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*STANDARD SPECIFICATIONS
FOR WATER SYSTEM AND
EFFLUENT SEWER SYSTEM CONSTRUCTION
SOUTH ALABAMA UTILITIES*

*CHAIRMAN
MARCUS HOBBS*

*BOARD MEMBERS
LARRY YONGE, SEC., TREAS.
WARREN CARTER, DIRECTOR
LORETTA PRESNELL, DIRECTOR*

*VICE CHAIRMAN
W.TODD McCAIN*

*GENERAL MANAGER
DONNIE CUNNINGHAM*

*CONSTRUCTION SUPERINTENDENT
BRAIN ROBINSON – WATER
BRAXTON PLATT - SEWER*

QUESTIONS RELATIVE TO THE
STANDARD SPECIFICATIONS
SHOULD BE DIRECTED TO:

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SPEAKS & ASSOCIATES

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SECTION 0100

GENERAL INFORMATION AND REQUIREMENTS FOR WATER AND/OR SEWER SERVICE

1. BOARD'S STANDARD SPECIFICATIONS

Copies of the "Standard Specifications for Water System and Effluent Sewer System Construction" may be obtained at South Alabama Utilities, P.O. Box 319, Semmes, Alabama 36575 and P.O. Box 428, Citronelle, Alabama 36522.

The standards are intended to provide a basis for system improvements that will result in facilities that will efficiently perform their intended purpose over their useful life.

As such, the standards will change from time to time. Suggestions for improving the standards should be submitted in writing to the Construction Superintendent. Complaints regarding standards thought to be unreasonable should also be submitted to the Construction Superintendent, but must be accompanied by suggested changes or modifications.

2. JURISDICTION

These standard specifications shall apply to all water lines, effluent sewer lines, and related appurtenances to be owned, operated, or maintained by South Alabama Utilities, hereinafter called the Board.

3. PURPOSE

These standard specifications are adopted to establish minimum acceptable standards for the design and construction of water and sewer facilities owned, operated, and maintained by the Board. Such facilities include water and sewer lines and miscellaneous related appurtenances associated with the water system. These specifications are applicable when facilities are to be constructed by the customer and turned over to the Board for operation and maintenance.

4. STANDARDS FOR PLANS

Plans for water and sewer lines and other appurtenances to the Board's systems shall clearly define the work and all details shall be in conformance with the Board's standards.

4.1 Scale: Scale of drawings shall be a minimum of 1" = 60'. Plans shall show all facilities to be installed, including

paving, grading, drainage, and all other proposed facilities, including the new water and sewer lines. At a minimum, two-foot ground elevation contours shall be required.

4.2 Datum: All elevations on plans are to refer to N.G.V. (Mean Sea Level) Datum. All plans submitted to the Board shall clearly state the datum reference to N.G.V.D. and the benchmark utilized to establish the datum.

4.3 Locality Map: A locality/vicinity map, showing the area in which the project is located, shall be included in all sets of plans.

4.4 Review and approval of plans: Plans and other required data shall be submitted to the Board for review and approval before commencing any construction on the site.

4.5 Record drawings: Upon completion of the project, the plans are to be revised to show the work as it was actually constructed. The locations of all fittings, services, hydrants, valves and other appurtenances are to be clearly shown and dimensioned.

5. SUBMITTAL REQUIREMENTS

The following requirements apply to water and sewer facilities for residential and commercial subdivisions or individual commercial establishments submitted to the Board for review, approval, and maintenance. These requirements shall be applicable for all subdivision or commercial establishments which require new construction.

5.1 The following items must be completed prior to start of construction:

5.1.1 Submit a minimum of one (1) set of plans to the Construction Superintendent. Upon review and resolution of any comments by the Board, provide two (2) complete sets of the project plans, including the water and sewer sheets, which have an Alabama Registered Engineer's seal, signature, and registration number affixed to the cover sheet. **Where effluent sewer service is desired, contact the Board 120 days in advance of the anticipated initial start of construction.**

5.1.2 Have on file signed Utility Agreement and have paid the required construction fee (if applicable).

5.1.3 Where future phases of construction are planned, one (1) copy of the Master Development Plans shall be submitted to the Board.

