top weighted), each provided with an adequate length of electric cable, with a stainless steel cable holder for installation inside the wet well.

H. Starting/Stopping Level: The starting level and stopping level for each pump shall be independently adjustable.

2.4 Access Door and Frame: Shall be Halliday Series S2R or approved equal, and shall be 48"x 48" (minimum).

2.5 Portable Hoist: Shall not be required.

2.6 Precast Concrete Wetwell and Valve Pit:

A. Dimensions, wall penetrations and elevations shall be shown on the drawings.

B. Constructed and installed in accordance with Sections 3 and 4.

C. See standard details herein for minimum dimensions and special notes.

2.7 Piping and Valves:

- A. Piping shall be Ductile Iron designed in accordance with ANSI/AWWA C-150/A21.50 and Manufactured in accordance with ANSI/AWWA C151/A21.51.
- B. Piping joints shall be “Flanged” true and perpendicular to the axis of the pipe. Flanges shall be cleaned of all burrs, deformations, or other imperfections before joining.
- C. Connections to equipment shall be made in a manner which will not induce strain or stress on the equipment or valve flanges.
- D. Check valves shall be swing type, iron body conforming to Mueller Figure A2600-6-01, Clow F-5345, or equal.
- E. Plug valves shall be Pratt Ballcentric Plug Valve or equal.
- F. Air-Vacuum Valves shall be Crispin SL 20 or equal, minimum two-inch (2”) in size.

2.8 Lift Station Site:

- A. The lift station site shall be a minimum of 50 feet by 50 feet in dimension and shall be graded almost level except for a gentle slope away from the wetwell to promote positive drainage off the site.
- B. An access road (minimum of 14 feet wide) shall be provided to each site.
- C. The site and access road shall be covered with 6” of Graded Aggregate Base (meeting the requirements of GDOT Standard Specification of Roads and Bridges, Section 815) compacted to a minimum density of 95% Standard Proctor Density.
- D. The site layout plan of equipment and structures shall allow for truck access to both sides of the wetwell and generator. The control panel should be located near the wetwell, but with adequate clearance to allow generous standing room in front of the panel and to allow doors and hatches to operate without conflict.
- E. All lift stations shall be provided with security lighting. Security light must be mounted on a hinged pole with winch. Standard pole shall be a galvanized steel hinged square pole, General Electric No. ASHS-20-2T-4.011 GV, 20 feet in height, with a General Electric No. M180 Winch/Chain and a No. RBSU2H6 GV Bracket. The security light attached to the top of the pole shall be a General Electric No. M2RR-07-S-1-H-2-LN-PEC1TL or alternate acceptable to the City.

2.9 Fencing:

- A. The lift station site shall be fenced with 72” high chain link fence with 3 strands of barbed wire.
- B. Chain link fabric shall be No. 9 gauge wire conforming to ASTM a 392-92, Class 1 coating galvanized after weaving by hot-dipped process with not less than 1.2 oz. of zinc per sq. ft. when tested per ASTM A90, 2” mess size, knuckled at one selvage and twisted and barbed at the other selvage.
- C. Double 6’ sing gates shall be provided for access, with heavy-duty galvanized steel, non-lift-off hinges. Swing gates shall conform to ASTM F 900.
- D. Fence post, gate post and line post shall be heavy-duty external and internal zinc coated conforming to ASTM F 1083-91. Gate post and corner post shall be a minimum of 2.5” O.D. and line post shall be a minimum of 1.9” O.D.
- E. All accessories clips, bolts, wire ties etc. shall be galvanized.

2.10 Sanitary Forcemains:

- A. Sanitary forcemains shall conform to all requirements under Section 1, Part 1, 2.2, 2.3,2.10,2.11 & 2.12, Part 3, 3.1(except F), 3.2.,3.3,3.4(except C), 3.5, 3.6, 3.7, 3.8, 3.11, 3.13(except D, E, F, G, H & I) and 3.15 (except F, which shall read as Locate, remove, and replace all defective pipe, valves and fittings. Clamps or other repair devices shall not be used).
- B. All PVC force main pipes shall be solid green in color.

- C. Force mains shall be installed with 48 inches of cover measured from finished grade to top of pipe barrel, unless otherwise shown on drawings.
- D. Force mains shall terminate in the receiving manhole at no more than 1 foot above flow line.
- E. Section 3, Part 3.7, Water Main Separation applies to forcemains.

2.11 Testing: After installation and testing, the pump vendor shall furnish the services of a competent factory representative of the pump manufacturer for the purpose of inspecting the installation and initial operation of the station. The equipment will be inspected for defects or weakness, or both and if found, the equipment shall at once be removed and be replaced with new parts or be made good in a satisfactory manner, at no additional expense to the City of Calhoun.

- A. Continuous 24-hour test shall be made after all defects have been remedied, at no additional expense to the City of Calhoun.
- B. After installation and testing, the pump vendor shall make written certification to the City of Calhoun that the equipment and controls have been properly installed in accord with the Drawings and Specifications, and that operation and maintenance instructions have been furnished to the City of Calhoun.

2.12 Guarantee: The pump vendor shall guarantee the equipment to be free from defects in workmanship, design, and material for a period of one (5) years after initial operation begins. The pump vendor shall supply replacements at no additional expense to the City of Calhoun, for every defective part, and every part showing undue wear during the guarantee period.

END OF SECTION

110. Contact Information

Larry Vickery, Utilities General Manager: Office 700 West Line Street
Phone: (706) 629-4701
Direct line (706) 602-6026
Fax (706) 629-1611
E-mail lvickery@calnet-ga.net

Jerry Crawford, Water & Sewer Director: Office 700 West Line Street
Phone (706) 629-4701
Direct line (706) 602-6078
Fax (706) 602-6079
E-mail jcrawford@calnet-ga.net

David Burnett, Engineering Dept. Manager: Office 700 West Line Street
Phone (706) 602-6089
Fax (706) 629-1611
E-mail dburnett@calnet-ga.net

Mark Williamson, Water & Sewer Const. Office 705 West Line Street
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Fax (706) 602-6077
E-mail mwilliamson@calnet-ga.net

Engineering Department:

Kyle W. Ellis, Utilities Engineer: Office 700 W. Line Street
Phone (706)602-6087
Email kellis@calnet-ga.net

Kevin King, Engineering Technician: Office 700 West Line St.
Phone (706) 602-6111
E-mail kking@calnet-ga.net

Tod Lankford, Engineering Technician: Office 700 West Line St.
Phone (706) 602-6081
E-mail tlankford@calnet-ga.net

111. Appendix

A. Water System Standard Detail Drawings

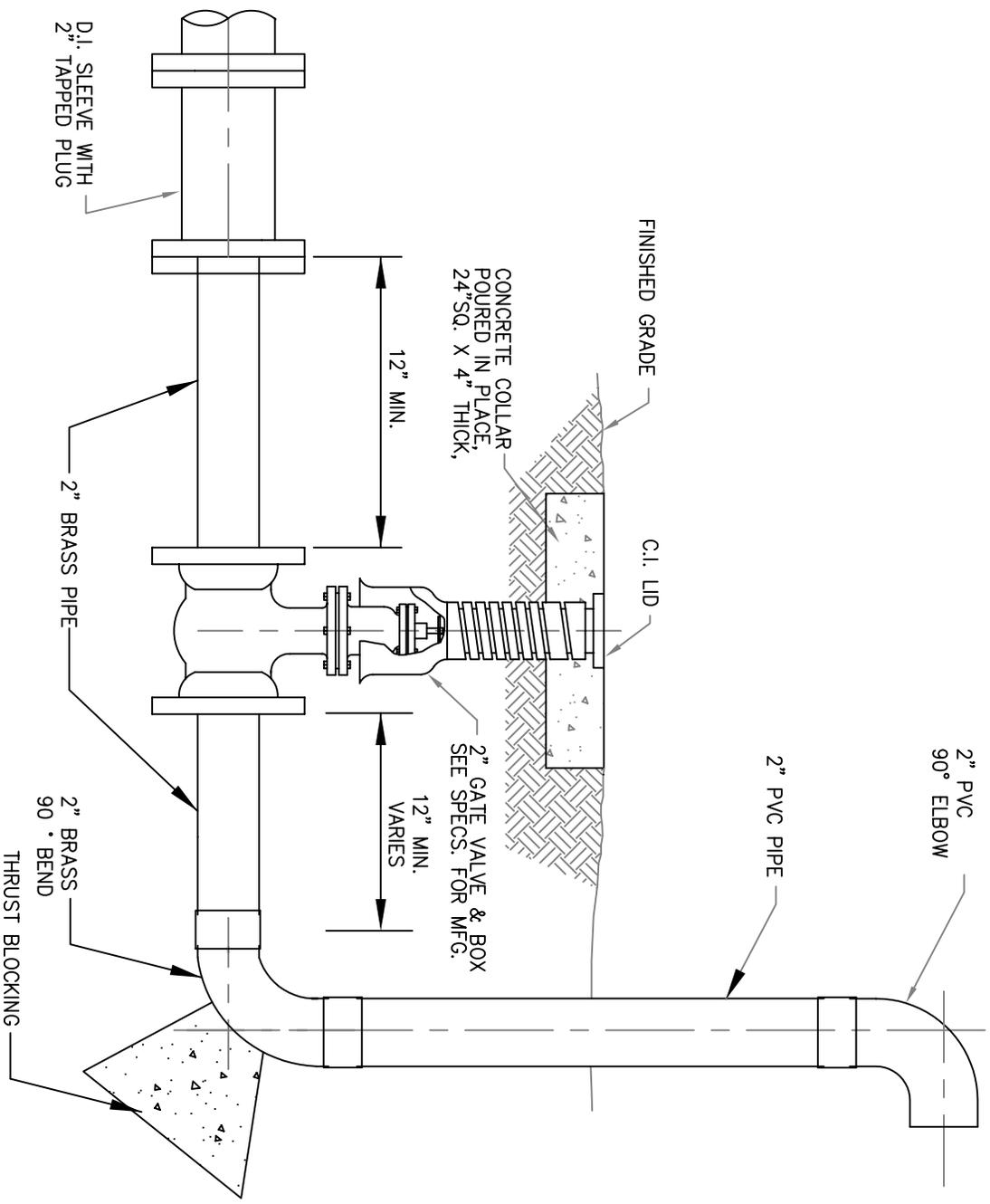
1. 2" Blow-Off Assembly
2. Gate Valve & Box
3. Blocking for Vertical Bends
4. Thrust Blocking
5. Creek or Stream Crossing
6. Service Connections
7. Fire Hydrant Assembly
8. Pipe Bedding
9. Long Side Service Casing
10. Pipe Anchor Detail
11. Railroad Crossing Bore
12. Highway Crossing Bore
13. Large Water Meter Pit – Section View
14. Double Check Backflow Preventer
15. RPZ Type Backflow Preventer
16. 2" Loop at Cul-de-sac
17. Water Meter Pit (4" to 6") – Plan View
18. Water Meter Pit (8" to 12") – Plan View
19. Curb Stop Detail

B. Sanitary Sewer System Standard Detail Drawings

1. Standard Precast Manhole
2. Typical Manhole Invert Plans
3. Shallow Manhole
4. Drop Manhole Connection
5. Service Lateral
6. Cleanout
7. Pipe Bedding
8. Blocking for Vertical Bends
9. Thrust Blocking
10. Standard Manhole Frame & Cover
11. Air Release Valve in Shallow Manhole
12. Lift Station Wetwell Detail #1
13. Lift Station Wetwell Detail #2
14. Force Main Valve Pit
15. Lift Station Control Panel
16. Dumpster Pad Detail
17. Grease Trap Detail

C. General Standard Detail Drawings, General Notes, and Forms

1. Residential Street Utility Locations
2. D.O.T. Pavement Replacement
3. Local Road & Driveway Pavement Replacement
4. Tracing Wire Testing Station
5. General Notes for Water Distribution System Construction
6. General Notes for Sanitary Sewer System Construction
7. Utility Easement Form
8. Letter-of-Credit Form



WATER SYSTEM DETAILS
2" BLOW-OFF ASSEMBLY

CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

DRAWN BY: JWC

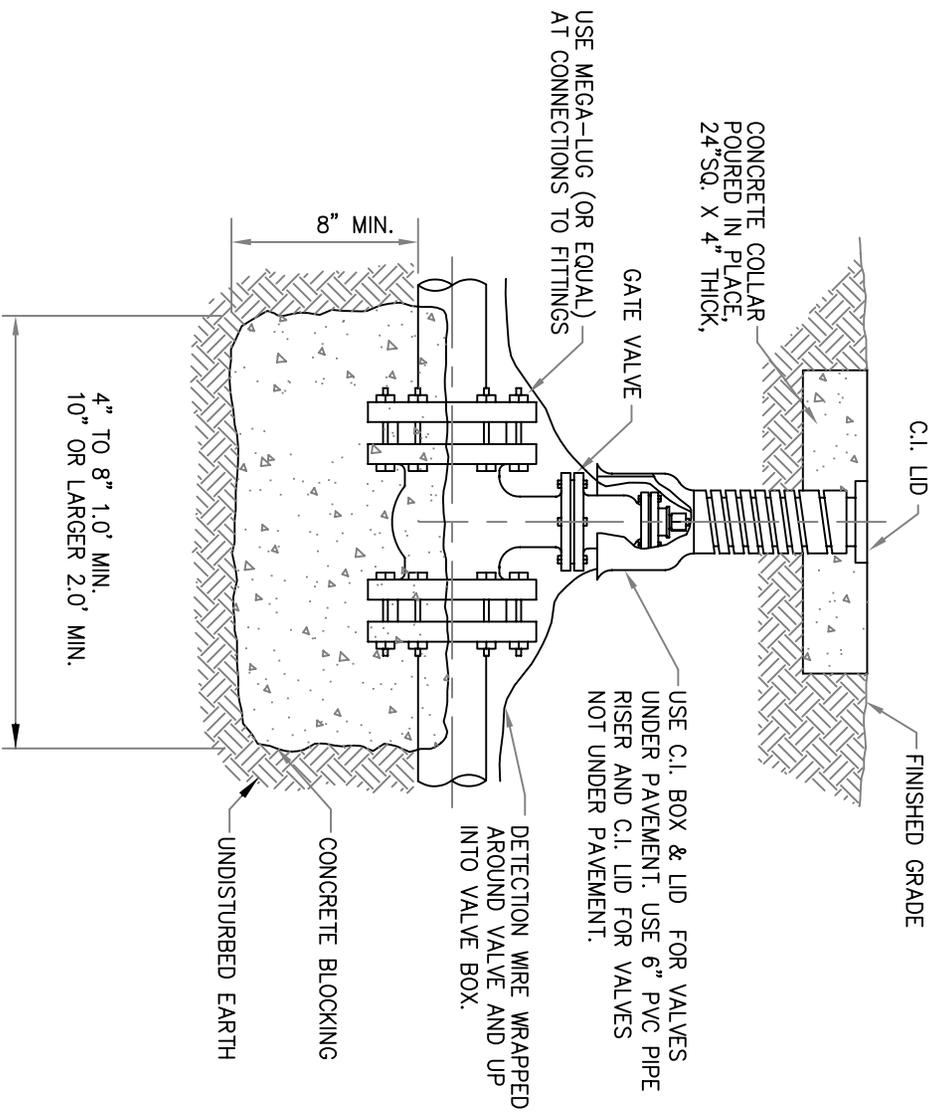
SCALE: NTS

DATE: SEPT. 21, 1998

DWG. NO.: WATER-01

NOTES

1. USE READY-MIX CONCRETE WITH 3,000 PSI STRENGTH @ 28 DAYS.
2. PLACE CONCRETE BEARING SURFACES AGAINST UNDISTURBED EARTH.
3. PLACE CONCRETE CLEAR OF JOINT AND JOINT ACCESSORIES.
4. CONNECTION OF VALVES TO FITTINGS SHALL REQUIRE A MINIMUM OF 18 INCHES OF DUCTILE IRON PIPE.



SECTION

WATER SYSTEM DETAILS
GATE VALVE & BOX

CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

DRAWN BY: JWC

SCALE: NTS

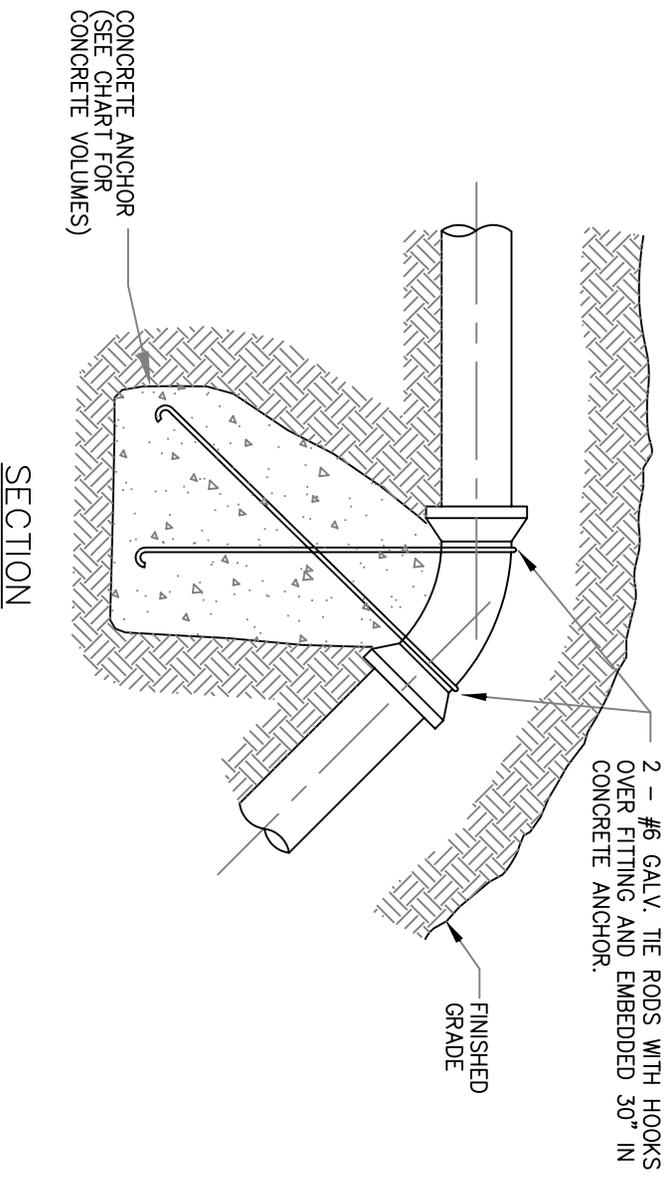
DATE: SEPT. 21,1998

DWG. NO.: WATER-02

NOTES

1. USE READY-MIX CONCRETE WITH 3,000 PSI STRENGTH @ 28 DAYS.
2. PLACE CONCRETE CLEAR OF JOINT & JOINT ACCESSORIES.

VOLUME OF CONCRETE ANCHOR (CUBIC YARDS)				
FITTING DIAMETER	90° BEND	45° BEND	22.5° BEND	11.25° BEND
4"	1.00	0.50	0.25	0.25
6"	1.75	1.00	0.50	0.25
8"	3.00	1.75	1.00	0.50
10"	4.75	2.50	1.25	0.75
12"	6.50	3.75	2.00	1.00
14"	7.75	5.00	2.50	1.50
16"	11.75	6.75	3.25	1.75



WATER SYSTEM DETAILS
BLOCKING FOR VERTICAL BENDS

CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

DRAWN BY: JWC

SCALE: NTS

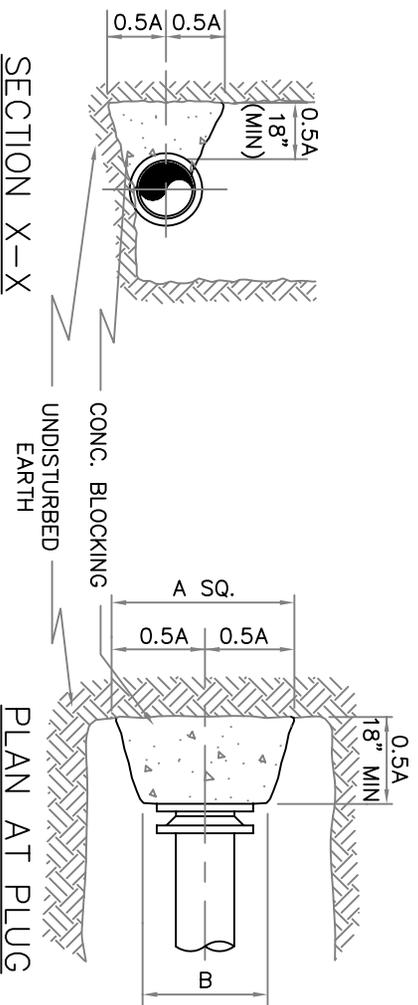
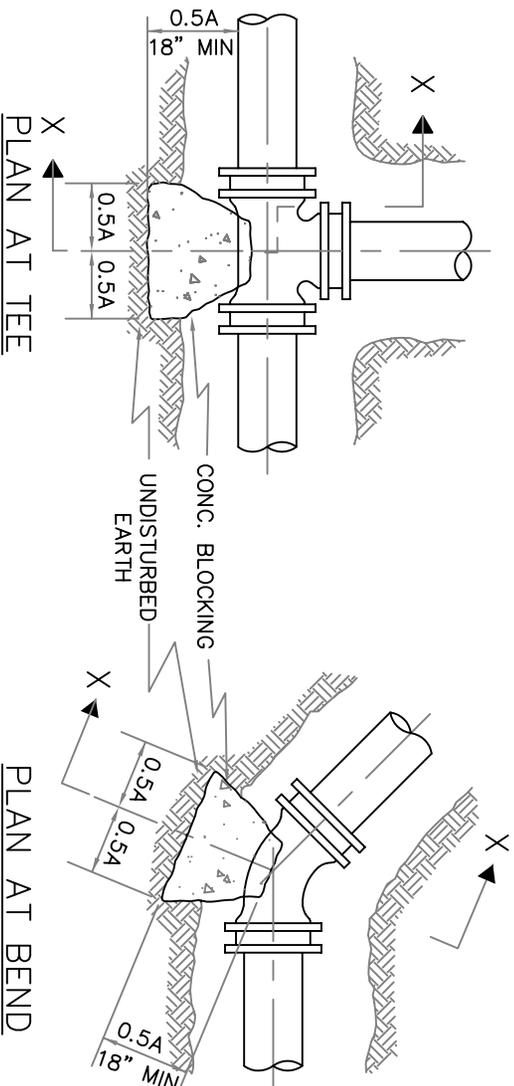
DATE: SEPT. 21,1998

DWG. NO.: WATER-03

NOTES

1. USE READY-MIX CONCRETE WITH 3,000 PSI STRENGTH @ 28 DAYS.
2. PLACE CONCRETE BEARING SURFACES AGAINST UNDISTURBED EARTH.
3. PLACE CONCRETE CLEAR OF JOINT AND JOINT ACCESSORIES.
3. DIMINIONS BASED ON SOIL BEARING OF 4000 P.S.I.