5.1.4 A note stating that "All materials and construction shall be in strict conformance with South Alabama Utilities' Standard Specifications for Water System and Effluent Sewer System Construction, latest revision" shall be included prominently on the plans.

5.1.5 *Certificate of compliance from material suppliers.*

5.1.6 Where applicable, the Board shall be furnished with executed permanent easements for water and sewer facilities not located in county-maintained public road right-of-way. The easement shall be exclusively for the use of water or sewer lines, and shall not be joint easements with drainage facilities or other utilities. The minimum width of easements shall be 20 feet; 10 feet if adjacent to a public right-of-way. Easements shall be submitted in a form satisfactory to the Board. Easement descriptions shall be prepared by a Professional Land Surveyor licensed in the State of Alabama, on the form provided in Attachment "A", and a survey of the easement conforming to the "Standards of Practice for Surveying in the State of Alabama" as adopted by the Alabama Society of Professional Engineers and Land Surveyors shall be provided.

5.1.7 Written evidence that the contractor installing the lines is a State Licensed General Contractor or is otherwise a contractor approved in writing by the Board-see Paragraph 5.6.1.

5.1.8 After all previous items have been submitted to the Board and approved, provide a letter to the Board's Engineer stating the start date for the water and sewer construction.

5.2 The following shall be provided upon completion of construction:

5.2.1 Record drawings, including a list indicating, by line size, the length of new water or sewer lines.

5.2.2 Number of new hydrants actually installed.

5.2.3 Bacteriological test and hydrostatic test reports for water lines.

5.2.4 Hydrostatic test reports for effluent sewer lines.

5.2.5 Provide documentation required by the Utility Service Agreement, including a copy of record plat and restrictive covenants with language required. Digital files of the record plat and water and sewer layout sheets will also be required.

5.2.6 *Itemized cost for water and sewer system, including engineering and inspection cost.*

5.3 The Board requires that facilities serving commercial and residential properties be designed and constructed such that they may be extended to serve any future development as a result of cutouts from or additions to the initial and subsequent developments. The total cost of facilities to serve such cutouts, subdivision, or additions shall be at the expense of the developer.

5.4 Water Facility Design Considerations (See Section 0500):

5.4.1 Adequate cover and clearance shall be provided for water lines where they cross sanitary and storm drainage lines. Horizontal separation provided between water and sewer lines shall comply with ADEM regulations. Maintain a 6-foot horizontal separation between water lines and sanitary sewer lines. Where possible at crossings, the waterline shall pass above the sanitary sewer. A minimum of 12" vertical clear separation between water lines and other utilities shall be provided.

5.4.2 Water line sizes shall be adequate for proposed and future service. Lines shall be no less than 3" diameter unless approved by the Board.

5.4.3 Peak flow calculations and expected pressures in the line for the proposed water system shall be submitted to the Board. The system shall be designed to maintain a minimum pressure of 35 psi at all points in the distribution system under all conditions of flow. The minimum design flow in residential subdivisions shall be in accord with ADEM requirements (see Attachment "B"). For pressures greater than 80 psi, special provisions may be required. Where flow test data is provided by the Board, the new line shall be designed on the basis of the flow test data.

5.4.4 Location of hydrants shall be at street intersections and at approximately 800 linear foot intervals and at dead ends of the water mains. Hydrants are required on 6" or greater diameter water mains. Flush hydrants or flush stations shall be placed on smaller diameter mains at intervals required by the Board, but under all instances at dead ends.

5.4.5 Where possible, looped water systems shall be considered rather than dead end runs.

5.4.6 Valves shall be installed in locations to facilitate water system control. At a minimum, valves shall be located at all main line intersections, at selected dead-ends, and hydrant branches. On main-line runs, the interval shall not exceed 1,600 feet.

5.4.7 SDR 21 (200 psi) or greater P.V.C. pipe with metallic detection tape and wire shall be utilized for water mains. *Under pavement, ductile iron water main shall be utilized.*

5.4.8 Water services shall be installed on every lot and at each entrance in subdivision or multi-lot developments. In other developments, services shall be constructed as directed by the Board. In cases where individual water services are installed by other than the Board, they shall comply with current purchasing standards of the Board. Services shall be placed in locations on each lot as approved by the Board. *Service taps shall not be located under pavement.*

5.4.9 *Service main shall be SDR 9 HDPE, except for services over 50 feet in length (cul-de-sacs, medians, etc.) Service lines longer than 50 feet in length shall be Type "K" copper.*

5.4.10 Tapping of existing water mains, hydrostatic testing, and bacteriological testing must be coordinated with and performed in the presence of the Board's representative. Operation of valves on existing water mains, the filling or flooding of new water mains, and flushing of new or existing lines shall be performed by Water Board personnel only. A minimum of three (3) working days notice shall be required prior to commencing this work. Tapping of existing water mains will be performed by the Board only. Charges for taps will be determined by the Board.

5.5 Effluent Sewer Facility Design Considerations (See Section 0600):

5.5.1 Adequate cover and clearance shall be provided for sewer lines where they cross water and storm drainage lines. Horizontal separation provided between water and sewer lines shall comply with ADEM regulations. Maintain a 6-foot horizontal separation between water lines and sanitary sewer lines. Where possible at crossings, the waterline shall pass above the sanitary sewer. A minimum of 12" clear vertical separation between sewer lines and other utilities shall be provided.

5.5.2 Sewer line sizes shall be adequate for proposed and future service. Lines shall be no less than 2" diameter unless approved by the Board. The Board will review all the design information and provide the required line sizes to the developer.

5.5.3 The Board will advise the developer of the number and locations of any required air-release valves, check-valves, gate valves, and clean-outs.

5.5.4 Peak flow calculations for the proposed sewer system shall be submitted to the Board.

5.5.5 SDR 11 High Density Polyethylene (HDPE) pipe with metallic detection tape and wire shall be utilized for sewer mains and service lines.

5.5.6 Sewer services shall be installed on every lot in subdivision or multi-lot developments. In other developments, services shall be constructed as directed by the Board. Services shall be placed in locations on each lot as approved by the Board. *Service taps shall not be located beneath pavement.*

5.5.7 Tapping of existing sewer mains and hydrostatic testing must be coordinated with and performed in the presence of the Board's representative. A minimum of three (3) working days notice shall be required prior to commencing this work. Charges for taps will be determined by the Board.

5.6 Contractor Requirements:

5.6.1 Any contractor performing work on the South Alabama Utilities system or work that is to be accepted for operation and maintenance by the Board shall hold a current license from the State Licensing Board of the State of Alabama or shall petition the Board in writing for approval to perform work on South Alabama Utilities' system and shall receive written approval from the Board prior to performing construction defined above.

5.7 Plan Review or Inspection:

5.7.1 There will be no charge for the review of plans, calculations, submittal data, record drawings, test data and results, and other related items.

5.7.2 Fees for inspection of pressure test and sampling shall be as follows:

5.7.2.1 No charge for initial review during normal work hours.

5.7.2.2 Re-inspection of incomplete or unacceptable work will be billed as directed by the Board.

5.7.2.3 Charges for inspections on holidays or weekends will be billed at rates determined by the Board.

5.7.2.4 Charges for tapping existing lines shall be established by the Board on a case-by-case basis.

5.7.3 The Board (or authorized representative of the Board) reserves the right to inspect the work at any time. There will be no charge for normal or routine inspection of the work. However, when work is found to be defective or in non-compliance with the Board's specifications, the Board maintains the absolute right to refuse to operate/maintain the lines and refuse to

supply service to the lines. **All work inspected on weekends and holidays will be charged at the overtime rate set by the Board.**

5.7.4 Payment of Fees: The owner/contractor shall pay any and all charges due prior to lines being accepted for operation and maintenance by the Board and meters being set for service.

6. FINAL INSPECTION AND ACCEPTANCE OF WORK

Upon request by the contractor and notice by the Owner that work is substantially complete, final inspection and acceptance of work shall be made by the Board. Once satisfactorily completed, the work will be accepted by the Board for operation and maintenance.

7. GUARANTEE OF PIPE INSTALLATION AND REPAIRS

All work and/or materials furnished and/or installed on the South Alabama Utilities' system shall be guaranteed for a period of one (1) year after written notice of final acceptance of the project by the Board's Construction Engineer. The guarantee shall absolutely extend and cover damage by other utility companies or damage by unknown parties to water and sewer system facilities. The owner shall make arrangements in writing with the Board as to the method in which payment will be made for cost incurred by the Board for repairs to the facilities covered by the one (1) year guarantee.