PIPE SIZE	90° BEND		45° BEND		22.5° BEND		11.25° BEND		TEES		PLUGS	
	A	A	A	A	A	A	A	A	A	A	B	B
4"	15"	12"	12"	12"	12"	12"	12"	12"	12"	12"	10"	10"
6"	20"	16"	12"	12"	12"	12"	12"	12"	18"	18"	18"	12"
8"	30"	20"	15"	15"	15"	12"	12"	24"	24"	24"	12"	12"
10"	36"	26"	18"	18"	14"	14"	30"	30"	30"	30"	14"	14"
12"	40"	32"	20"	20"	16"	16"	36"	36"	36"	36"	16"	16"
14"	48"	36"	26"	26"	18"	18"	40"	40"	40"	40"	18"	18"
16"	64"	42"	32"	32"	20"	20"	48"	48"	48"	48"	20"	20"



WATER SYSTEM DETAILS
THRUST BLOCKING

CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

DRAWN BY: JWC

SCALE:

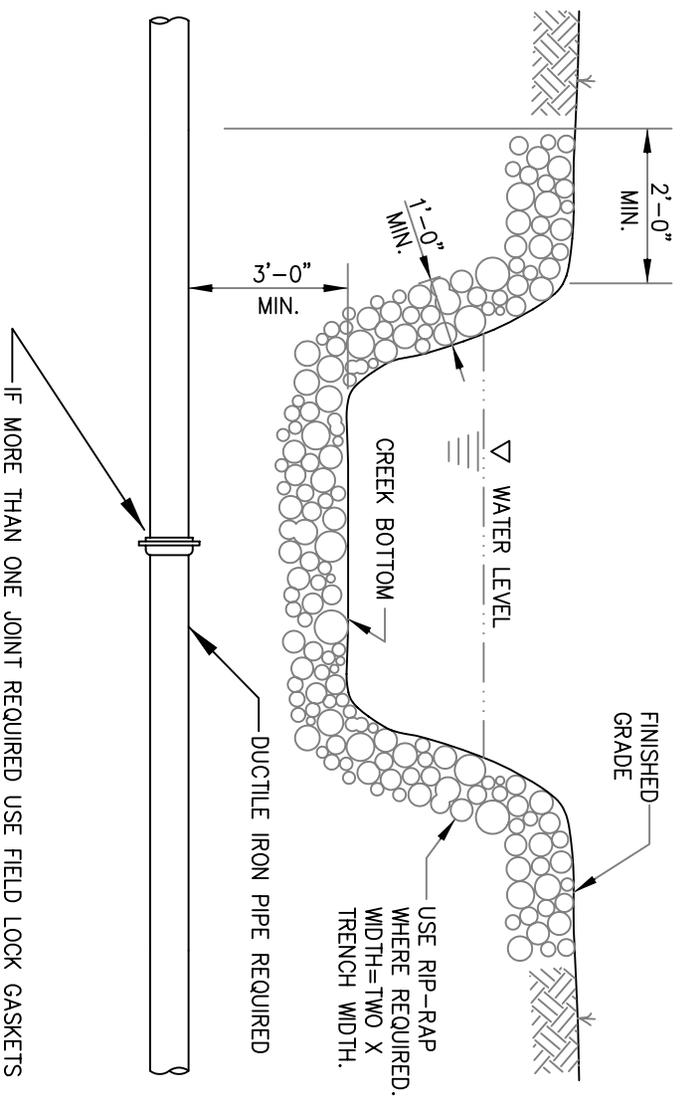
NTS

DATE:

SEPT. 21,1998

DWG. NO.:

WATER-04



IF MORE THAN ONE JOINT REQUIRED USE FIELD LOCK GASKETS

SECTION

WATER SYSTEM DETAILS
CREEK OR STREAM CROSSING

CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

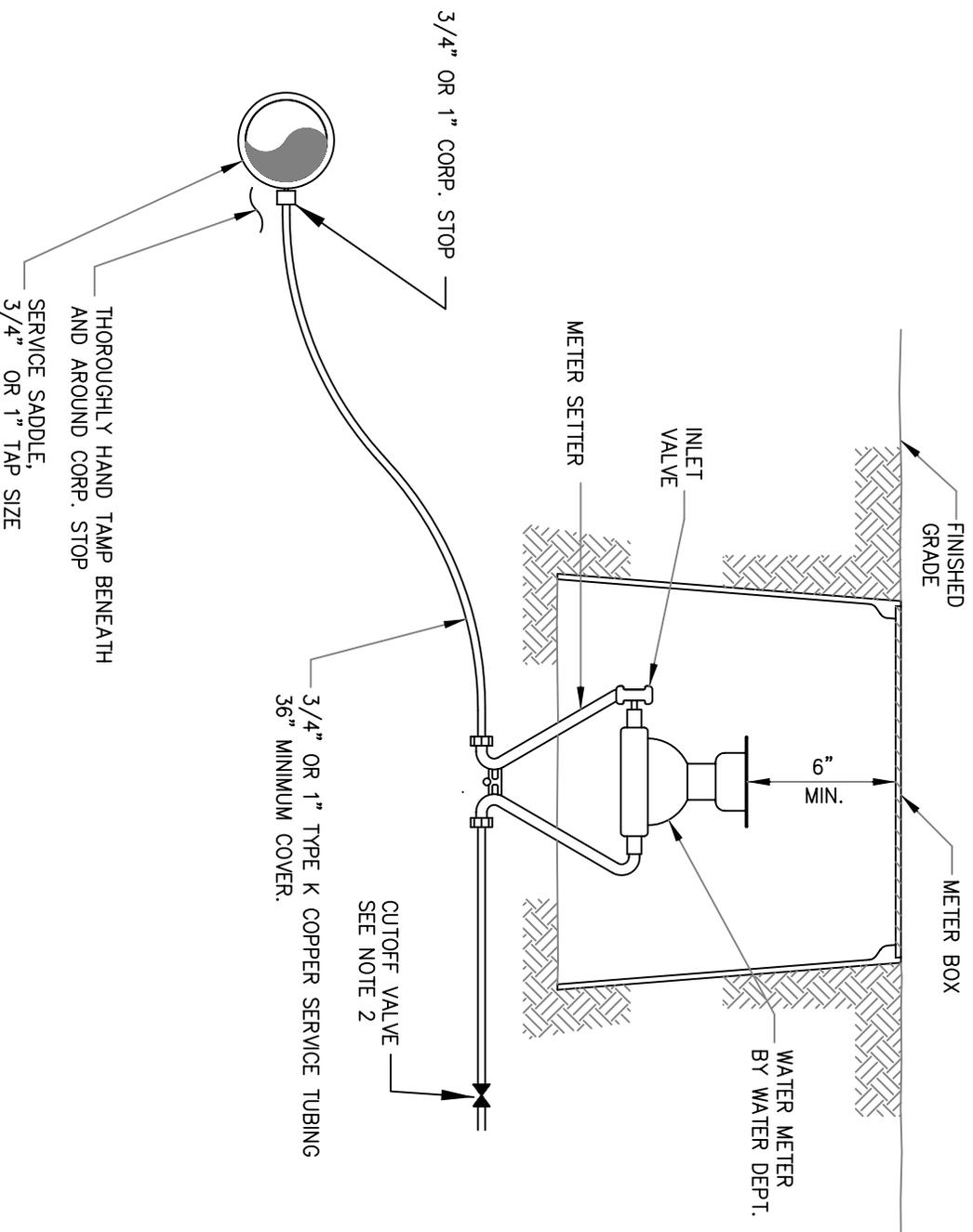
DRAWN BY: JWC

SCALE: NTS

DATE: SEPT. 21,1998

DWG. NO.: WATER-05

- NOTE:
1. SEE SPECIFICATIONS FOR ACCEPTABLE MATERIALS AND MANUFACTURERS.
 2. CUTOFF VALVE MUST BE IN PLACE BEFORE METER CAN BE INSTALLED.



WATER SYSTEM DETAILS
 3/4" & 1" SERVICE CONNECTIONS

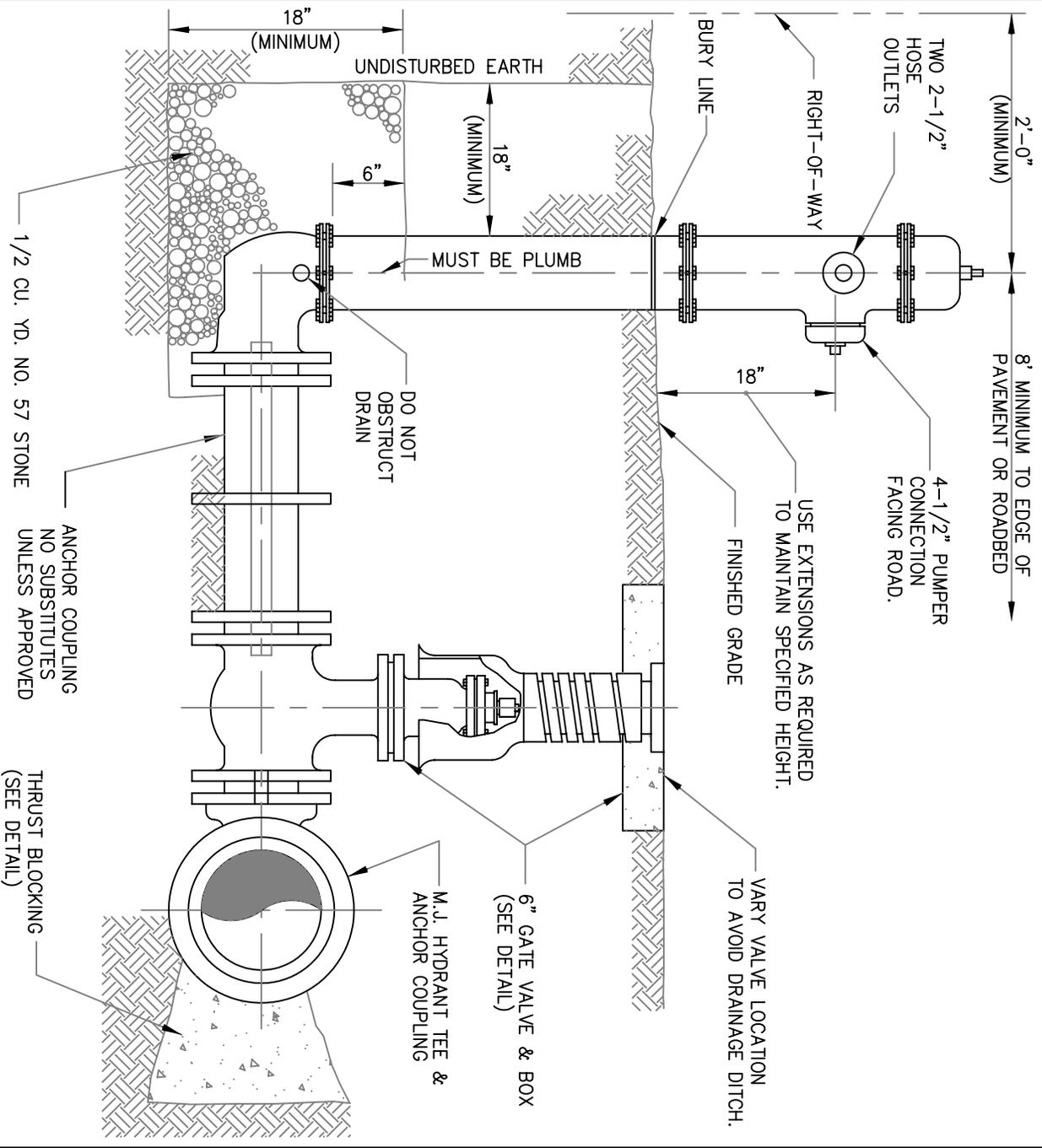
CITY OF CALHOUN
 ENGINEERING DEPARTMENT
 P.O. BOX 248
 CALHOUN, GEORGIA 30701
 TELEPHONE (706) 629-4701

DRAWN BY: JWC

SCALE: NTS

DATE: SEPT. 21,1998

DWG. NO.: WATER-06



NOTE:
SEE SPECIFICATIONS FOR ACCEPTABLE MATERIALS AND MANUFACTURERS.

WATER SYSTEM DETAILS
FIRE HYDRANT ASSEMBLY

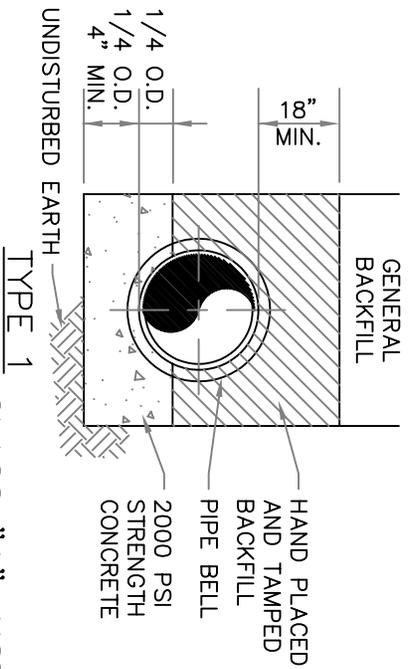
CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

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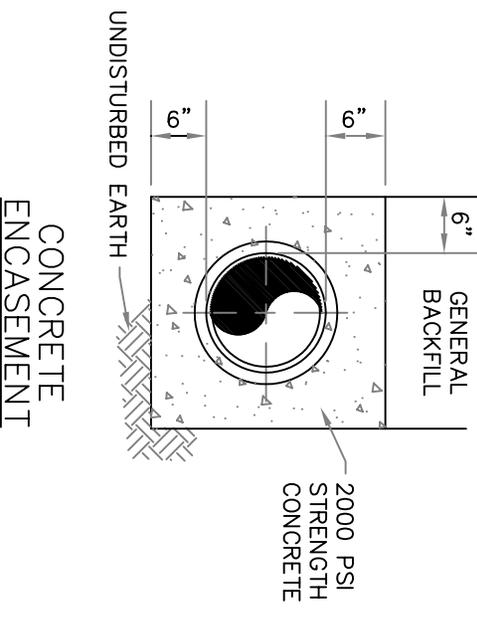
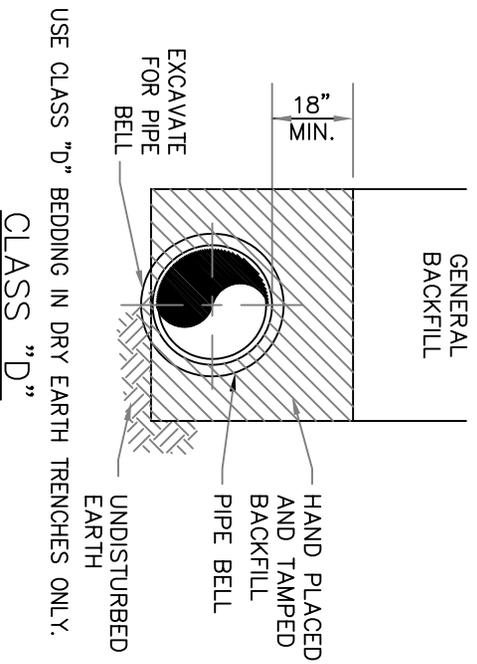
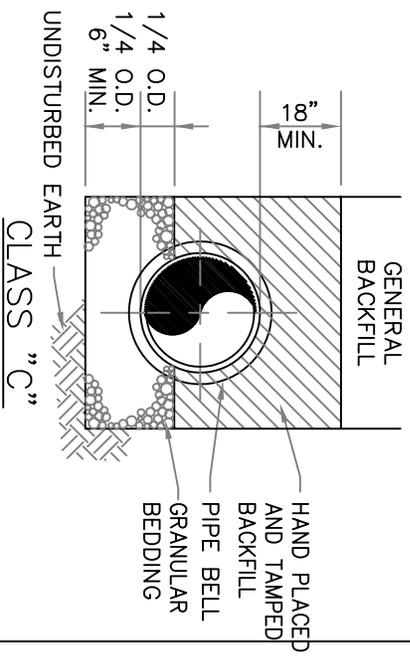
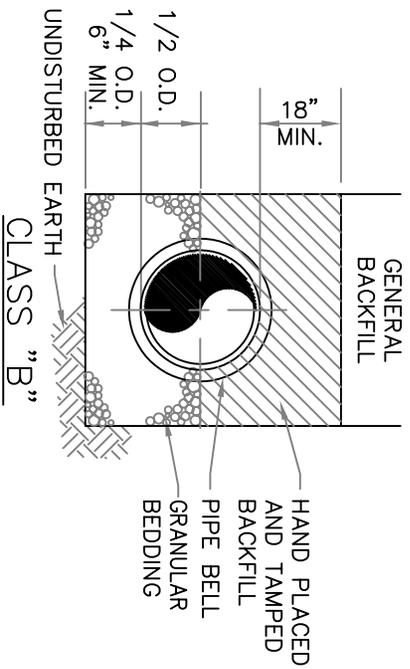
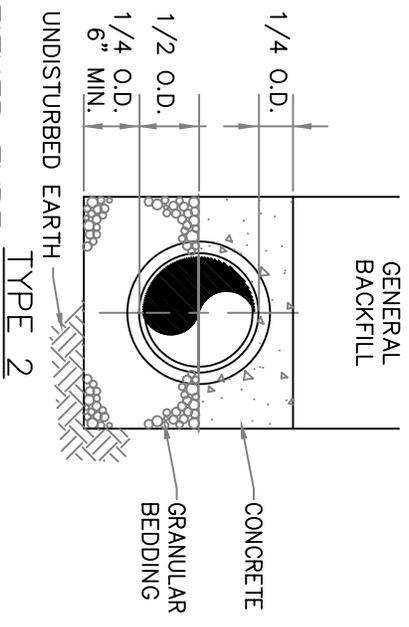
SCALE: NTS

DATE: SEPT. 21, 1998

DWG. NO.: WATER-07



CLASS "A", USE EITHER TYPE



USE CLASS "D" BEDDING IN DRY EARTH TRENCHES ONLY.

WATER SYSTEM DETAILS
PIPE BEDDING

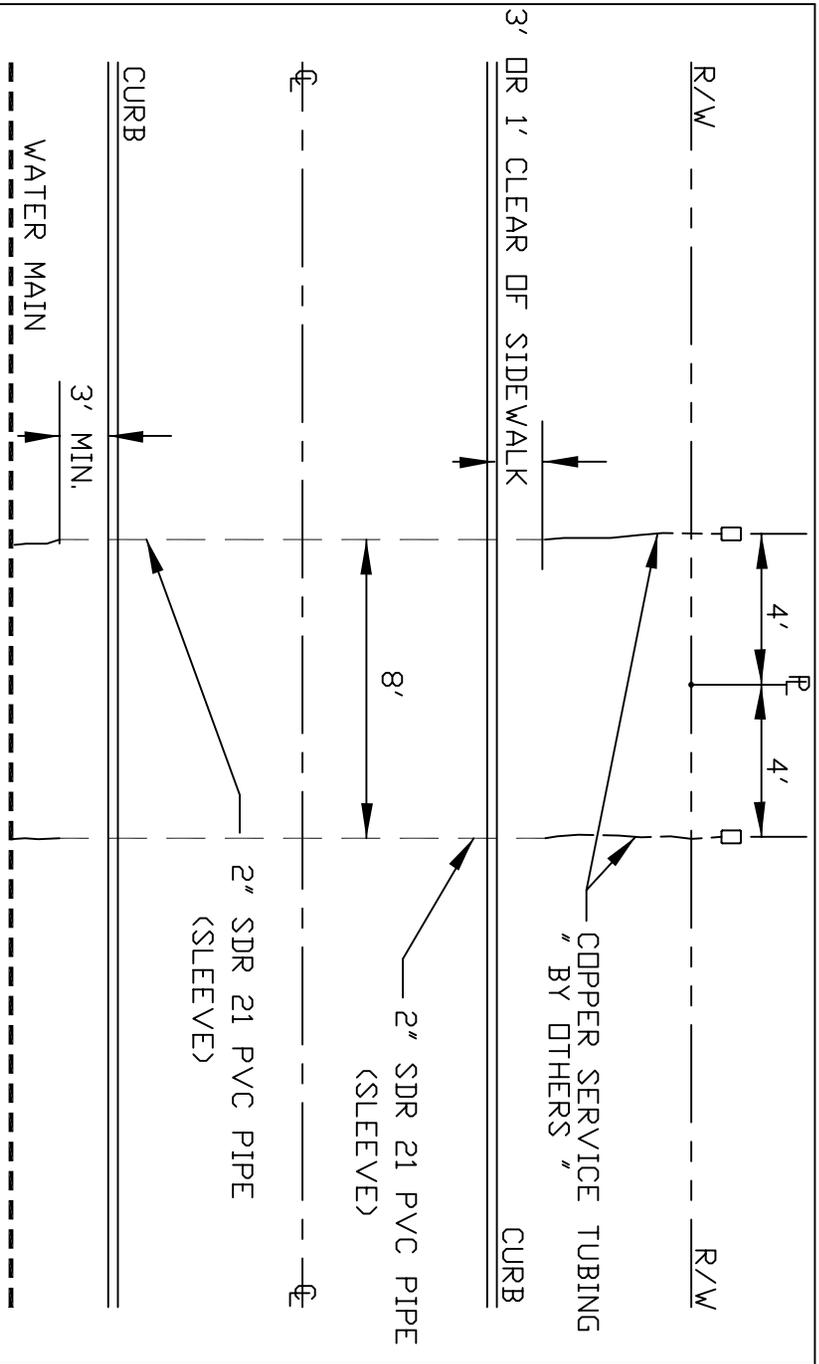
CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