8. RIGHT TO SERVICE

The Board retains the right to terminate service to any development or individual which violates the Service Agreement for the development or the terms and conditions of service.

9. SPECIAL CONSIDERATIONS FOR SUBDIVISIONS DESIGNED FOR LARGE DWELLINGS

9.1 Large dwellings are defined as residential dwellings with greater than 2,500 square feet under roof.

9.2 Services for large dwellings shall be 1" potable water, ¾" irrigation, and 1" sewer services.

END OF SECTION

LINE EASEMENT
(Water or Sewer)

STATE OF ALABAMA:
COUNTY OF MOBILE:

KNOW ALL MEN BY THESE PRESENT that _____
the Grantors, for and in consideration of the sum of \$ _____, cash in hand paid to us by THE UTILITIES BOARD OF THE TOWN OF CITRONELLE dba SOUTH ALABAMA UTILITIES, hereinafter referred to as SOUTH ALABAMA UTILITIES, the Grantee, receipt whereof is hereby acknowledged, and for the further consideration of the general public benefit which will accrue to the neighborhood and the benefit which will accrue to our property by reason of the construction of a _____ line hereinafter referred to, do hereby REMISE, RELEASE, QUITCLAIM AND CONVEY unto the SOUTH ALABAMA UTILITIES, its successors or assigns, an exclusive right and easement to construct and maintain a _____ line under the soil of a _____ foot strip of land running across a parcel of land in the County of Mobile, State of Alabama, described hereinbelow, which strip is more particularly described as follows:

**(ADD LEGAL DESCRIPTION AND SURVEY SIGNED/SEALED BY REGISTERED LAND SURVEYOR
IN THE STATE OF ALABAMA)**

Together with all the rights and privileges necessary or convenient for the full enjoyment or use thereof, including the right to construct and maintain necessary appurtenances and the right of necessary and reasonable ingress and egress by the agents or employees of the Grantee, its successors or assigns over and across said parcel of land to said strip and over and across said strip for the purpose of laying, constructing, inspecting, repairing and maintaining said _____ lines and/or said appurtenances under the soil along said strip. **Further, the Grantors agree not to fence or otherwise limit access to the easement without written approval from the South Alabama Utilities.**

TO HAVE AND TO HOLD THE SAME unto the SOUTH ALABAMA UTILITIES, its successors and assigns forever.

IN WITNESS WHEREOF, We have hereunto set our hands and seals on this _____ day of _____, 20____.