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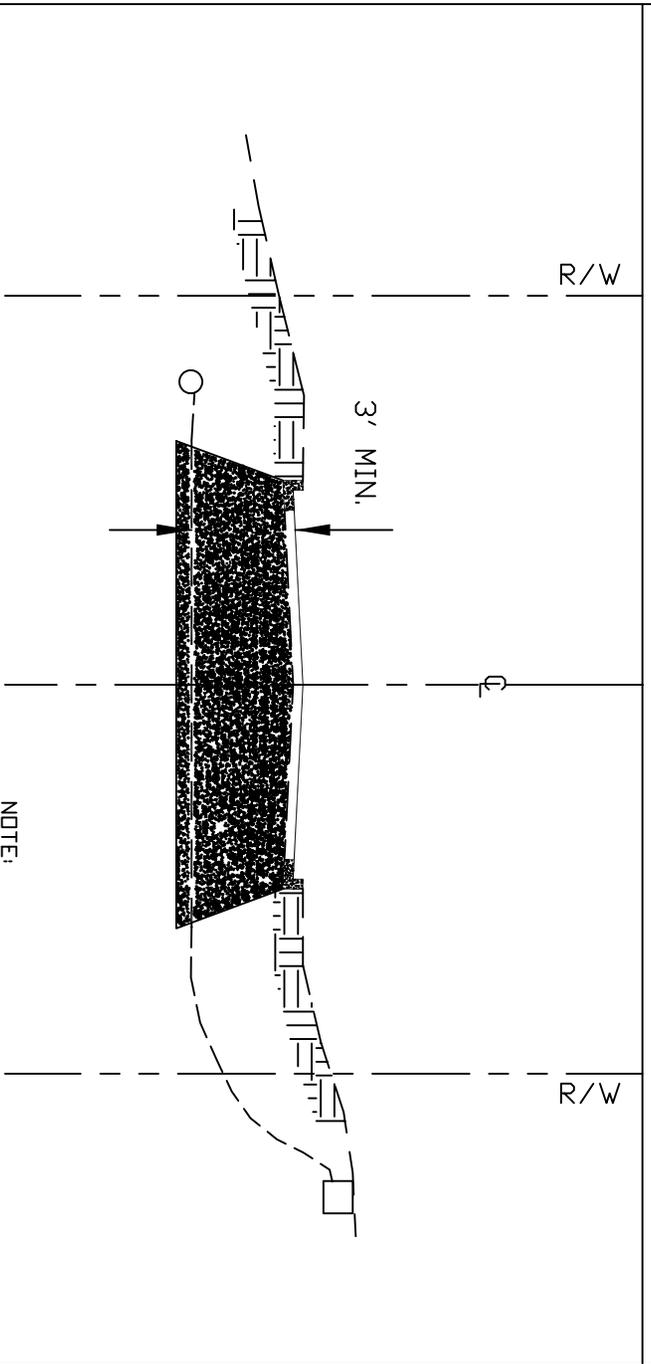
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DATE: SEPT. 21,1998

DWG. NO.: WATER-08



PLAN



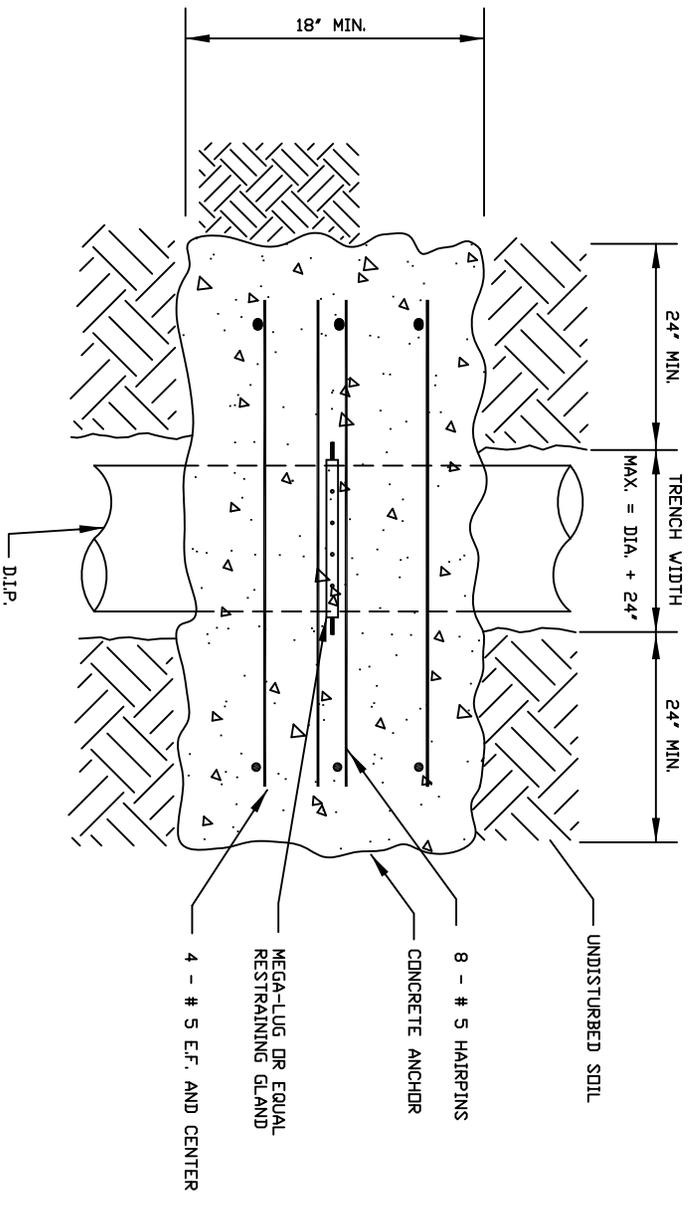
PROFILE

NOTE:
BACKFILL SHALL BE CLEAN CRUSHER RUN
COMPACTED TO 95% STANDARD PROCTOR

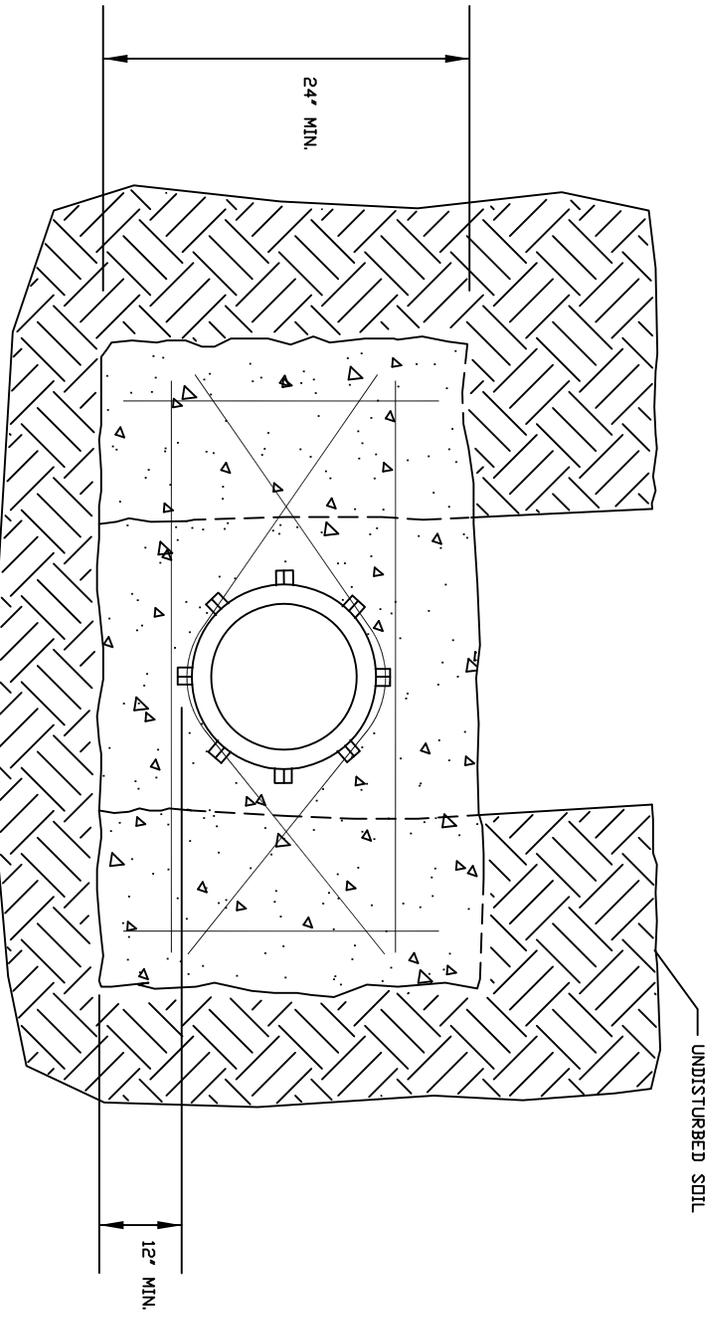
WATER SYSTEM DETAILS
LONG SIDE SERVICE CASING

CITY OF CALHOUN
WATER AND SEWER CONSTRUCTION
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4750

DRAWN BY: JWC	SCALE: NTS	DATE: OCT. 5, 2005	DWG. NO.: WAT-09
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TOP VIEW



WATER SYSTEM DETAILS
PIPE ANCHOR DETAIL

CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

DRAWN BY: JWC

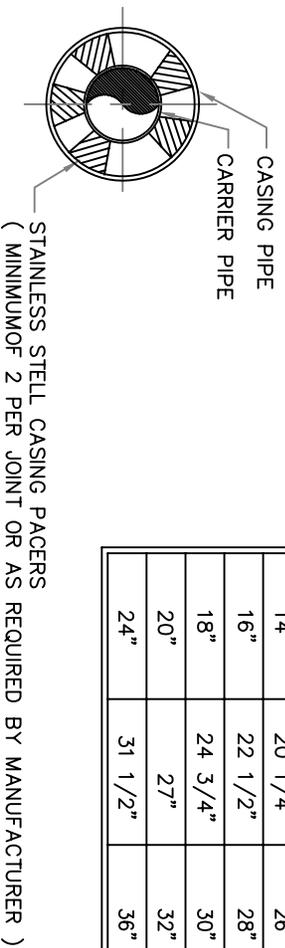
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DATE: SEPT. 21, 1998

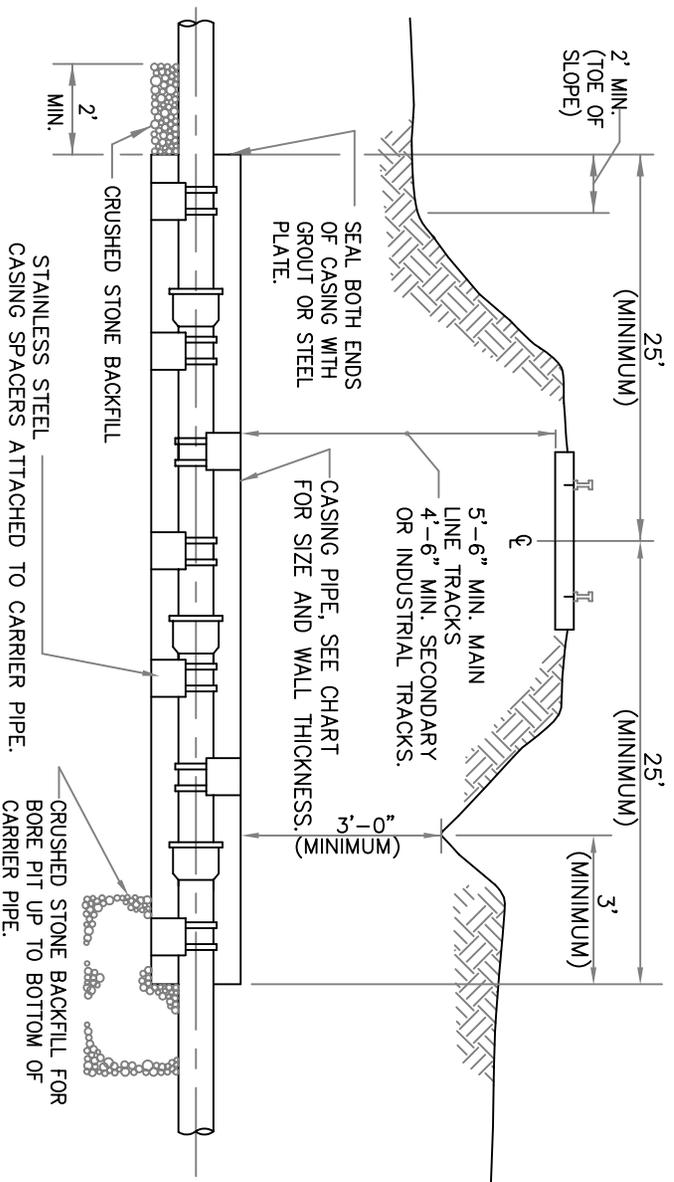
DWG. NO.: WATER-10

- NOTES
1. INSTALL CASING BY BORING AND JACKING, UNLESS OTHERWISE NOTED.
 2. CARRIER PIPE IN CASING SHALL BE DUCTILE IRON PIPE, PUSH-ON JOINTS. PROVIDE RESTRAINED JOINTS, U.S. FIELD LOK OR EQUAL FOR 12" AND SMALLER.

DUCTILE IRON CARRIER PIPE	STEEL CASING PIPE		
INSIDE DIA.	MAX O.D.	NOMINAL DIA.	WALL THICK.
6"	11"	16"	0.250"
8"	13 1/2"	18"	0.250"
10"	15 1/2"	20"	0.375"
12"	18"	24"	0.375"
14"	20 1/4"	26"	0.375"
16"	22 1/2"	28"	0.500"
18"	24 3/4"	30"	0.500"
20"	27"	32"	0.500"
24"	31 1/2"	36"	0.500"



SECTION



WATER SYSTEM DETAILS
RAILROAD CROSSING

CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

DRAWN BY: JWC

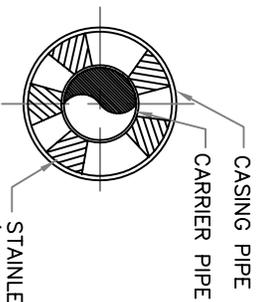
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DATE: DEC. 8 1997

DWG. NO.: WAT-11

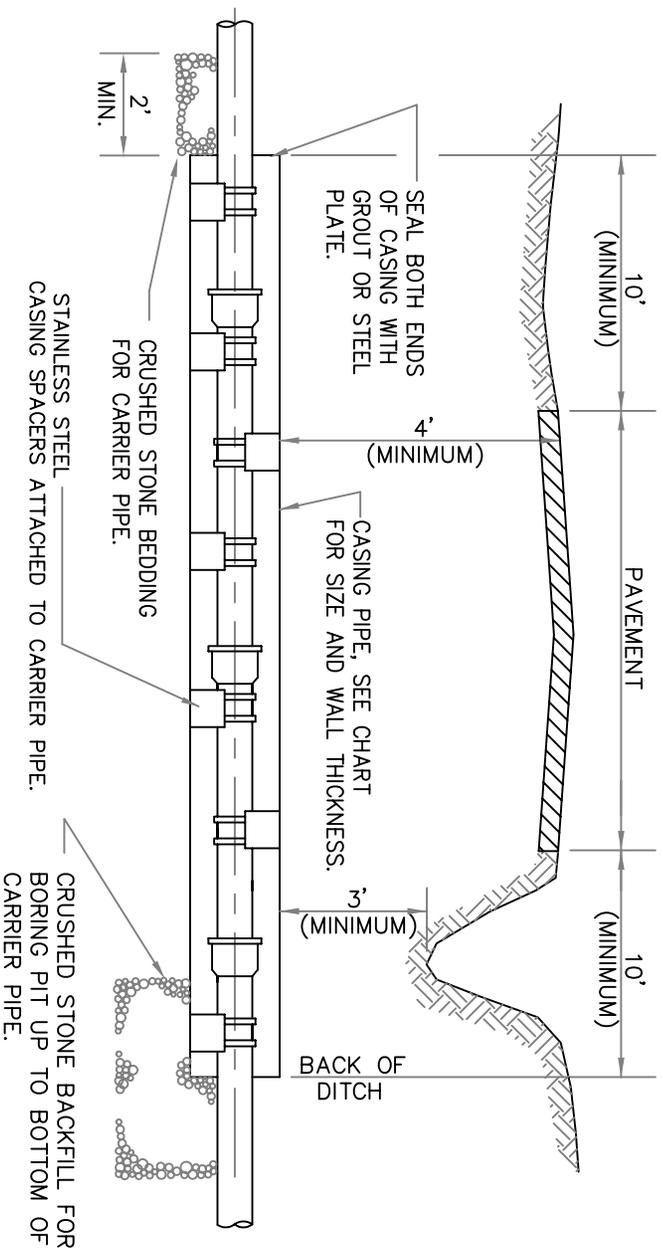
- NOTES
1. INSTALL CASING BY BORING AND JACKING, UNLESS OTHERWISE NOTED.
 2. CARRIER PIPE IN CASING SHALL BE DUCTILE IRON PIPE, PUSH-ON JOINTS. PROVIDE RESTRAINED JOINTS, U.S. FIELD LOK OR EQUAL FOR 12" AND SMALLER.

INSIDE DIA.	MAX O.D.	NOMINAL DIA.	WALL THICK.
6"	11"	16"	0.250"
8"	13 1/2"	18"	0.250"
10"	15 1/2"	20"	0.375"
12"	18"	24"	0.375"
14"	20 1/4"	26"	0.375"
16"	22 1/2"	28"	0.500"
18"	24 3/4"	30"	0.500"
20"	27"	32"	0.500"
24"	31 1/2"	36"	0.500"



STAINLESS STEEL CASING PACERS
(MINIMUM OF 2 PER JOINT OR AS REQUIRED BY MANUFACTURER)

SECTION



WATER SYSTEM DETAILS
HIGHWAY CROSSING

CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

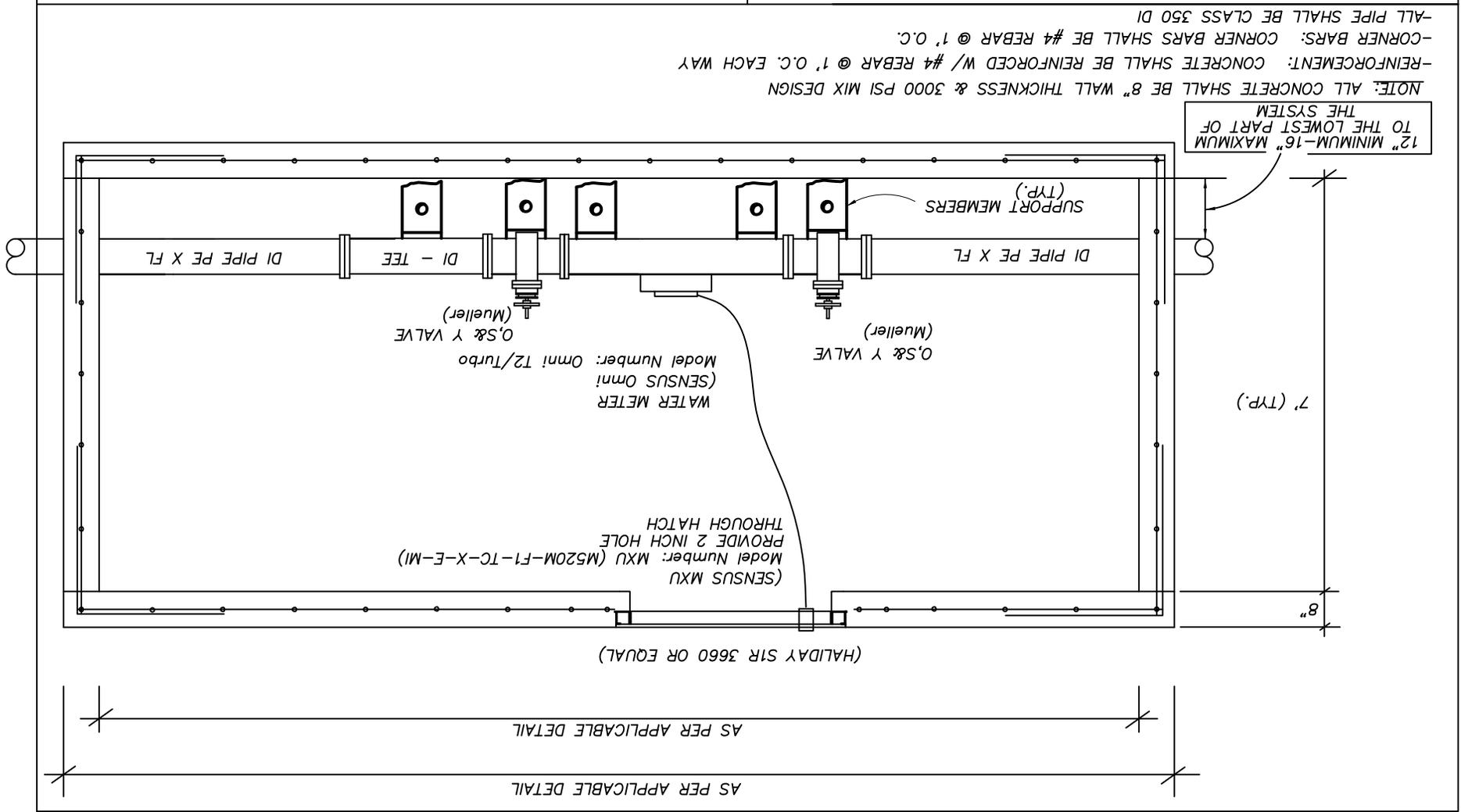
DRAWN BY: ATL

SCALE: NTS

DATE: DEC. 10 1996

DWG. NO.: WAT-12

<p>CITY OF CALHOUN ENGINEERING/INSPECTION DEPARTMENT P.O. BOX 248 CALHOUN, GEORGIA 30701 TELEPHONE (706) 602-6081</p>	<p>DATE: 2/12/2012</p>	<p>SCALE: NTS</p>	<p>DRAWN BY: DMB</p>
<p>DWG. NO.: WATER-13</p>		<p>SECTION VIEW WATER METER PIT</p>	