WITNESS: _____
By _____

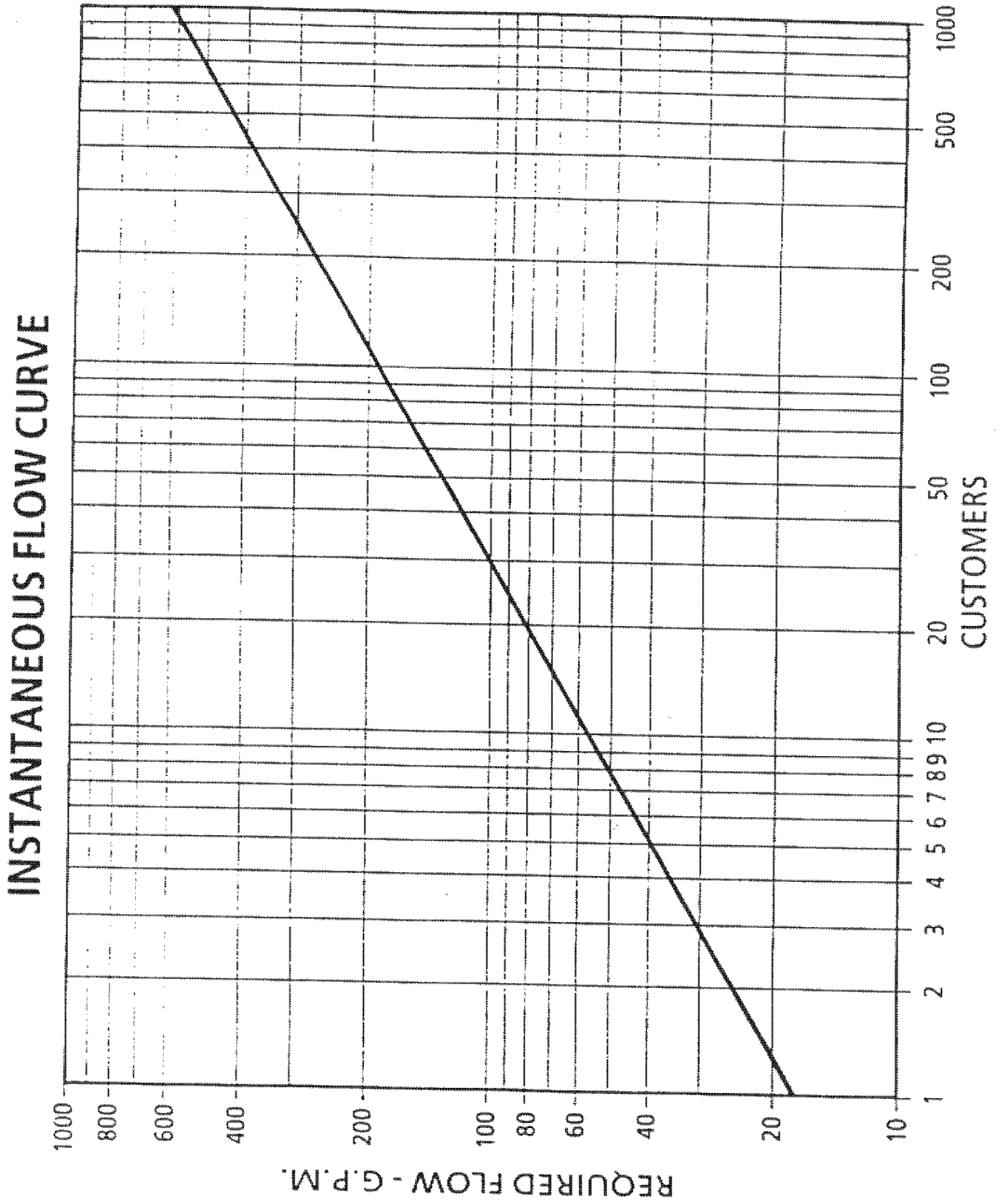
STATE OF ALABAMA:
COUNTY OF MOBILE:

I, _____, a Notary Public in and for said State and County, do hereby certify that _____ and _____, whose names are signed to the foregoing conveyance, and who are known to me, acknowledged before me on this day, that being informed of the contents of the conveyance, they executed the same voluntarily on the day the same bears date.

GIVEN UNDER MY HAND AND OFFICIAL SEAL on this _____ day of _____, 20____.

NOTARY PUBLIC, MOBILE COUNTY, ALABAMA
PREPARED BY:

SECTION 0100
ATTACHMENT "B"



SECTION 0200

CLEARING, GRUBBING, AND REMOVALS

1. SCOPE

This section shall include the work required by the contractor for completing clearing, grubbing, and removal work for the project. At a minimum, clearing and grubbing shall extend 6 feet beyond the centerline of the pipeline in each direction or where applicable, provide 5 feet clear of structures.

2. CLEARING

Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal. Downed timber, snags, brush, and other vegetation in areas to be cleared shall be cut off flush with or below the original ground surface. Trees and vegetation to be left standing shall be protected from damage incidental to clearing, grubbing, and construction operations by suitable means as the circumstances require.

3. GRUBBING

Grubbing shall consist of the removal and disposal of stumps, roots larger than three (3) inches in diameter, and matted roots from the areas to be cleared. This material, together with logs and other organic or metallic debris not suitable for foundation purposes, shall be excavated and removed to a depth of not less than 18 inches below the original surface level of the ground in fill areas and not less than two (2) feet below the finished earth surface in excavated areas indicated as construction areas. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform with the original adjacent surface of the ground.

4. REMOVALS

Where indicated by the plans or where conflicting with new construction shown by the plans or indicated by the specifications, all items shall be removed.