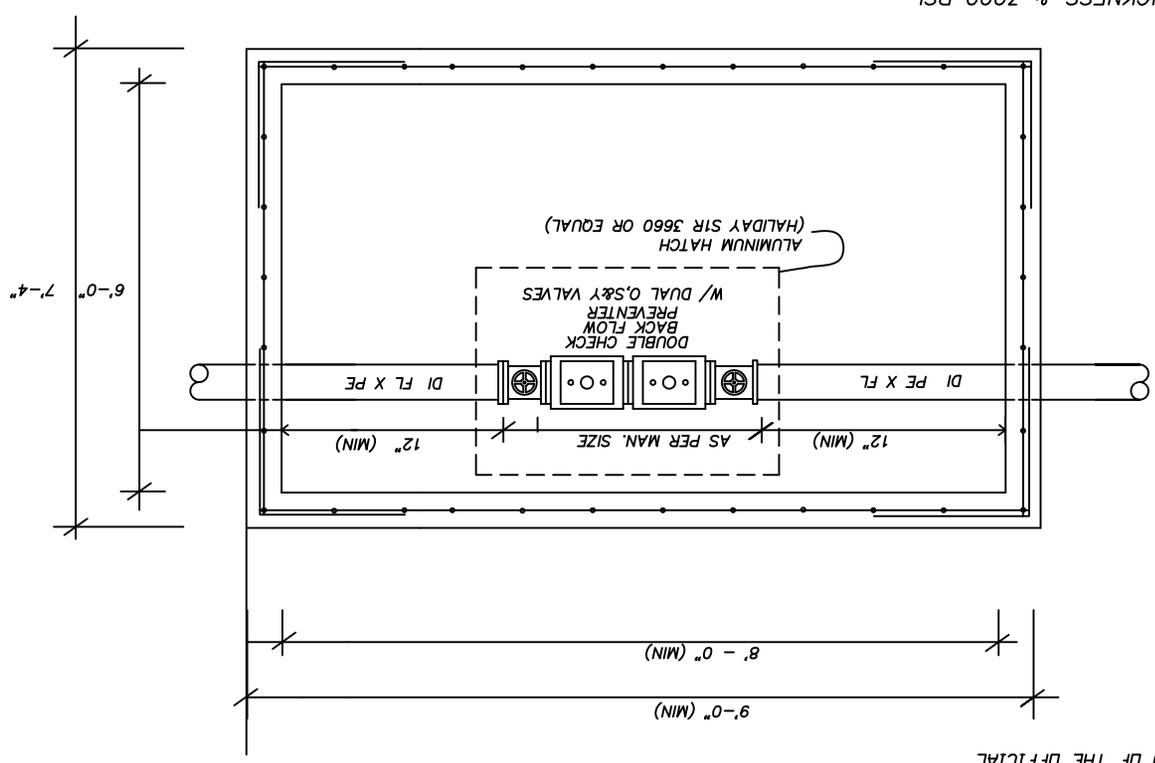


DWG. NO.: WATER-14	DATE: Rev 4/19/12	SCALE: NTS	DRAWN BY: JGS
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CITY OF CALHOUN
ENGINEERING/INSPECTION
DEPARTMENT
700 WEST LINE STREET
CALHOUN, GEORGIA 30701
TELEPHONE (706) 602-6081

DOUBLE CHECK BACKFLOW ASSEMBLY
SIZES 4" TO 12"
PLAN VIEW

NOTE: ALL CONCRETE SHALL BE 6" THICKNESS & 3000 PSI
REINFORCEMENT: CONCRETE SHALL BE REINFORCED W/ #4 REBAR @ 1' O.C. EACH WAY
-CORNER BARS: CORNER BARS SHALL BE #4 REBAR @ 1' O.C.
-ALL PIPE SHALL BE CLASS 350 DI
-ALL PIPE, FITTINGS, & BFP SHALL BE FULLY SUPPORTED
BY CONCRETE OR STEEL PIERS
-INSTALLATION AND MAINTENANCE ARE THE OWNERS
RESPONSIBILITY
-ANNUAL TESTING BY CERTIFIED TESTER IS REQUIRED
- ALL RPZ TYPE BACK FLOWS SHALL BE INSTALLED ABOVE GROUND
A MINIMUM OF 12" ABOVE GRADE AND NOT MORE THAN 36" ABOVE GRADE.



ALL INSTALLATIONS ARE SUBJECT TO CHAPTER 50 OF THE OFFICIAL
CODE OF ORDINANCES OF CALHOUN, GEORGIA
Codified through
Ordinance No. 905, adopted December 19, 2011.

DRAWN BY: JGS

SCALE: NTS

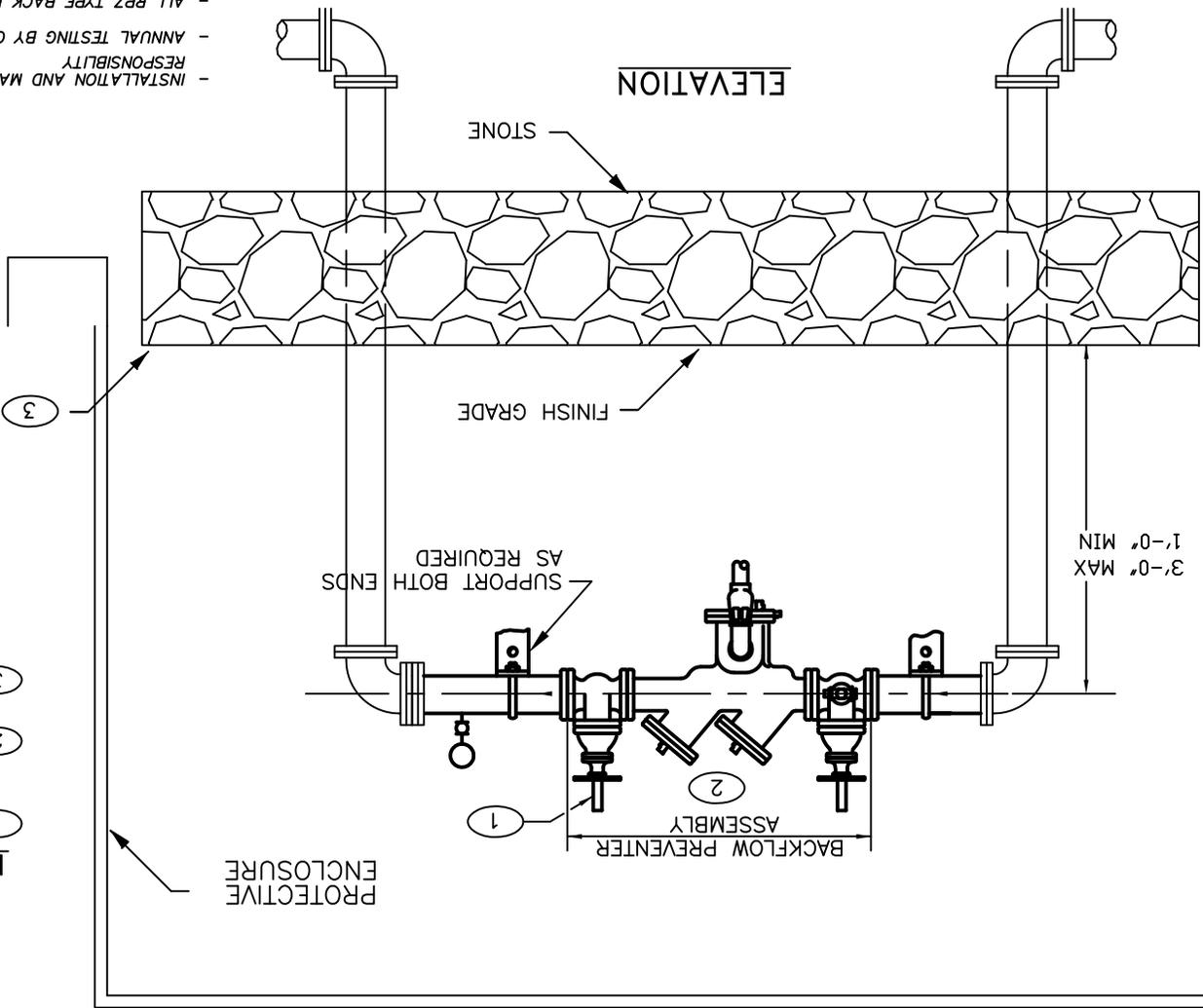
DATE: 9/25/2007

DWG. NO.: WATER-15

RPZ TYPE BACKFLOW DEVICE 2" TO 12" PROFILE VIEW

CITY OF CALHOUN
ENGINEERING/INSPECTION
DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 602-6081

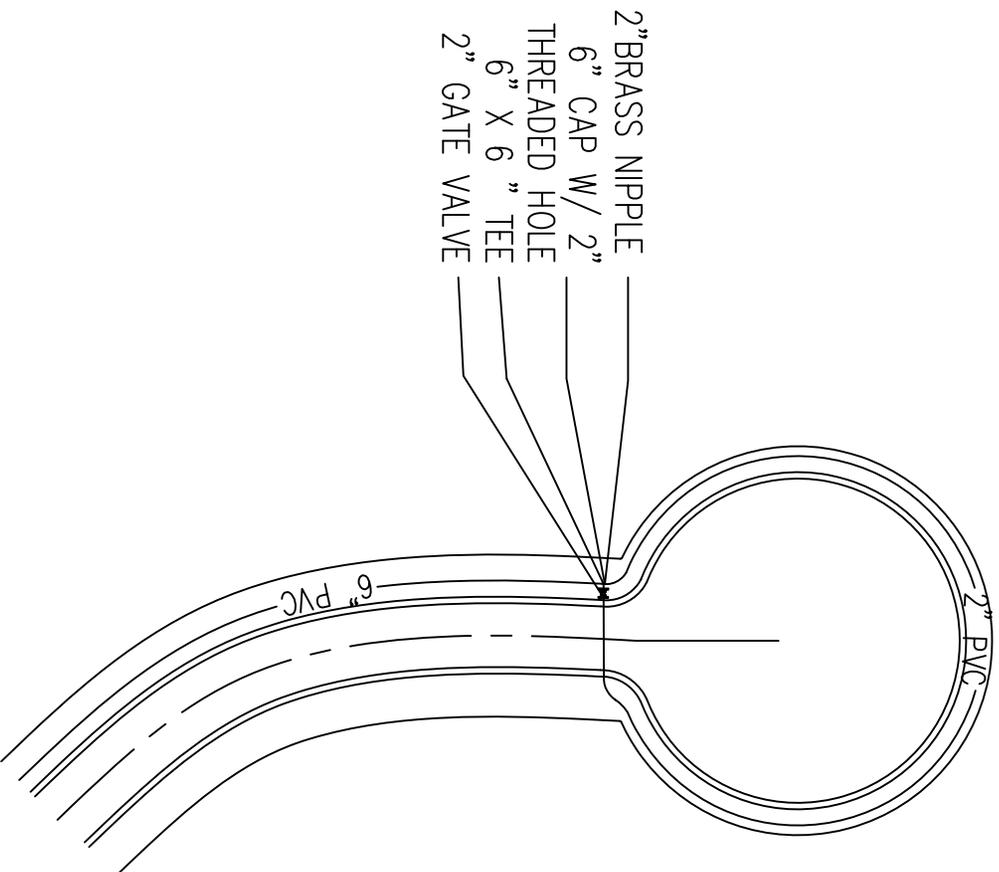
- INSTALLATION AND MAINTENANCE ARE THE OWNERS RESPONSIBILITY
- ANNUAL TESTING BY CERTIFIED TESTER IS REQUIRED
- ALL RPZ TYPE BACK FLOWS SHALL BE INSTALLED ABOVE GROUND A MINIMUM OF 12" ABOVE GRADE AND NOT MORE THAN 36" ABOVE GRADE.



- KEYED NOTES:**
- 1 PROVIDE ADEQUATE CLEARANCE ABOVE UNIT FOR OPERATION OF VALVES OR UNIT REPAIR.
 - 2 BYPASS PIPING AROUND BFP IS PROHIBITED.
 - 3 PROVIDE POSITIVE DRAINAGE FOR FULL FLOW AT DISCHARGE.



NOTE:
USE DUCTILE IRON BETWEEN SLEEVE AND NEAREST FITTING WHEN LESS THAN 20'.



WATER SYSTEM DETAILS
2" LOOP AT CUL-DE-SAC

CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

DRAWN BY: JGS

SCALE: NTS

DATE: DEC. 6, 2006

DWG. NO.: WATER-16

DRAWN BY: DMB

SCALE: NTS

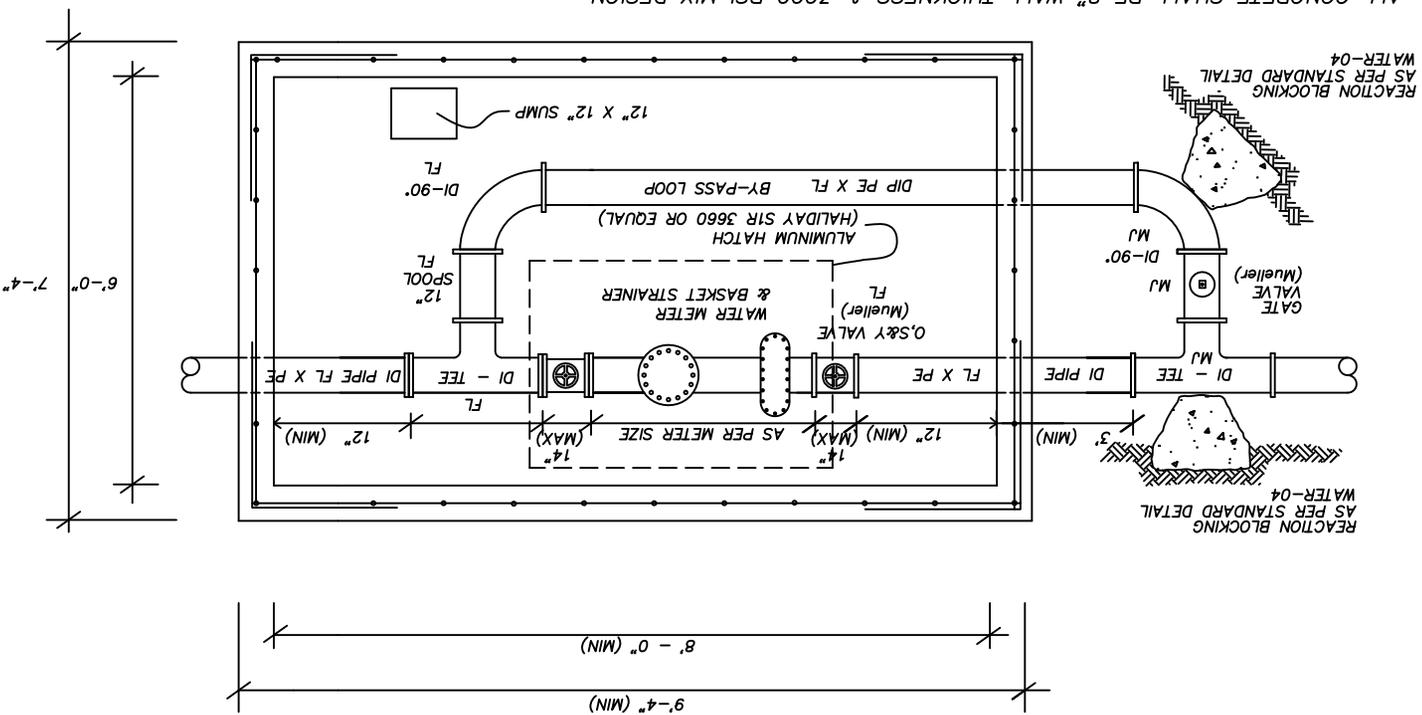
DATE: 2/12/2012

DWG. NO.: WATER-17

WATER METER PIT PLAN VIEW WATER METERS 4" TO 6"

CITY OF CALHOUN
ENGINEERING/INSPECTION
DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 602-6081

NOTE: ALL CONCRETE SHALL BE 8" WALL THICKNESS & 3000 PSI MIX DESIGN
-REINFORCEMENT: CONCRETE SHALL BE REINFORCED W/ #4 REBAR @ 1' O.C. EACH WAY
-CORNER BARS: CORNER BARS SHALL BE #4 REBAR @ 1' O.C.
-ALL PIPE SHALL BE CLASS 350 DI
-ALL PIPE, FITTINGS, METERS, & BFP SHALL BE FULLY SUPPORTED
BY CONCRETE OR STEEL PIERS



DRAWN BY: DMB

SCALE: NTS

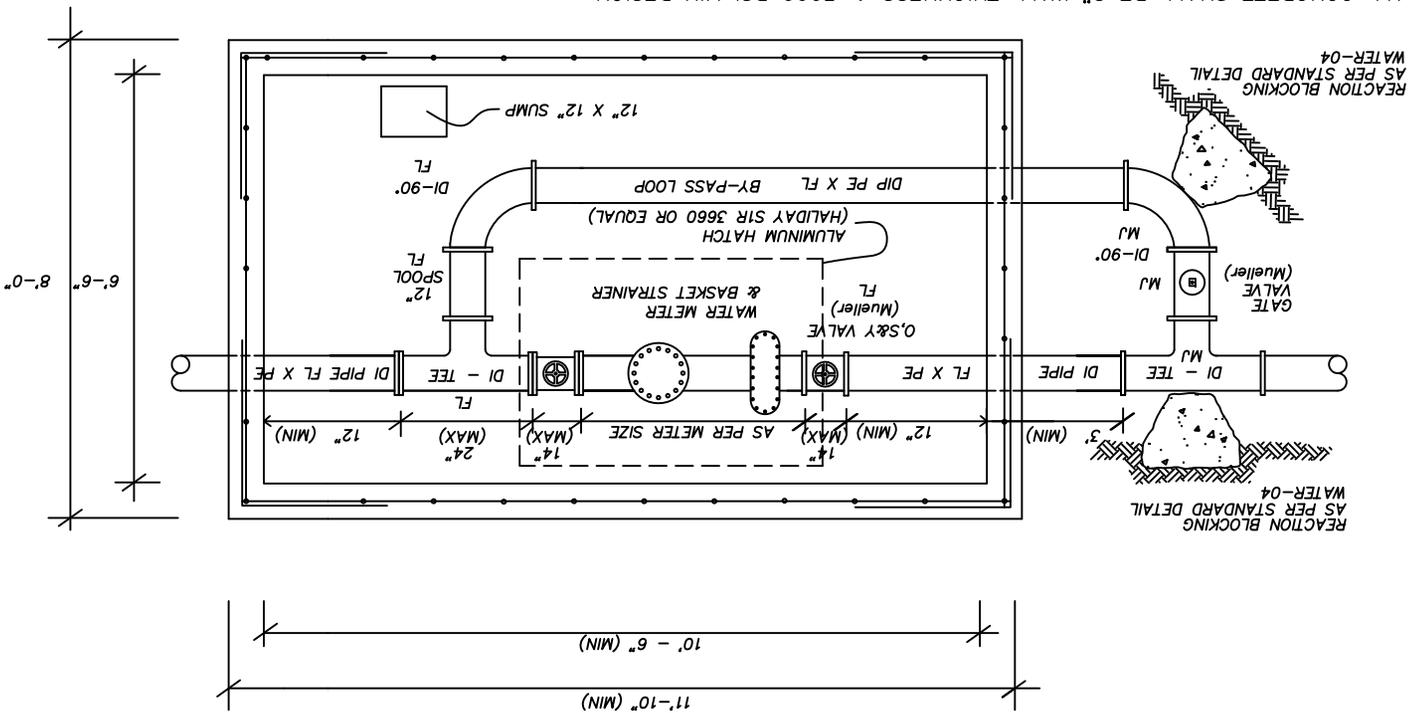
DATE: 2/12/2012

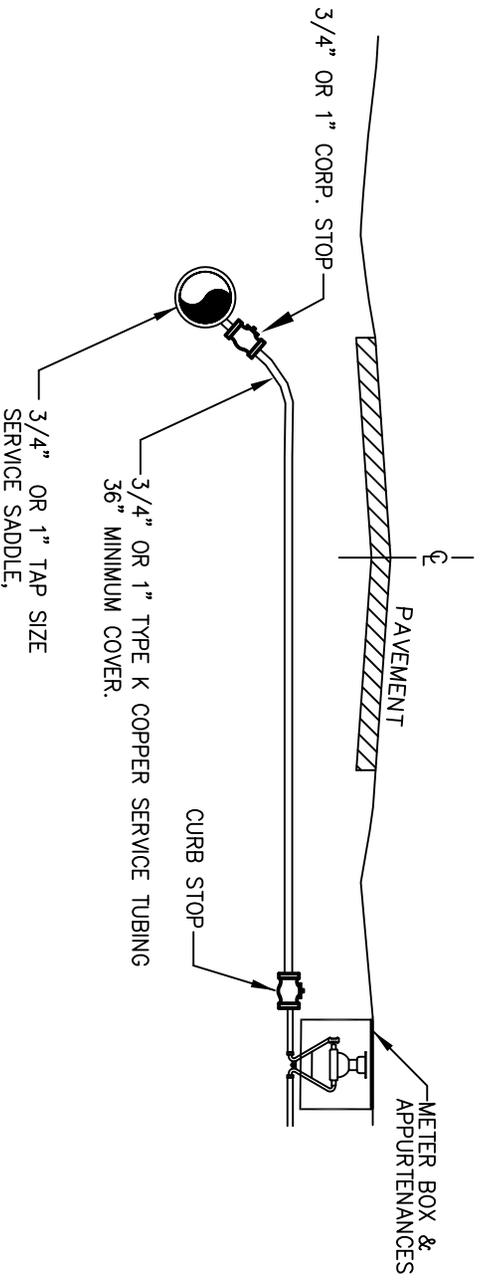
DWG. NO.: WATER-18

WATER METER PIT PLAN VIEW 8" TO 12"

CITY OF CALHOUN
ENGINEERING/INSPECTION
DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 602-6081

NOTE: ALL CONCRETE SHALL BE 8" WALL THICKNESS & 3000 PSI MIX DESIGN
-REINFORCEMENT: CONCRETE SHALL BE REINFORCED W/ #4 REBAR @ 1' O.C. EACH WAY
-CORNER BARS: CORNER BARS SHALL BE #4 REBAR @ 1' O.C.
-ALL PIPE SHALL BE CLASS 350 DI
-ALL PIPE, FITTINGS, METERS, & BFP SHALL BE FULLY SUPPORTED
BY CONCRETE OR STEEL PIERS





- NOTES
1. SEE SPECIFICATIONS FOR ACCEPTABLE MATERIALS AND MANUFACTURERES.
 2. INSTALL CURB STOP ON SERVICE LINES OUTSIDE OF THE METER BOX.

WATER SYSTEM DETAILS
SERVICE CONNECTIONS W/ CURB STOP

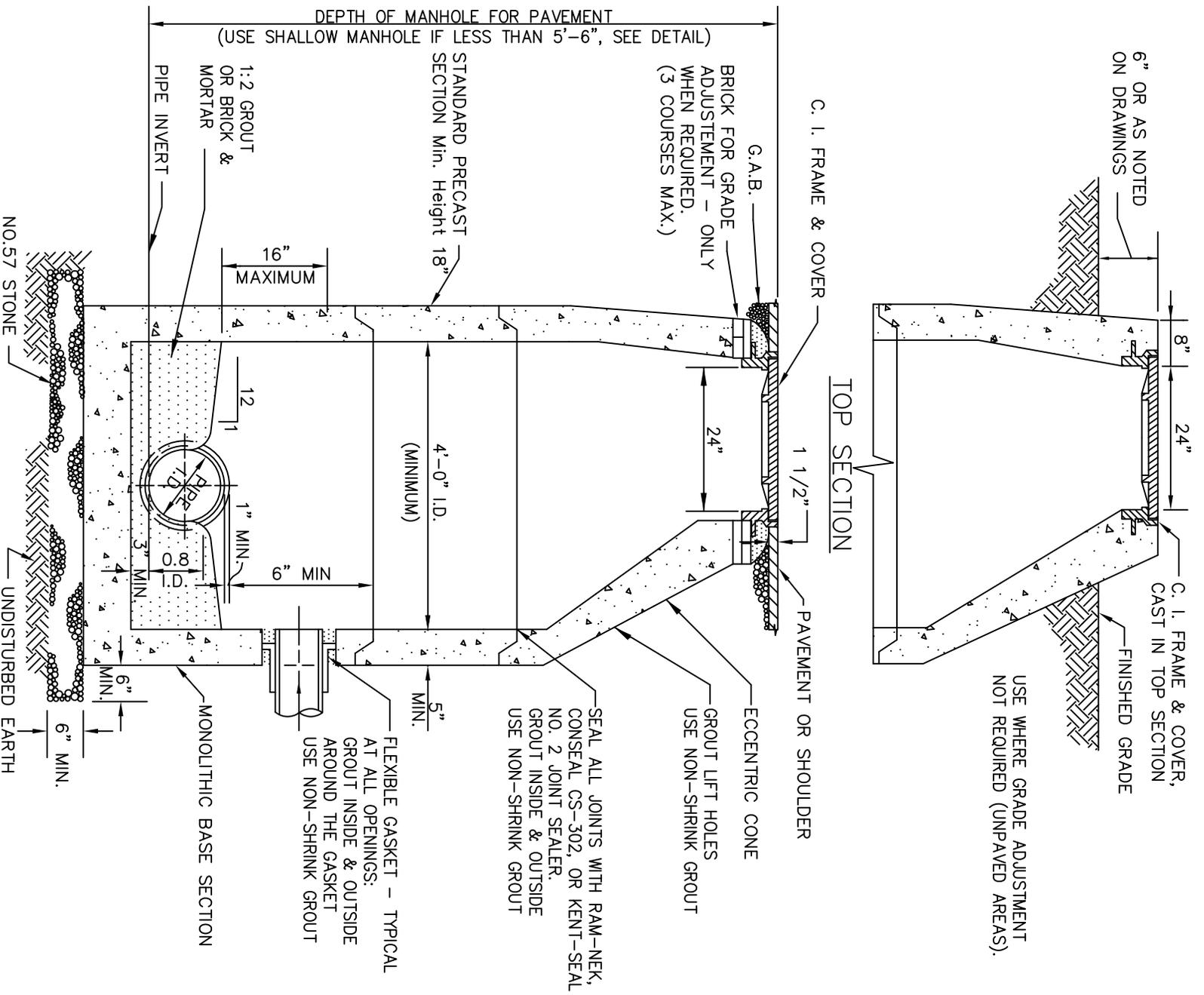
CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

DRAWN BY: KWE

SCALE: NTS

DATE: APR. 23, 2014

DWG. NO.: WAT-19



SEWER SYSTEM DETAILS
STANDARD WETCAST MANHOLE

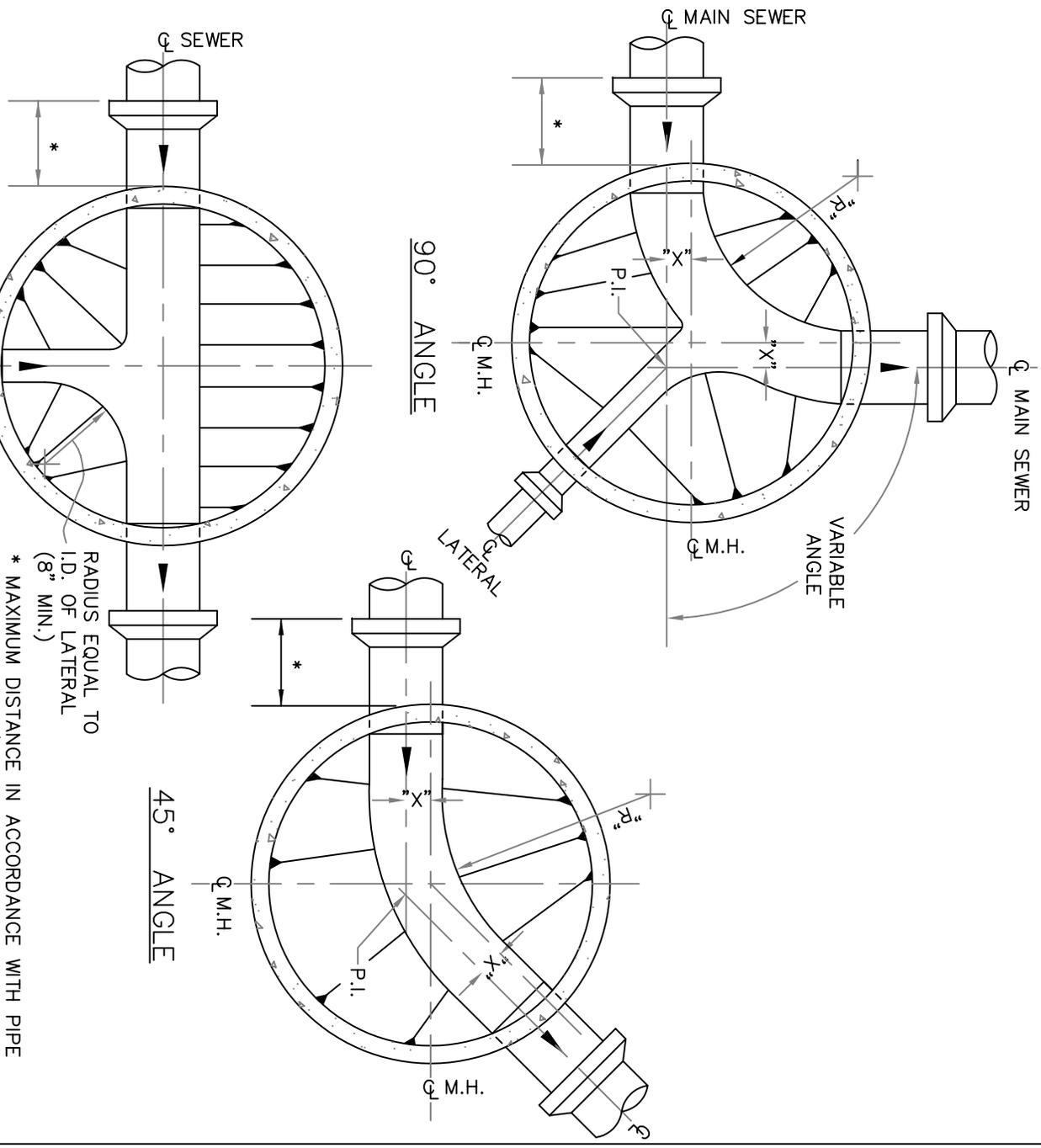
CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

DRAWN BY: JWC

SCALE: NTS

REV. DATE: 04-01-09

DWG. NO.: SEWER-01



* MAXIMUM DISTANCE IN ACCORDANCE WITH PIPE MANUFACTURER'S RECOMMENDATIONS.

STRAIGHT THROUGH
LATERAL

STANDARD MANHOLE DIMENSIONS				
PIPE SIZE	ANGLE	BASE DIA.	"R"	"X"
8" TO 18"	0° TO 90°	4'-0"	2'-0"	0"
21" TO 24"	0° TO 60°	4'-0"	2'-0"	6"
21" TO 24"	60° TO 90°	5'-0"	2'-0"	6"
30" TO 36"	0° TO 60°	5'-0"	3'-0"	8"
30" TO 36"	60° TO 90°	6'-0"	3'-0"	14"

SEWER SYSTEM DETAILS
TYPICAL MANHOLE INVERT PLANS

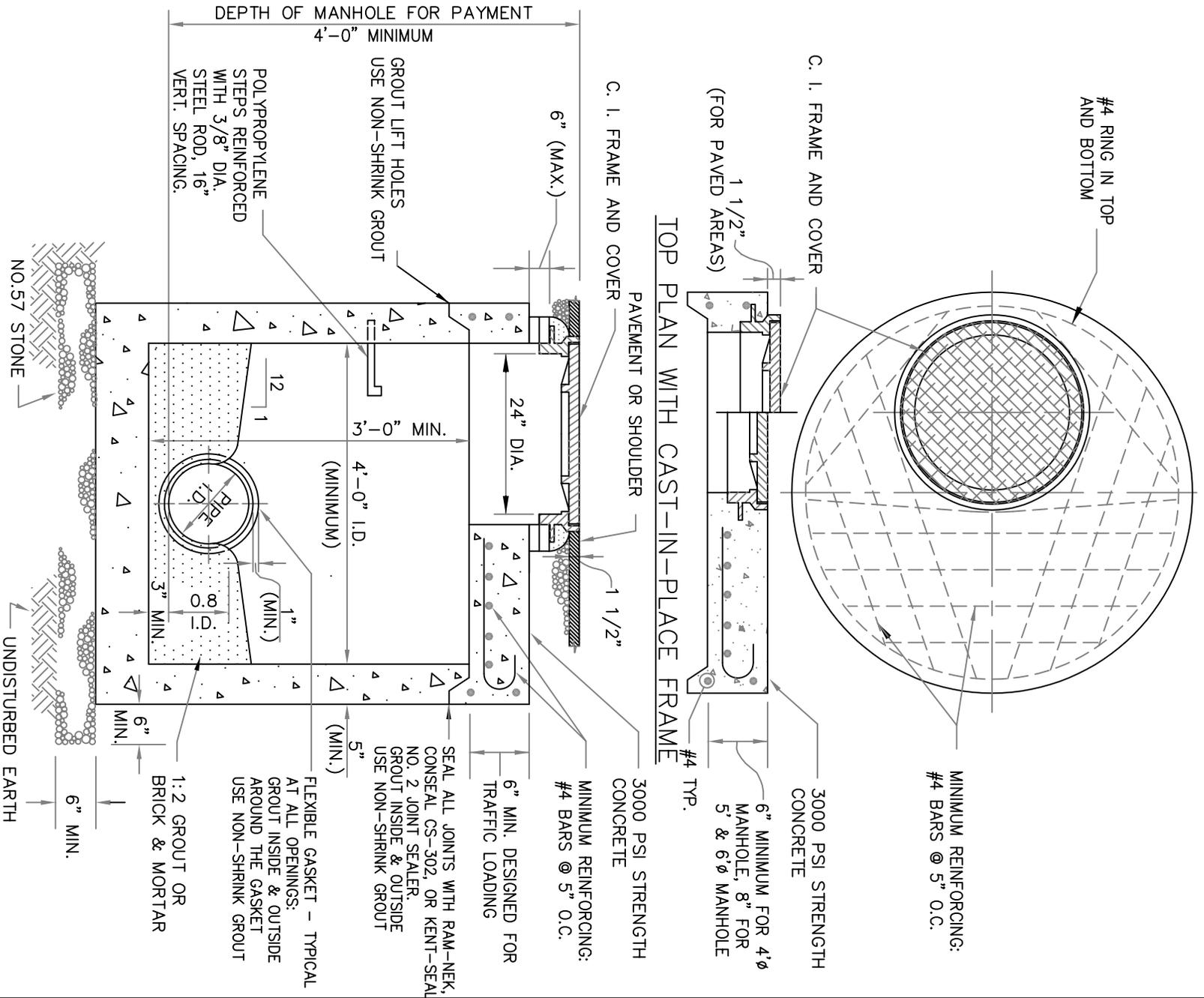
CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

DRAWN BY: JWC

SCALE: NTS

DATE: SEPT. 21,1998

DWG. NO.: SEWER-02

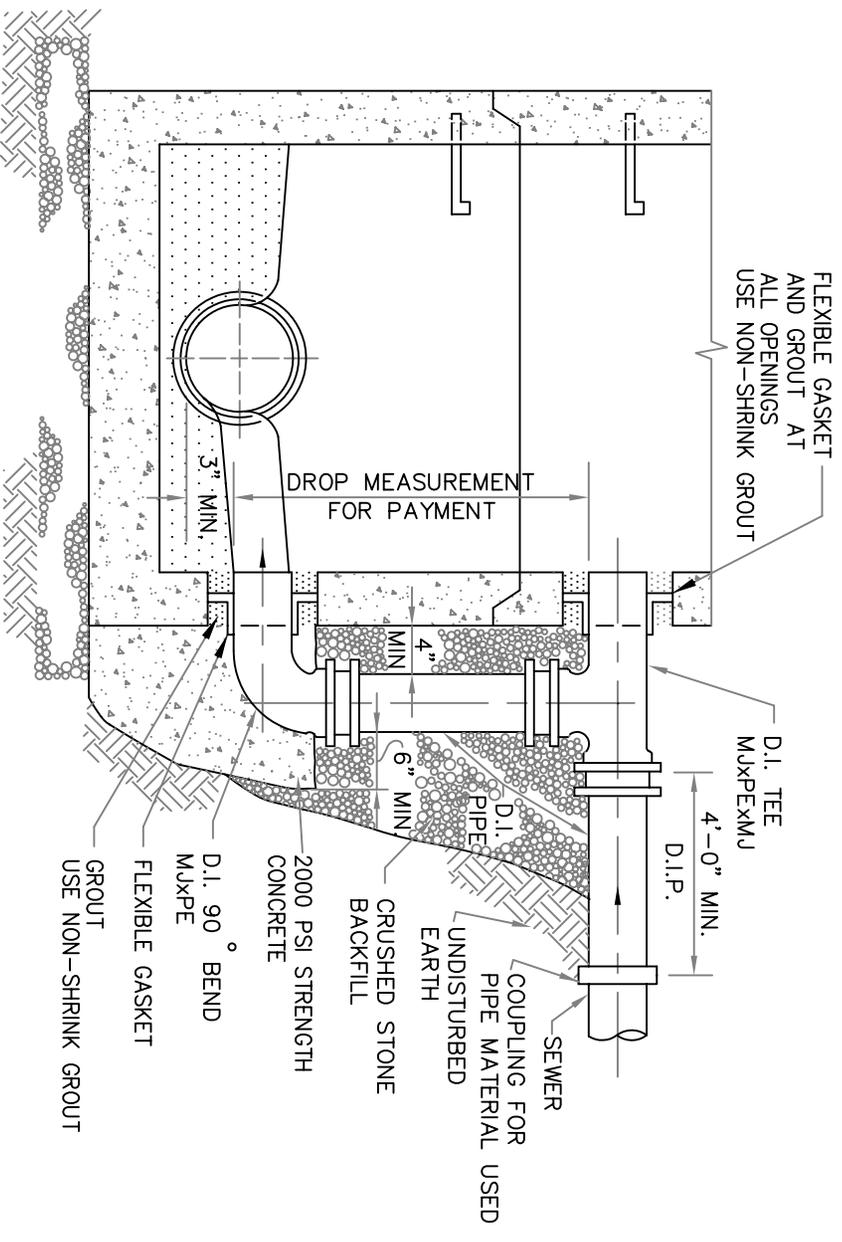


SEWER SYSTEM DETAILS
SHALLOW MANHOLE

CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

- NOTES
1. USE READY-MIX CONCRETE WITH 3,000 PSI STRENGTH @ 28 DAYS.
 2. SEE STANDARD WETCAST MANHOLE DETAIL FOR TOP SECTION OF MANHOLE.

DROP CONNECTION SCHEDULE		
SEWER SIZE	DROP SIZE	MINIMUM DROP
6"	6"	24"
8"	8"	24"
10"	8"	24"
12"	10"	36"
15"	12"	40"



SEWER SYSTEM DETAILS
DROP CONNECTION

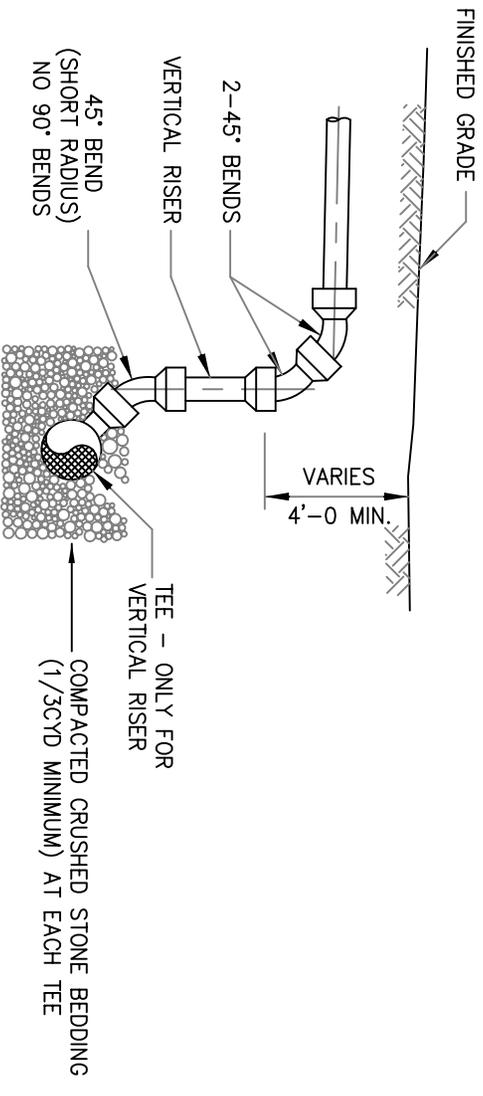
CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

DRAWN BY: JWC

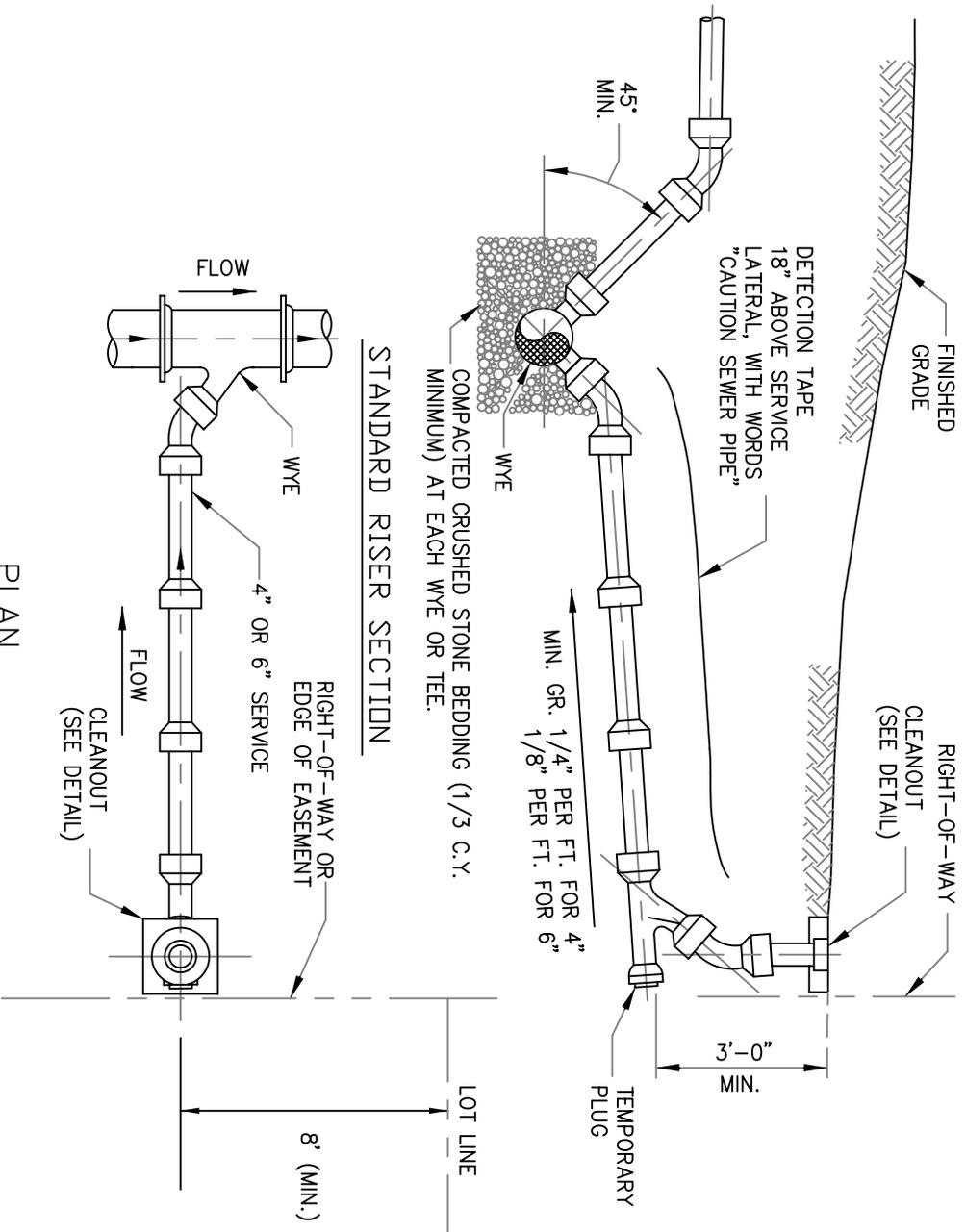
SCALE: NTS

DATE: SEPT. 21,1998

DWG. NO.: SEWER-04



VERTICAL RISER SECTION



PLAN

SEWER SYSTEM DETAILS
SERVICE LATERAL

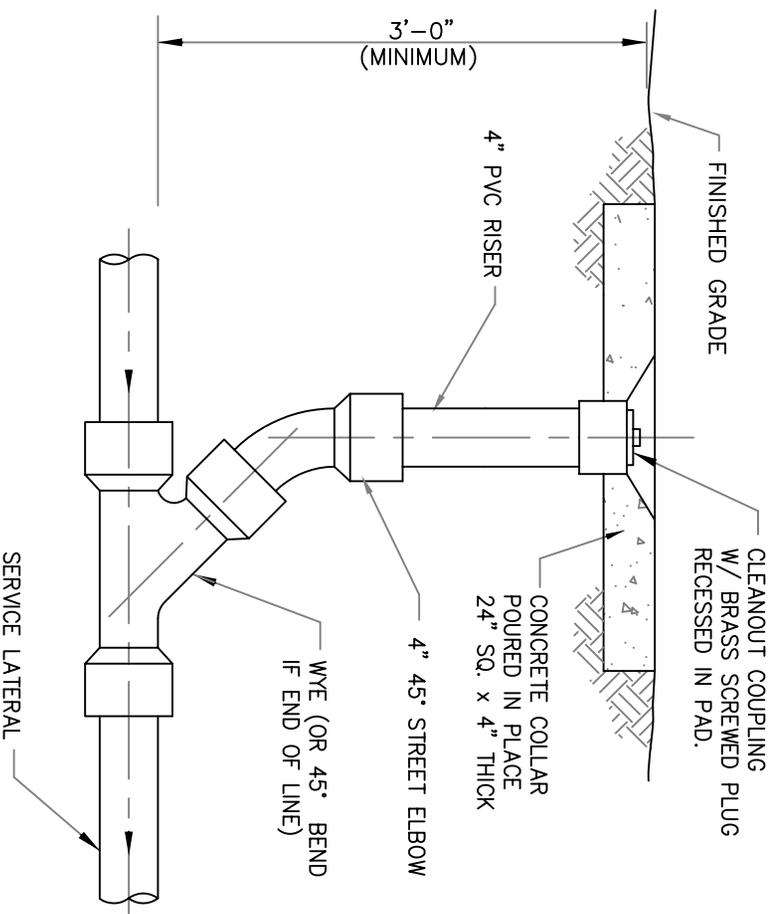
CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

DRAWN BY: JWC

SCALE: NTS

DATE: OCT. 5, 2005

DWG. NO.: SEWER-05



SEWER SYSTEM DETAILS
CLEANOUT

CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

DRAWN BY: JWC

SCALE: NTS

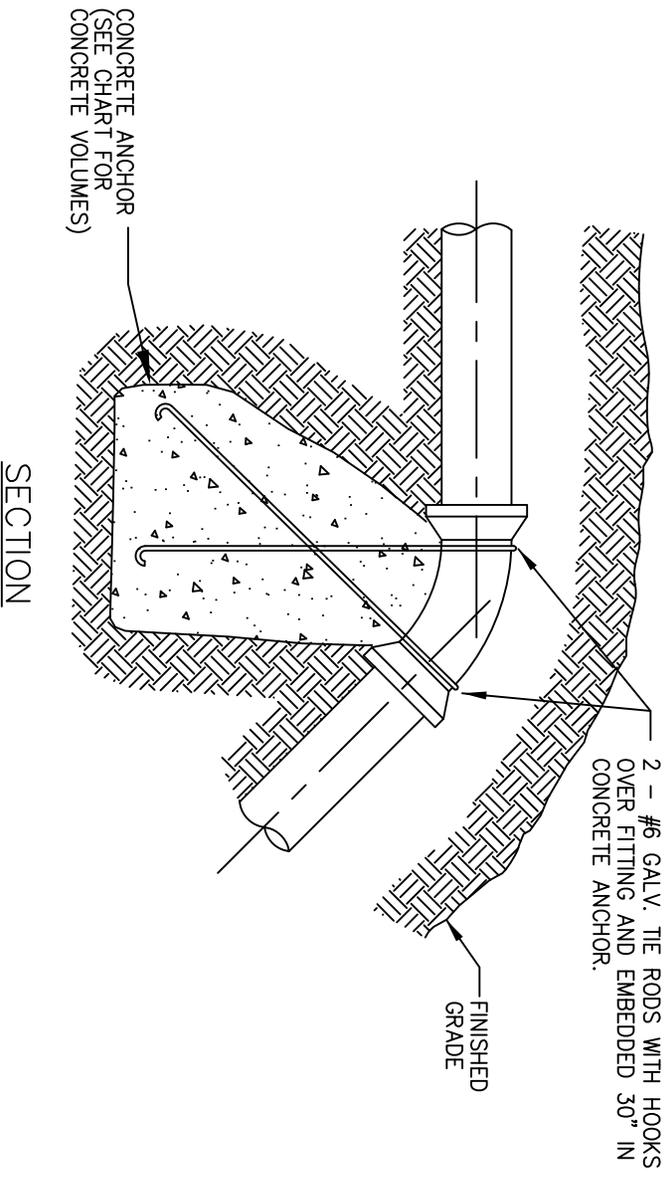
DATE: OCT. 5, 2005

DWG. NO.: SEWER-06

NOTES

1. USE READY-MIX CONCRETE WITH 3,000 PSI STRENGTH @ 28 DAYS.
2. PLACE CONCRETE CLEAR OF JOINT & JOINT ACCESSORIES.

VOLUME OF CONCRETE ANCHOR (CUBIC YARDS)				
FITTING DIAMETER	90° BEND	45° BEND	22.5° BEND	11.25° BEND
4"	1.00	0.50	0.25	0.25
6"	1.75	1.00	0.50	0.25
8"	3.00	1.75	1.00	0.50
10"	4.75	2.50	1.25	0.75
12"	6.50	3.75	2.00	1.00
14"	7.75	5.00	2.50	1.50
16"	11.75	6.75	3.25	1.75



SEWER SYSTEM DETAILS
BLOCKING FOR VERTICAL BENDS

CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

DRAWN BY: JWC

SCALE: NTS

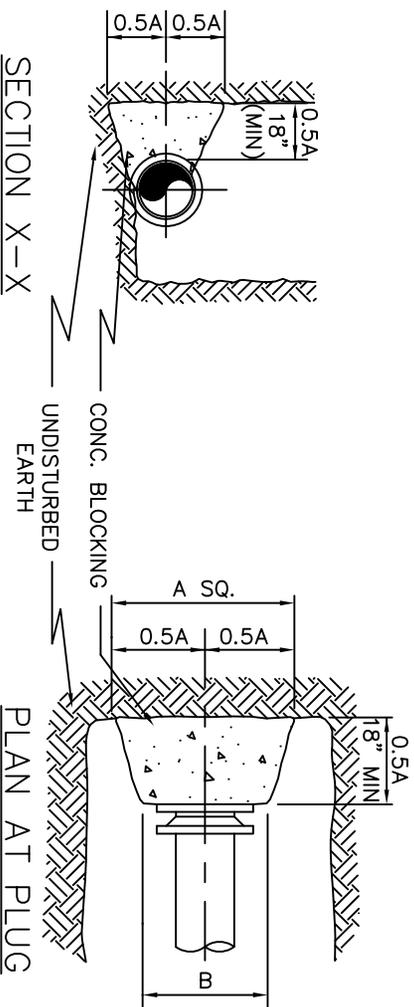
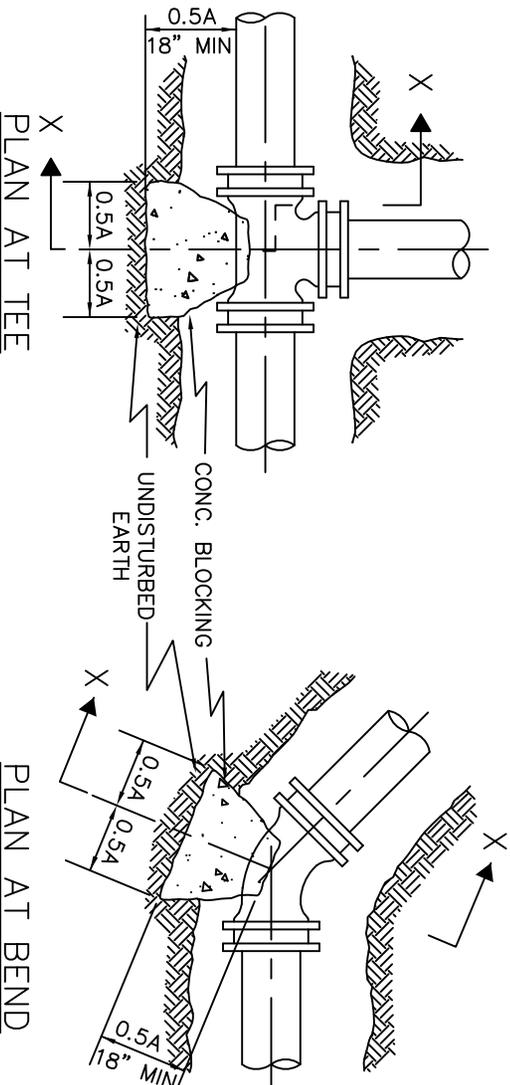
DATE: SEPT. 21, 1998

DWG. NO.: SEWER-08

NOTES

1. USE READY-MIX CONCRETE WITH 3,000 PSI STRENGTH @ 28 DAYS.
2. PLACE CONCRETE BEARING SURFACES AGAINST UNDISTURBED EARTH.
3. PLACE CONCRETE CLEAR OF JOINT AND JOINT ACCESSORIES.
3. DIMINIONS BASED ON SOIL BEARING OF 4000 P.S.I.

PIPE SIZE	90° BEND		45° BEND		22.5° BEND		11.25° BEND		TEES		PLUGS	
	A	A	A	A	A	A	A	A	A	A	B	
4"	15"	12"	12"	12"	12"	12"	12"	12"	12"	12"	10"	
6"	20"	16"	12"	12"	12"	12"	12"	12"	18"	18"	12"	
8"	30"	20"	20"	15"	15"	12"	24"	24"	24"	24"	12"	
10"	36"	26"	26"	18"	18"	14"	30"	30"	30"	30"	14"	
12"	40"	32"	32"	20"	20"	16"	36"	36"	36"	36"	16"	
14"	48"	36"	36"	26"	26"	18"	40"	40"	40"	40"	18"	
16"	64"	42"	42"	32"	32"	20"	48"	48"	48"	48"	20"	



SEWER SYSTEM DETAILS
THRUST BLOCKING

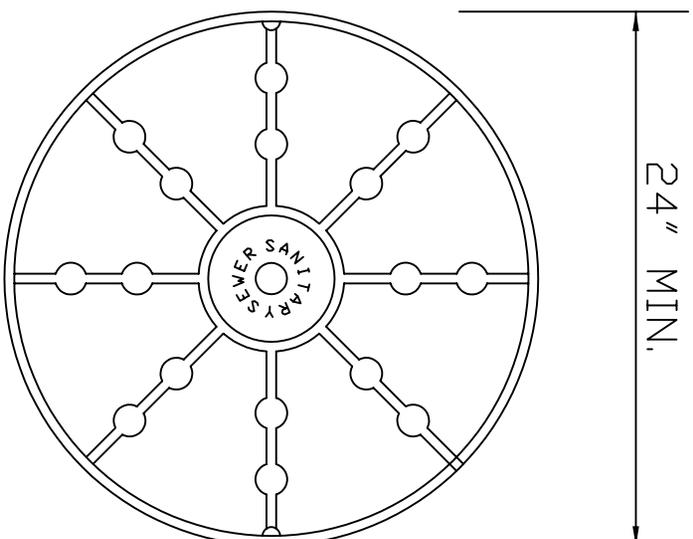
CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

DRAWN BY: JWC

SCALE: NTS

DATE: SEPT. 21, 1998

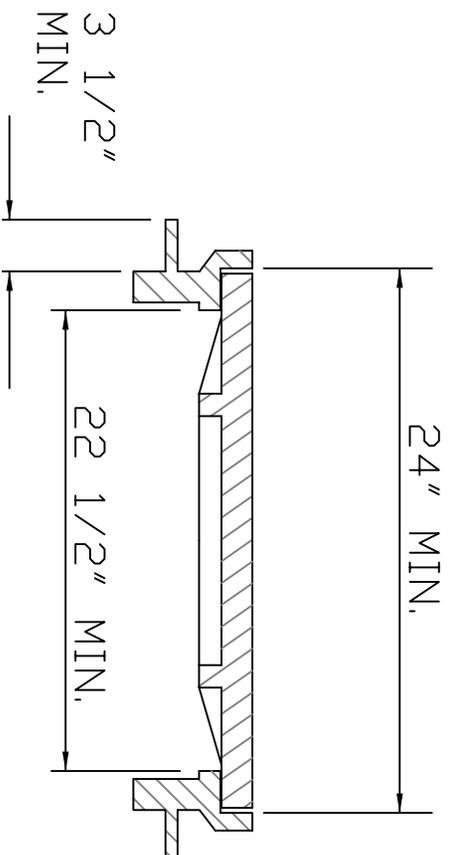
DWG. NO.: SEWER-09



24" MIN.

COVER

NOTE:
SEE SECTION 4
PART 2 2.2 FOR
ACCEPTABLE MFG.



24" MIN.

22 1/2" MIN.

3 1/2"
MIN.

FRAME

SEWER SYSTEM DETAILS
STANDARD CAST IRON FRAME & COVER

CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

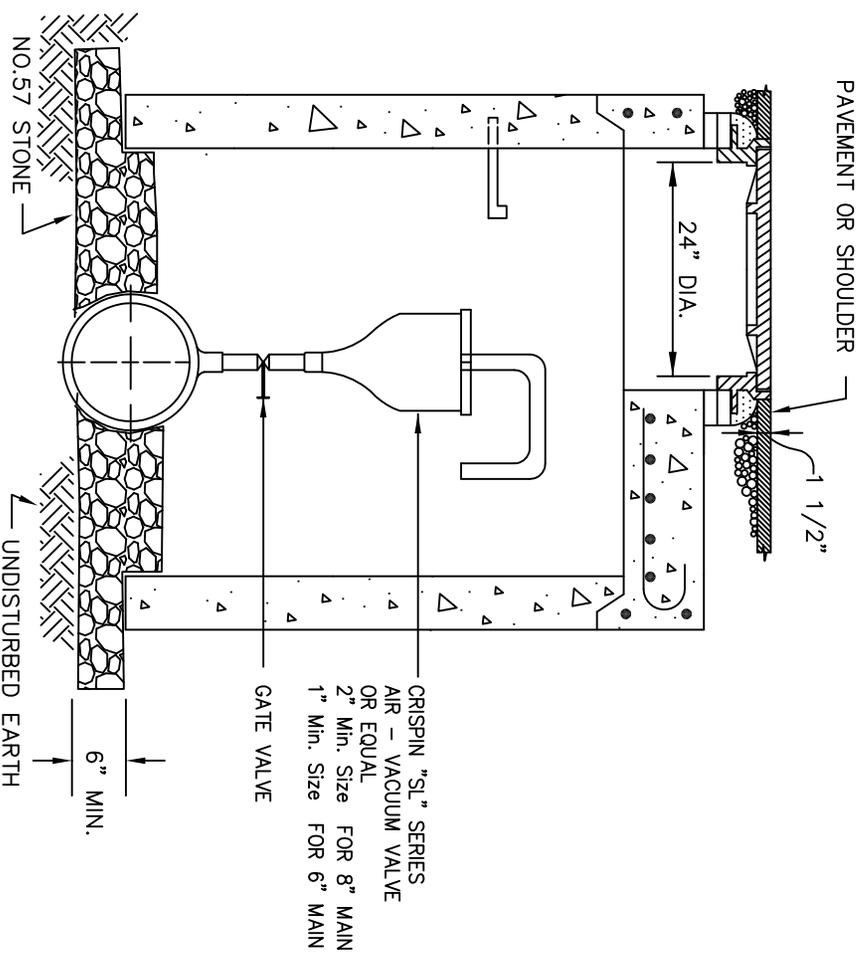
DRAWN BY: JWC

SCALE: NTS

DATE: SEPT. 21,1998

DWG. NO.: SEWER-10

NOTE:
 MANHOLE AND FRAME AND COVER SHALL CONFORM TO
 STANDARD DETAIL FOR SHALLOW MANHOLE
 WATER METER BOXES AS PER WATER DIST. SYSTEMS, SEC.1. PART2, 2.12
 MAY BE SUBSTITUTED WITH ENGINEERS APPROVAL.



SANITARY SEWER COLLECTION SYSTEM
 AIR RELIEF VALVE
 IN SHALLOW MANHOLE

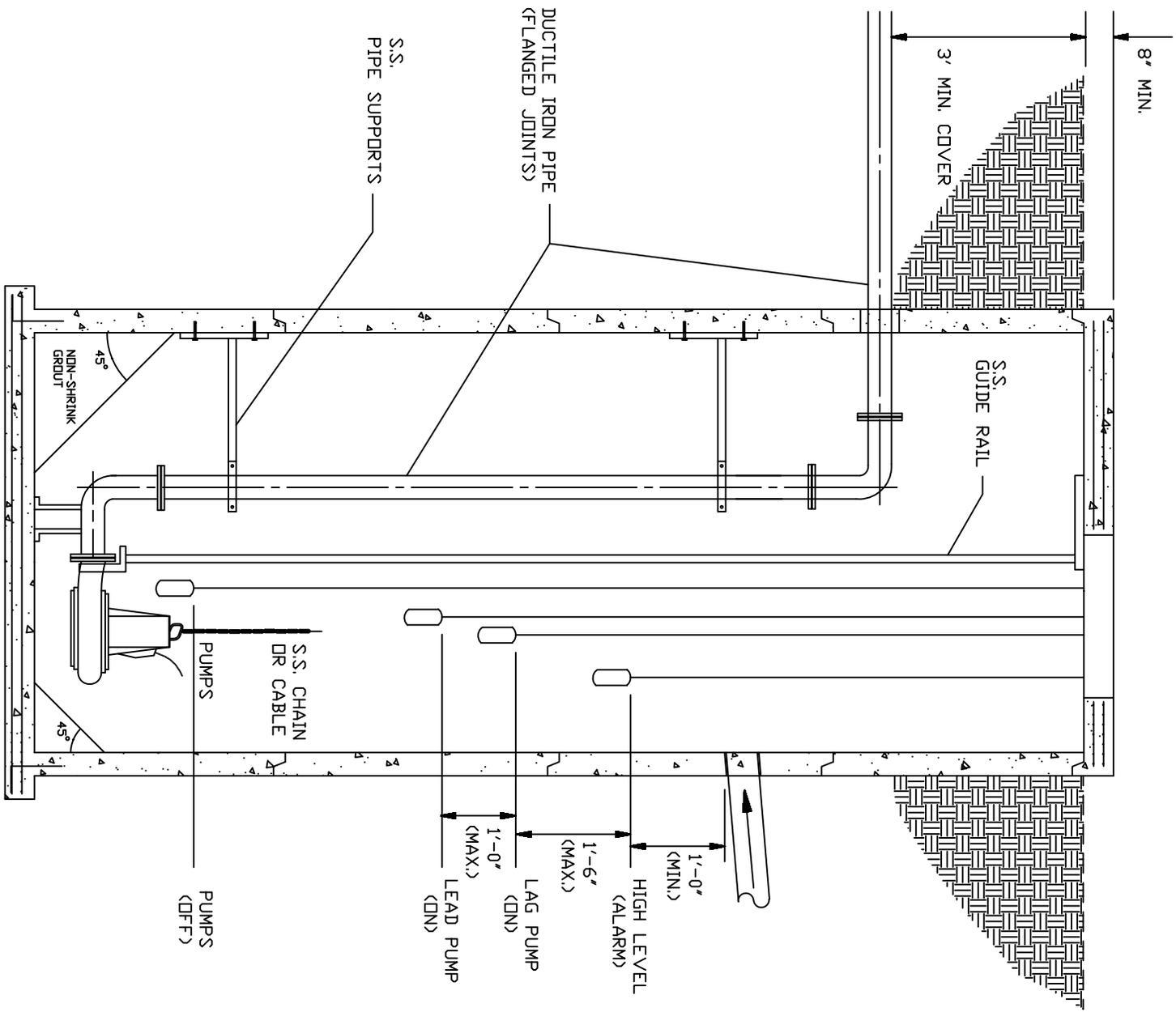
CITY OF CALHOUN
 ENGINEERING DEPARTMENT
 P.O. BOX 248
 CALHOUN, GEORGIA 30701
 TELEPHONE (706) 629-4701

DRAWN BY: JWC

SCALE: NTS

DATE: SEPT. 21, 1998

DWG. NO.: SEWER-11



LIFT STATION WETWELL
STANDARD DETAIL
LSP 2

CITY OF CALHOUN
ENGINEERING DEPARTMENT

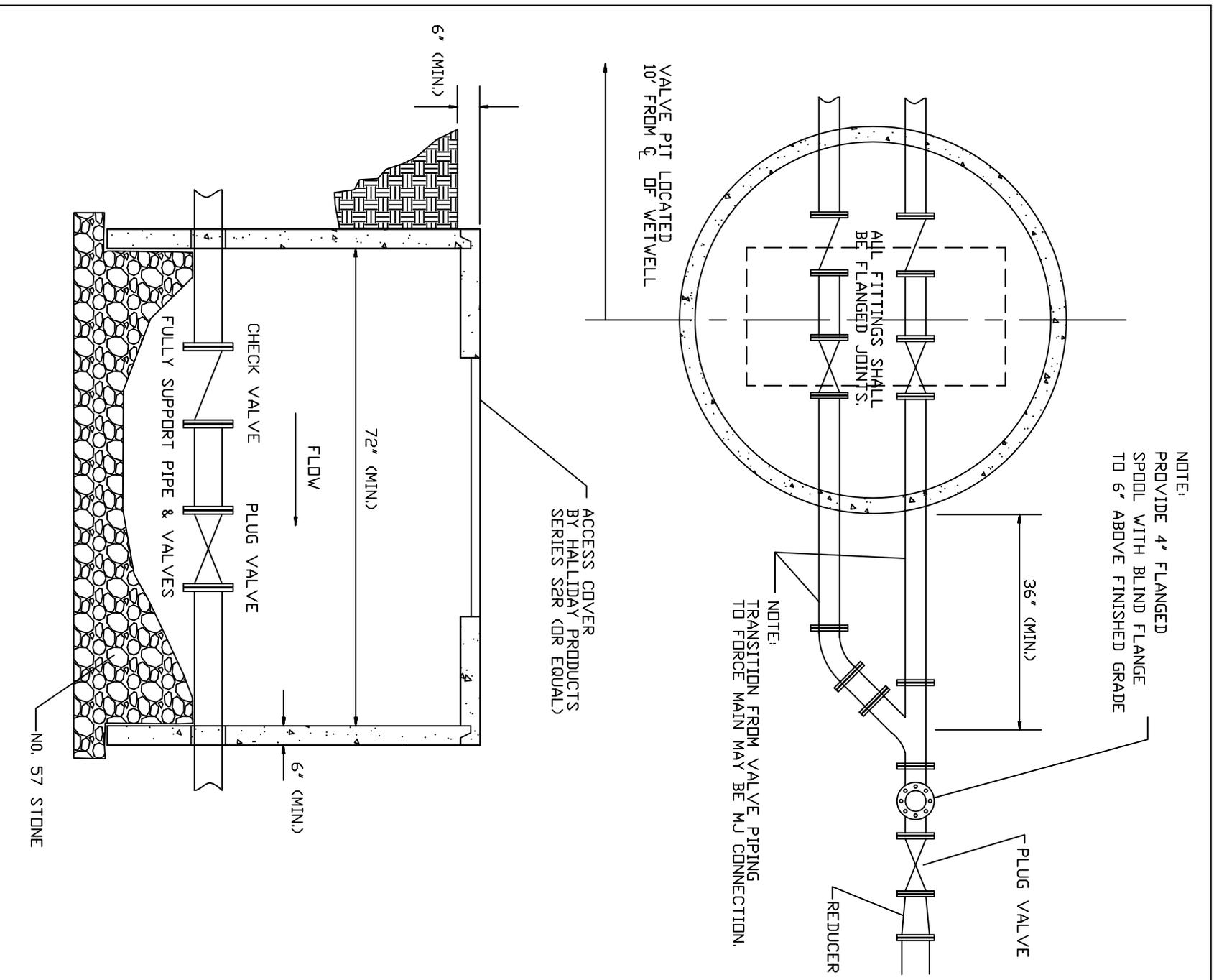
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

DRAWN BY: JWC

SCALE: NTS

DATE: JAN. 30, 2001

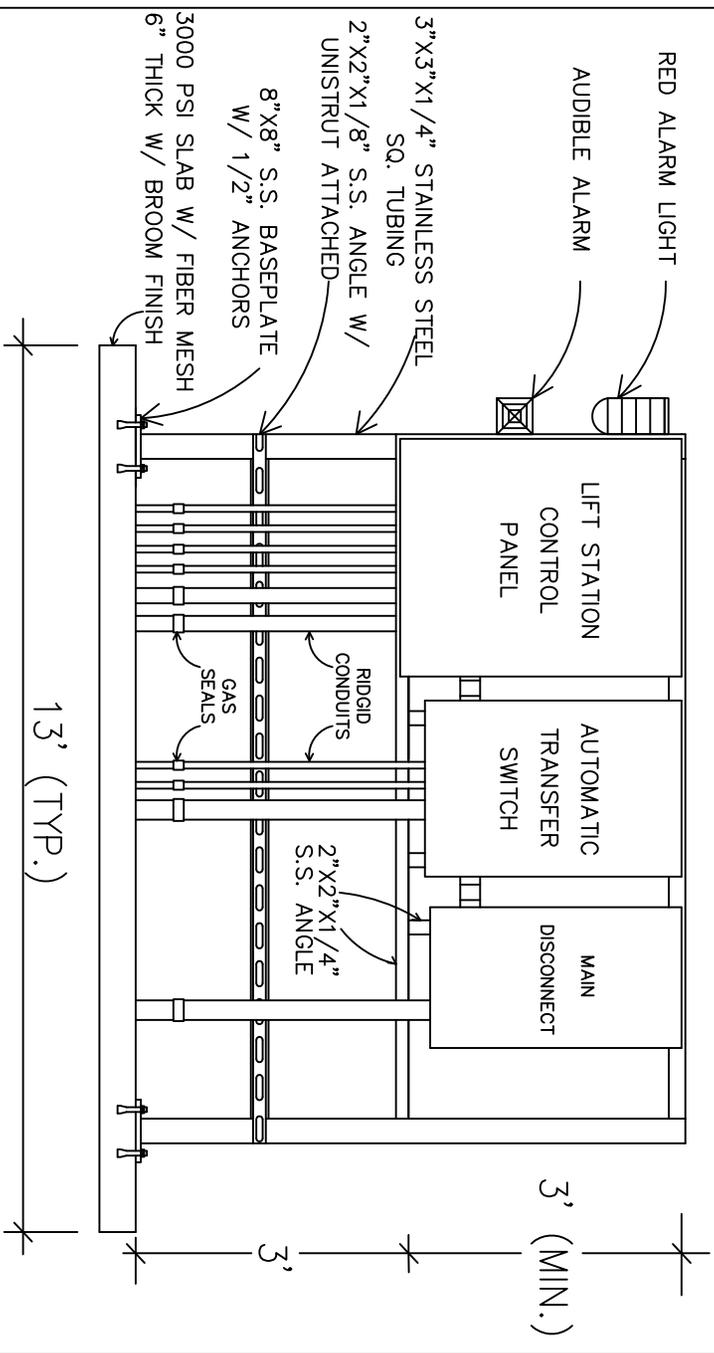
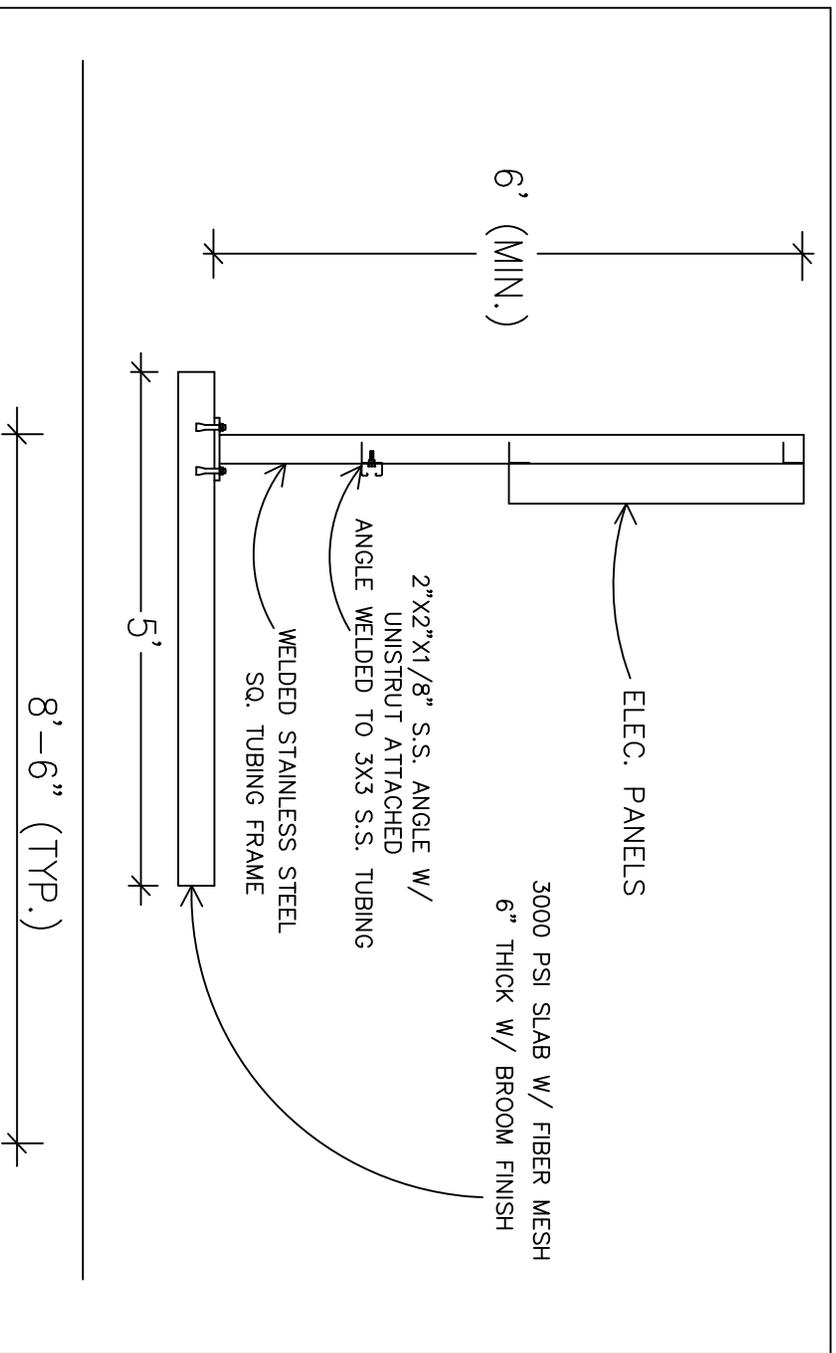
DWG. NO.: SEWER-13



FORCE MAIN VALVE PIT
STANDARD DETAIL
LSVP 3

CITY OF CALHOUN
WATER & SEWER
CONSTRUCTION
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

DRAWN BY: JWC	SCALE: NTS	DATE: JAN 4, 2007	DWG. NO.: SEWER-14
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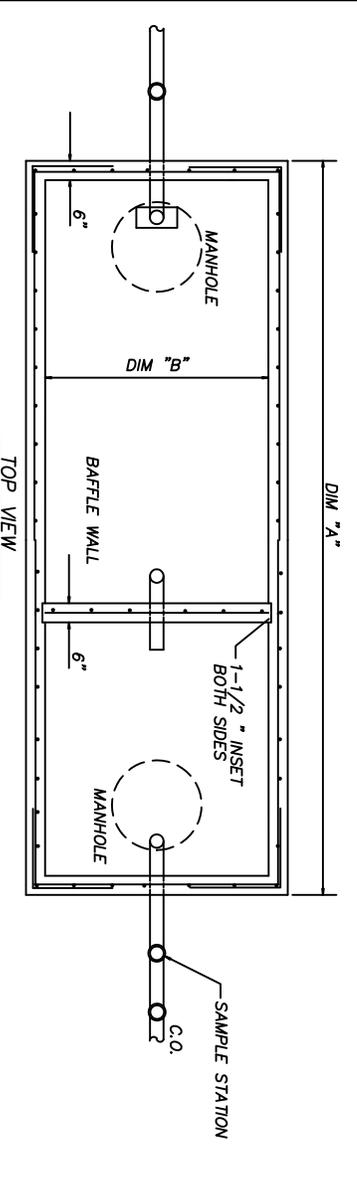


NOTE: ALL STAINLESS STEEL TO BE TYPE 304. INCREASE DIMENSIONS OF RACK AS NEEDED FOR LARGER LIFT STATIONS.

TYPICAL LIFT STATION
CONTROL PANEL

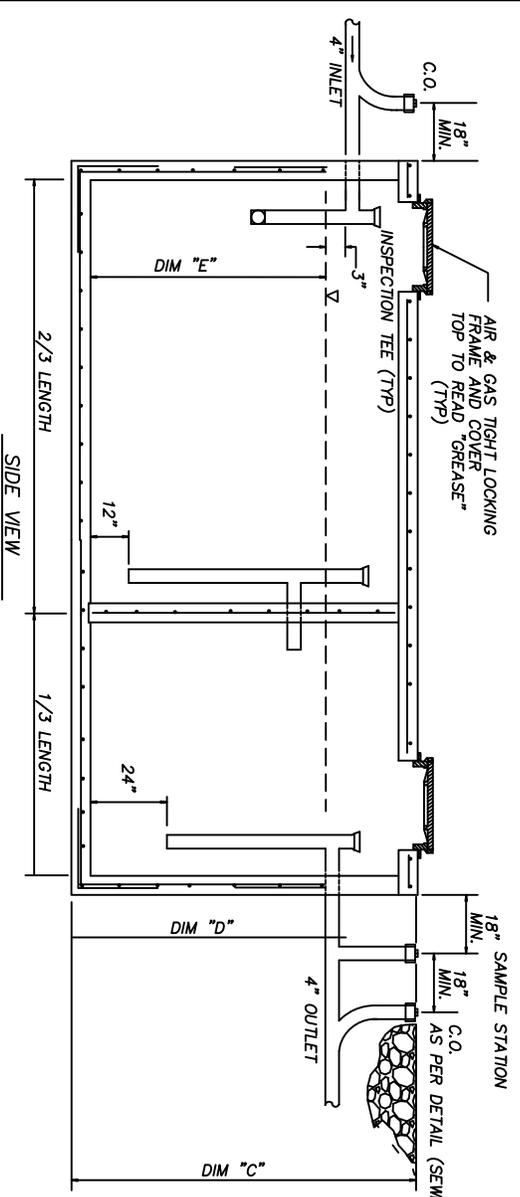
CITY OF CALHOUN
ENGINEERING DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30703-0248
TELEPHONE (706) 629-4750

DRAWN BY: JGS	SCALE: NTS	DATE: 4-17-07	DWG. NO.: SEWER-15
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SIZING CHART

GALLON CAPACITY	DIM 'A'	DIM 'B'	DIM 'C'	DIM 'D'	DIM 'E'
600	7'-0"	4'-8"	7'-0"	3'-6"	3'-2"
750	7'-0"	4'-8"	7'-0"	4'-3"	3'-11"
1000	7'-0"	5'-0"	7'-2"	4'-4"	3'-10"
1300	9'-0"	5'-0"	7'-2"	4'-2"	4'-10"
1500	9'-0"	5'-8"	7'-2"	5'-2"	4'-0"
1750	11'-2"	5'-8"	7'-2"	4'-4"	4'-7"
2000	11'-2"	6'-8"	8'-0"	4'-4"	3'-10"
2500	12'-8"	6'-8"	8'-0"	4'-7"	4'-9"
2750	12'-8"	6'-8"	8'-0"	5'-6"	5'-3"
3000	15'-7"	9'-7"	6'-6 1/2"	6'-0"	3'-9"
4000	15'-7"	9'-7"	6'-6 1/2"	6'-3"	5'-0"
5000	19'-11"	9'-11"	8'-11"	6'-2"	4'-9"



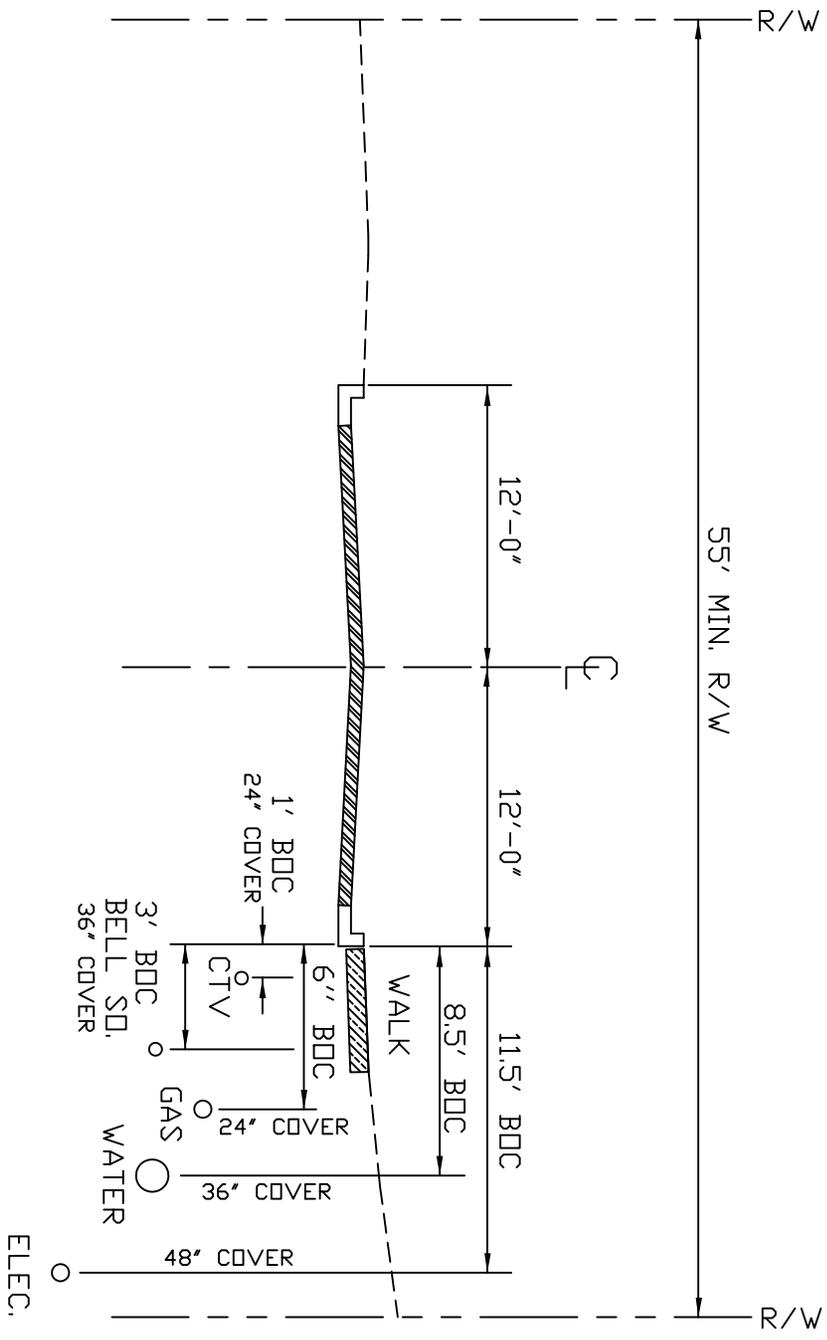
NOTE: ALL CONCRETE SHALL BE 6" Min. THICKNESS & 4000 PSI
 -REINFORCEMENT: CONCRETE SHALL BE REINFORCED W/ #4 REBAR @ 1' O.C. EACH WAY
 -CORNER BARS: CORNER BARS SHALL BE #4 REBAR @ 1' O.C.
 -LOADS: H-20 TRUCK WHEELS W/30 % IMPACT PER AASHTO
 -GRAY WATER ONLY, BLACK WATER SHALL HAVE A SEPARATE CONNECTION
 -OTHER DESIGNS BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF GEORGIA MAY BE SUBMITTED FOR REVIEW

CONSTRUCTION NOTE:
 STRUCTURE MUST BE DESIGNED FOR
 NON-BUOYANCY WHERE APPLICABLE

**OIL & GREASE TRAP
 STANDARD DETAIL**

CITY OF CALHOUN
 ENGINEERING/INSPECTION
 DEPARTMENT
 700 WEST LINE STREET
 CALHOUN, GEORGIA 30701
 TELEPHONE (706) 602-6081

DRAWN BY: JWC	SCALE: NTS	DATE: 10/05/12	DWG. NO.: SEWER -17
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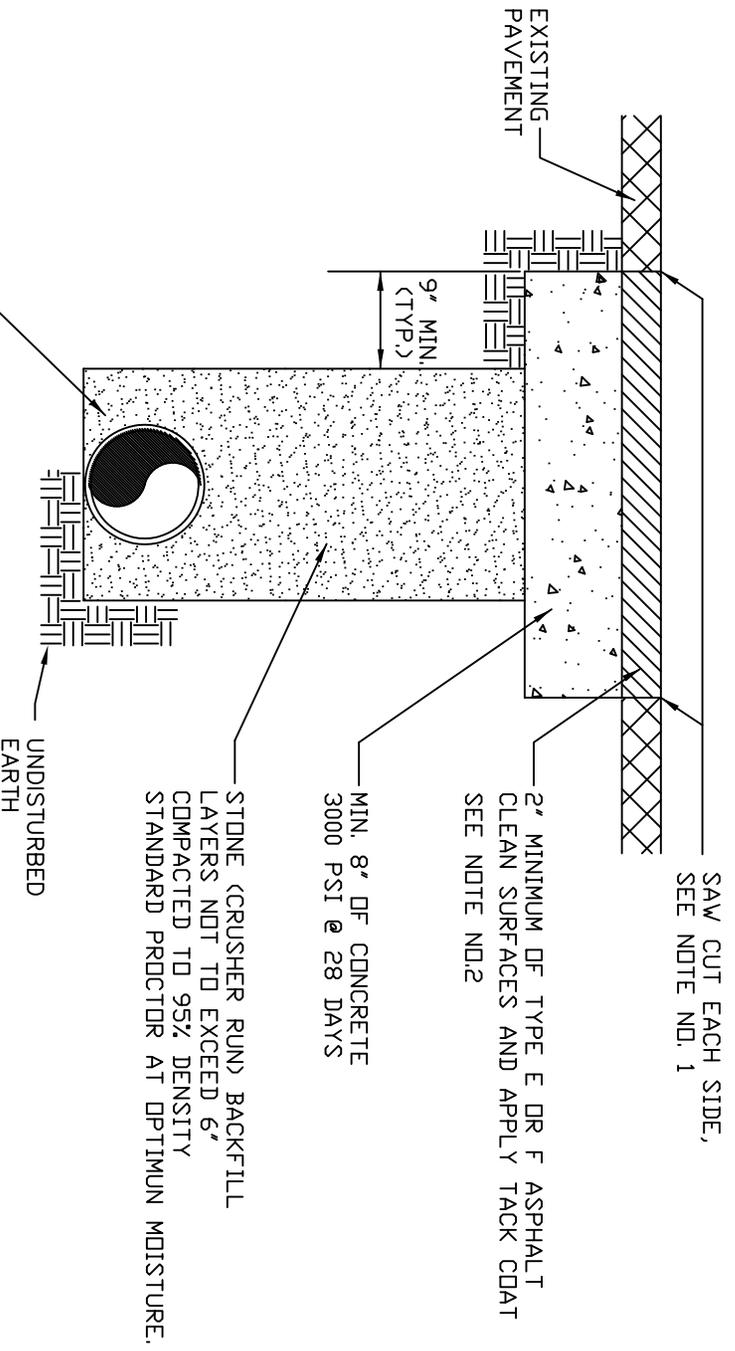
TYPICAL SECTION
FOR BOTH SIDES OF STREET

- NOTE NO. 1
SANITARY SEWER LOCATION SHALL BE REVIEWED ON AN INDIVIDUAL BASIS.
WATER AND SEWER SHALL BE ON OPPOSITE SIDES OF THE STREET.
- NOTE NO. 2
WATER AND SEWER SHALL NORMALLY BE INSTALLED ALONG ONE SIDE ONLY.

LOCAL (RESIDENTIAL SUBDIVISION)
UNDERGROUND UTILITY LOCATIONS
GENERAL STANDARD DETAIL 1

CITY OF CALHOUN
STREET DEPARTMENT
P.O. BOX 248
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4473

DRAWN BY: JWC SCALE: NTS DATE: DEC. 05,2002 DWG. NO.: GENERAL-01



NOTE NO. 1
 SAW CUTS TO FORM A NEAT LINE 9" ON EACH SIDE
 OF THE TRENCH OR TO VISIBLE BREAK WHICHEVER IS GREATER.

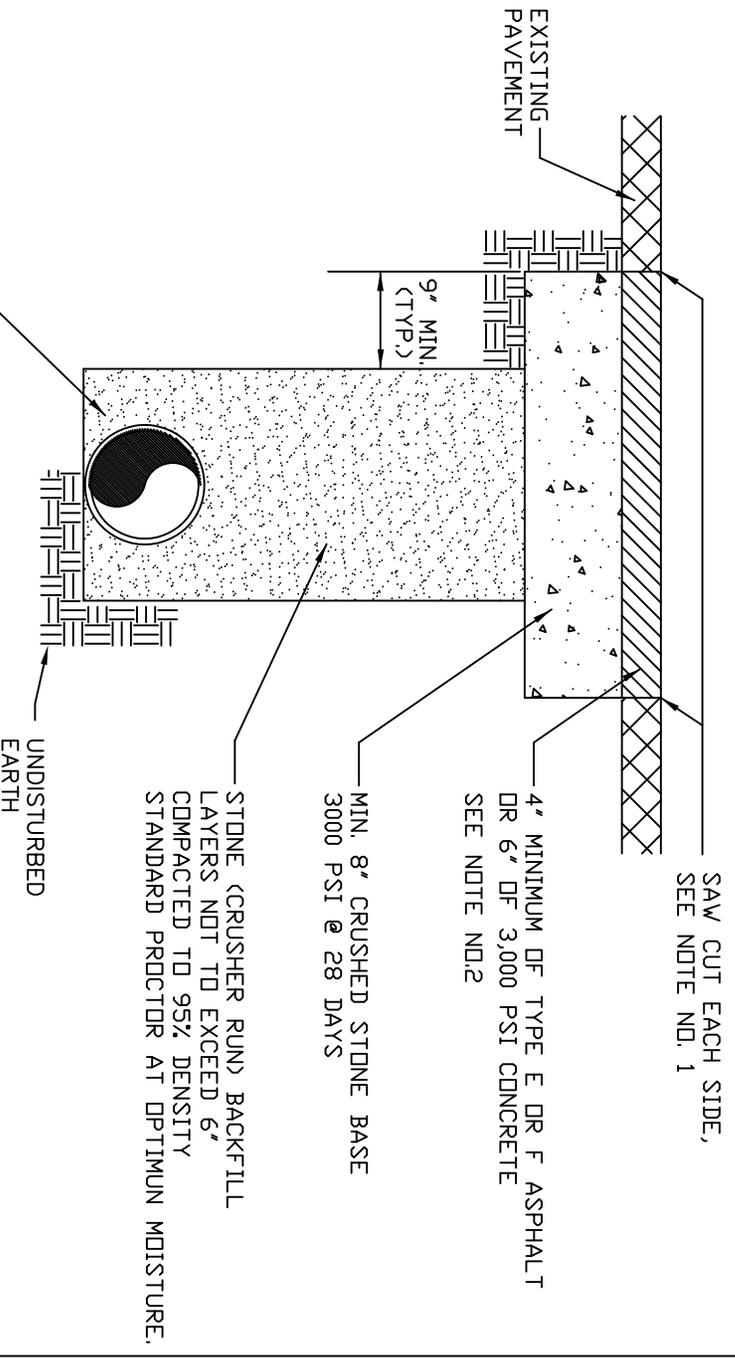
NOTE NO. 2
 REMOVE AND REPLACE BASE AND PAVEMENT TO OUTER EDGE OF EXISTING
 PAVEMENT IF REMAINING PAVEMENT WIDTH IS 24" OR LEES.

NOTE NO. 3
 SPECIAL BEDDING MAY BE REQUIRED IN AREAS WITH
 EXCESSIVELY WET OR YIELDING SOILS.
 BEDDING MAY ALSO BE REQUIRED UNDER OTHER SPECIFICATIONS.

D.O.T
 PAVEMENT REPLACEMENT
 GENERAL STANDARD DETAIL 2

CITY OF CALHOUN
 ENGINEERING DEPT.
 P.O. BOX 248
 CALHOUN, GEORGIA 30701
 TELEPHONE (706) 629-4750

DRAWN BY: JWC	SCALE: NTS	DATE: AUG. 12, 1998	DWG. NO.: GENERAL-2
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NOTE NO. 1
 SAW CUTS TO FORM A NEAT LINE 9" ON EACH SIDE
 OF THE TRENCH OR TO VISIBLE BREAK WHICHEVER IS GREATER.

NOTE NO. 2
 REMOVE AND REPLACE BASE AND PAVEMENT TO OUTER EDGE OF EXISTING
 PAVEMENT IF REMAINING PAVEMENT WIDTH IS 24" OR LEES.

NOTE NO. 3
 SPECIAL BEDDING MAY BE REQUIRED IN AREAS WITH
 EXCESSIVELY WET OR YIELDING SOILS.
 BEDDING MAY ALSO BE REQUIRED UNDER SPECIFICATIONS.

LOCAL ROAD & DRIVEWAY
 PAVEMENT REPLACEMENT
 GENARAL STANDARD DETAIL 3

CITY OF CALHOUN
 ENGINEERING DEPT.
 P.O. BOX 248
 CALHOUN, GEORGIA 30701
 TELEPHONE (706) 629-4750

DRAWN BY: JWC	SCALE: NTS	DATE: AUG. 12,1998	DWG. NO.: GENERAL-3
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**CALHOUN UTILITIES
SANITARY SEWER SYSTEM CONSTRUCTION
GENERAL NOTES**

1. All sanitary sewer system construction must follow the current City of Calhoun sanitary sewer system specifications.
2. D.I.P. sewer lines shall have a cement-mortar interior lining and a Class 50 minimum wall thickness.
3. All Polyvinyl Chloride (PVC) sewers shall meet the requirements for minimum wall thickness as specified under SDR 26 in ASTM D3034, latest revision. PVC is not allowed for sewers greater than 12" in diameter or installed at a depth greater than 15'.
4. Ductile Iron Pipe is required for sanitary sewer lines:
 - a. Under all stream crossings
 - b. With 12% or greater slope
 - c. At all drop manholes
 - d. Inside casings
 - e. With less than 3' of cover or over 15' in cover
 - f. At all other locations specified by the City
5. Information regarding underground utilities on these plans is not guaranteed as to accuracy or completeness. Prior to beginning work, the Contractor shall request a field location through the utilities protection center and any utility owners thought to have facilities in the area. The Contractor shall promptly compare these field-marked locations with the project plans and then notify the designer of any anticipated problems or need for design changes. It is the Contractor's responsibility to excavate or cause the utility owner to excavate for the purpose of determining exact elevations or locations at utility crossings and other critical locations well in advance of the work under this contract. Damage to existing utilities resulting from the Contractor's negligence shall be repaired at the Contractor's expense. The Developer and/or the Developer's Contractor is responsible for verifying the exact location, size, and material of any existing water or sanitary sewer facility proposed for connection or use by this project.
6. All sewer service laterals shall be 4" or 6" in diameter. The minimum grade for 4" services is 2% and the minimum grade for 6" services is 1%.
7. The Developer shall notify the sewer system inspector 48 hours before beginning construction.
8. The Developer is: (name, address, and telephone number).
9. The 24-Hour local contact is (name and 24 hour telephone numbers).
10. This project consists of: (Describe sanitary sewer work to be done, including length of pipe and sizes and number of manholes.).
11. This property (is /is not) located within a 100 year flood plain as shown on F.I.R.M. Community Panel Number _____, dated _____.
12. An undisturbed vegetative buffer meeting local and state requirements adjacent to all running streams and creeks will be left and maintained.
13. A copy of the **approved** construction plans must be kept on the job site at all times that construction is underway.
14. The Developer's contractor is responsible for recording accurate locations of all pipelines, fittings, valves, and other appurtenances on "as-built" markup drawings.
15. In areas to be paved, completely backfill trench - to the surface - with compacted crusher-run stone.

**SANITARY SEWER SYSTEM
GENERAL NOTES**

CALHOUN UTILITIES
ENGINEERING DEPARTMENT
700 W. LINE STREET
CALHOUN, GEORGIA 30701
TELEPHONE (706) 629-4701

STATE OF GEORGIA
COUNTY OF GORDON

FOR AND IN CONSIDERATION of the sum of Ten and No Hundredths (\$10.00) Dollars, and other valuable consideration, as described herein; the undersigned hereby grants and conveys to the CITY OF CALHOUN, a municipal corporation of the State of Georgia, its successors and assigns, the free, permanent and uninterrupted easement, use, liberty and privilege of a right of way twenty (20) feet in width, under and through the property of the undersigned located in Land Lot ___ in the ___th District and ___rd Section of Gordon County, Georgia as more particularly described in the attached plat marked Exhibit "A"; for the purpose of a utility easement for laying, maintaining and operating utility lines (including all appurtenant structures) as a part of the utility system of said City. For the consideration aforesaid the undersigned hereby agrees that said City may maintain said utility in, on, under and through the said property and said utility may be of such size and may be determined at such depth as may be determined by the City of Calhoun. The undersigned expressly agrees that the said City shall have a temporary construction easement of such minimum working width (not exceeding 50 feet) as is reasonably necessary for the proper installation of said utility. The undersigned further agrees not to construct any structure or building within the limits of said twenty (20) feet permanent easement and that said City, its successors and assigns shall have the right to operate and maintain said utility in and through said property and the easement and right of way granted, together with the right of ingress and egress to and from the same to the extent necessary to install, repair, keep up, replace, maintain and operate said utility.

The City of Calhoun shall, as soon as reasonably practical, replace the land where the utility or pipe is placed back in the same condition as existed before its installation.

The City of Calhoun shall not be liable for, or bound by any statement, agreement or understanding not expressed herein.

The undersigned does not convey any land, but merely grants the rights, privileges and easements hereinbefore set out.

IN WITNESS WHEREOF, the undersigned has set hand affixed seal this _____ day of _____, 20__.

OWNER: _____

BY: _____

TITLE: _____ (SEAL)

Signed, sealed and delivered
in the presence of:

WITNESS

NOTARY PUBLIC,
GEORGIA STATE AT LARGE
MY COMM. EXPIRES: _____

IRREVOCABLE LETTER OF CREDIT

Date: _____

Issuer: _____

Customer: _____

Beneficiary: City of Calhoun Georgia
(Calhoun Utilities)

700 West Line Street
Calhoun, GA 30701

Please check **one**: Construction Period; Warranty Period

For the account of our Customer, we the Issuer hereby issue and establish this **Irrevocable Letter of Credit** in your favor for an amount(s) not exceeding \$ _____ U.S. Dollars in the aggregate (the "Credit Amount"). These funds shall be available upon your presentation of drafts drawn on us at sight, accompanied by any written certificates or documents indicated below.

Presentation of such drafts shall be made during regular business hours, on or prior to (the Expiration Date as defined herein)) hereof, at our office located at the Issuer address or at such other address as we may specify in written notice to you (the "Presentment Address"). Drafts drawn and presented hereunder and in compliance with the terms and conditions hereof will be duly honored by us with our own funds.

1. DRAWINGS:

Partial drawings of funds hereunder are: Permitted **OR** Not permitted. If permitted, partial drawings made and honored shall correspondingly reduce (and shall not in the aggregate exceed) the Credit Amount stated above.

Each draft must specify its dollar amount and state on its face that it is "**Drawn under IRREVOCABLE LETTER OF CREDIT NO. _____ DATED _____.**" Each draft must be accompanied by any additional documentation specified below, all duly executed and in form and content satisfactory to us.

the case of a final drawing that extinguishes the Credit Amount or any remaining balance thereof, the draft must be accompanied by the original of the **Letter of Credit.** (In the case of drafts for permitted partial drawings prior to said final drawing, each such draft must be need not be accompanied by this **Letter of Credit.**)

The following additional documentation must be delivered to us at the Presentment Address contemporaneously with each draft presented by you:

2. EXPIRATION DATE

- A. If this **Letter of Credit** is for the Construction Period it shall expire on the earlier of (a) our close of business on _____, or (b) the day on which the Credit Amount is reduced to zero by drawings hereon made and honored. Upon such expiration, we shall be fully discharged of all obligations hereunder and you shall surrender this **Letter of Credit** to us for cancellation.
- B. If this **Letter of Credit** is for the Warranty period it shall expire on the later of (a) one (1) year from the date of your acceptance of all completed construction by Customer or (b) your acceptance of all completed construction and repairs to said construction by Customer. As a requirement for acceptance under either (a) or (b) herein the Customer shall have scheduled and performed with you an end-of-warranty inspection of the completed construction, including all installed facilities and utilities, and complete or repair any deficiencies found by you during said end-of-warranty inspection. Upon the completion and repair of said deficiencies and the execution and delivery of a quit-claim deed to all installed facilities (to include, but not limited to all pipe, conduit, manholes, valves, meters and related materials) from Customer to you, this **Letter of Credit** will be surrendered and returned by you to us. This **Letter of Credit** shall not be released by you if the Customer fails to schedule and perform an end-of-warranty inspection or correct found deficiencies.

3. TRANSFERABILITY

- This **Letter of Credit** is non-transferable, and no valid transfer or assignment hereof shall be authorized or permitted.
- This **Letter of Credit** may be transferred in its entirety, but not in part, upon your delivering to us your prior written notice of the intended transfer and payment of our transfer fee. In the event of such transfer, and at all times after the date thereof, (a) the transferee shall be deemed the sole Beneficiary for all purposes hereof and, we shall have no further obligation or responsibility to you (as the original Beneficiary) hereunder; and (b) the words "you" and "your" wherever used herein, shall mean and refer to the transferee.

4. COMPLIANCE

You alone shall be responsible for the correctness of the amount and timeliness of each drawing, for the proper application and disbursements of the amounts drawn hereunder, and for your compliance with the provisions hereof. Neither you nor any other person shall have any recourse against us for any amount paid by us in good faith hereunder pursuant to any draft or documentation which fully complies with the terms hereof, or which on its face appears otherwise in order but proves to be erroneous, forged, fraudulent, invalid or insufficient in any respect, in the absence of gross negligence or willful misconduct on our part. Under no circumstances shall we be held responsible for any impossibility or difficulty in your achieving strict compliance with the requirements hereof precisely as stated herein.

5. DISHONOR

We reserve the right to dishonor any draft which does not strictly comply with the requirements hereof. In no event shall we be precluded from relying upon any reason for dishonor of a draft given by us in a communication received by you (or by the

presenter of the draft) within a reasonable time not exceeded seven (7) business days after the draft and all required accompaniments are presented to and received by us (the "Seven-Day Period"). We shall be entitled to rely upon any such reason without regard to either (a) the timing of any presentation made before the Expiration Date, or (b) the timing during the Seven-Day Period of any preliminary communication(s) from us concerning any dishonor decision or reason for dishonor. For any such reason so given by us within the Seven-Day Period, we shall conclusively be deemed to have met the timing requirements imposed by the International Standby Practices published by the International Chamber of Commerce (the "ISP98").

The Expiration Date shall not be extended to accommodate a presentation made less than seven (7) Business Days prior to the Expiration Date and you shall not be entitled to submit a draft or any documents in support of a drawing after the Expiration Date. In no event shall we be required to communicate a dishonor decision or our reasons for such decision prior to or at any time less than the Seven-Day Period.

6. APPLICABLE LAW: JURISDICTION

This **Letter of Credit** is subject to **ISP98**, which is made a part hereof by this reference; and to the extent not inconsistent with **ISP98**, this **Letter of Credit** shall be governed by and construed in accordance with the laws of the State of Georgia, U.S.A.

For purposes of any litigation which might arise hereunder, your acceptance of this **Letter of Credit** shall constitute our consent to the jurisdiction and venue of any court of competent jurisdiction in Gordon County, Georgia, and your agreement to institute no such litigation elsewhere.

7. RECORD RETENTION

Customer acknowledges and agrees that Issuer may from time to time retain information about Customer and documents Customer signs, including, but not limited to, this **Letter of Credit** and documents related to this **Letter of Credit** (collectively, the "documents") electronically (such as in optical, digital or other electronic storage and retrieval system) and destroy the original documents. Issuer and Customer agree and intend that any copy of any document produced by Issuer from the electronic media shall have the same legal force and effect as the original documents for all purposes and in all circumstances, including, but not limited to, collection, admissibility, authentication, or any other legal purpose.

8. MISCELLANEOUS

The pronouns "we", "us", "our" whenever used herein shall mean and refer to the Issuer. The pronouns "you" and "your" wherever used herein shall mean the City of Calhoun, Georgia (Calhoun Utilities).

If by mistake or inadvertence, or for any other reason, any funds in excess of the Credit Amount at the time available are paid by us and received by you, you shall promptly refund the full amount of such excess to us.

None of the provisions of the **Letter of Credit** shall be deemed waived by any failure on our part to require strict compliance therewith.

If and in the event that any provision hereof is adjudged invalid or unenforceable by any court or governmental agency having jurisdiction in the matter, and notwithstanding any

provisions hereof to the contrary, this **Letter of Credit** shall be deemed null and void ab initio and both of us shall be restored to our respective formerly occupied conditions as though this **Letter of Credit** were never issued.

Yours very truly,

(Name of Issuer)

By: _____

Title: _____

By: _____

Title: _____

Errata & Addenda

Calhoun Utilities Development Policies & Specifications for Water and Sanitary Sewer Adopted 2009 Updated 2015

1. Page 101-3, Sect. C., para 2, line 1

Line changed to read: “easements must be approved by the City of Calhoun” instead of “a proved”

2. Page 103-1, Sect. E., para 7

Paragraph changed to read: "Specifications" and “Standards” shall refer to the City of Calhoun Utilities Development Policies & Specifications for Water and Sanitary Sewer, instead of “City of Calhoun Standard Specifications for Water and Sanitary Sewer Installation”.

3. Page 102-2, Sect. C., para 2, line 3

Line changed to read: “been submitted to, and approved by, the Utilities Engineering Department Manager.” instead of “Utilities Department Engineer”

4. Page 106-3, Sect. 3.3, para B

Paragraph changed to read: “Whenever the difference in elevation between the inlet and outlet sewer inverts exceeds 24 inches provide an outside drop connection in accordance with the detail shown on the Drawings.” instead of 30” inches. (per EPD comment)

5. Water System Detail Drawing #13 & 14, Appendix

Changed Aluminum Hatch to (Haliday or equal) instead of (Haliday S1R 3660 or equal)

6. Page 103-8, Sect. G., para 3.7

Specifications for tracing wire revised and expanded. All other references to tracing wire revised to match new specs.

7. Page 110-1, Contact Information

Contact information updated.

8. Pages 101-2&3

Changed “Director of Utilities” to “Utilities General Manager”.

9. Cover

Updated names to reflect current office holders.

10. Table of Contents

Changed title of paragraph 109-B, 2.10 to “Sanitary Forcemains”

11. Page 103-8, Sect. G., para 3.7

Removed requirement for Warning Tape over water mains.

12. Page 103-6, Sect. G., para 2.10

Added specifications for tapping sleeves and full circle repair clamps.

13. Page 103-3, Sect. B., para 2.1, A

Added requirement for all waterlines 4" and greater to be Ductile Iron Pipe

14. Page 109-1, Sanitary Sewer Lift Stations, Sect. 109-A, Part 1, para 1.3, B

Added requirement for searchable PDF Operator's Manual for Lift Stations

15. Sect 106 B., Part 2 - Products 2, Precast Manholes, Para (a) 2.1 D

Added statement "NO MANHOLE STEPS ALLOWED".

16. Sect 106 B., Part 2 - Products 2, Precast Manholes, Para (a) 2.1 D

Added statement "NO MANHOLE STEPS ALLOWED".

17. Sewer System Detail Drawing #01 – Standard Wetcast Manhole

Removed steps.

18. Added Sewer Detail Drawing #16, Dumpster Pad Detail

19. Added Sewer Detail Drawing #17, Grease Trap Detail