5. DISPOSAL OF CLEARED AND GRUBBED MATERIAL

Disposal of all trees, branches, snags, brush, stumps, etc., resulting from the clearing, grubbing, and removals shall be the responsibility of the contractor and shall be disposed of by removal from the project site.

END OF SECTION

SECTION 0204

TURF

1. SCOPE

This section shall include requirements for all materials and labor as required to establish an acceptable stand of seeded grass over the entire project limits.

2. APPLICABLE PUBLICATIONS

The publications listed herein form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

3. PLANTING SCHEDULE

The seeding mix used shall be based on the planting date proposed by the contractor and as detailed herein.

4. DELIVERY, STORAGE, AND HANDLING

4.1 Delivery:

4.1.1 During delivery, turfing materials shall be protected from any drying or contamination by detrimental material.

4.1.2 Fertilizer and lime shall be delivered to the site in the original, unopened containers bearing the manufacturer's name and guaranteed chemical analysis.

4.2 Storage: Seed, lime, and fertilizer shall be kept in dry storage away from contaminants.

5. MATERIALS

5.1 Seed: Seed shall be state-certified seed of the latest season's crop and shall be delivered in original sealed packages bearing the producer's guaranteed analysis for percentages of mixtures, purity, germination, weed-seed content, and inert material. Seed shall be labeled in conformance with U.S. Department of Agriculture rules and regulations under the Federal Seed Act and applicable state seed laws. Seed that has become wet, moldy, or otherwise damaged will not be acceptable.

5.2 Topsoil:

5.2.1 Topsoil shall be the existing surface soil.

5.2.2 Additional topsoil, if required beyond that available, shall be a natural, friable soil representative of productive soils in the vicinity. It shall be obtained from well-drained borrow areas provided by the contractor and shall be free of any admixture of subsoil, foreign matter, objects larger than one inch in any dimension, toxic substances, and any materials or substances that may be harmful to plant growth. The pH range shall be 5.3 to 6.0. Topsoil that does not meet the lower pH limit shall be amended by the addition of lime, at a rate recommended based on soil tests.

5.3 Liming material: The contractor shall use either agricultural limestone or marl.

5.3.1 Agricultural limestone shall have a minimum calcium carbonate equivalent of 90 percent and shall be ground to such a fineness that at least 90 percent will pass the 10-mesh sieve and at least 50 percent will pass a 60-mesh sieve.

5.3.2 Marl shall have a minimum calcium carbonate equivalent of 80 percent and shall be crushed to such a fineness that at least 90 percent will pass an 8-mesh sieve and at least 80 percent will pass a 10-mesh sieve.

5.4 Fertilizer: Fertilizer shall be commercial grade, free flowing, uniform in composition and shall conform to applicable State and Federal regulations. Fertilizer shall conform to Fed. Spec. O-F-241, Type I, Class (1), (2), or Type II, Class (1), (2), (3), and shall bear the manufacturer's guaranteed statement of analysis. When slow release nitrogen forms are used in the fertilizer mixture, they shall be derived from sulfur coated urea (SCU), urea formaldehyde (UF), plastic or polymer coated prills, or isobutylenediurea (IBDU). Fertilizer for use prior to tilling and for use during the establishment period shall be selected by the contractor.

5.5 Mulch: Mulch shall be straw or hay mulch fixed in place with disk land packers or disk harrows.

5.5.1 Straw shall be stalks from oats, wheat, rye, barley, or rice that are free from noxious weeds, mold, or other objectionable material. Hay shall be in an air-dry condition and suitable for placing with blower equipment.

5.6 Water: Water shall not contain elements toxic to plant life.

6. SITE PREPARATION

6.1 Placing topsoil: Topsoil shall be distributed evenly over the disturbed area. Topsoil shall be spread so that planting can proceed with little additional soil preparation or additional tillage. Surface irregularities resulting from topsoiling or other operations shall be leveled to prevent depressions. Topsoil shall not be placed when the subgrade is frozen, excessively wet, extremely dry, excessively compacted, or in a condition detrimental to the proposed planting or grading. Soil compacted by construction equipment shall be pulverized to a minimum depth of 4 inches by disking before spreading topsoil.

6.2 Tillage: Prior to seeding, the soil shall be tilled to a depth of at least 6 inches. Tillage shall be accomplished by plowing, disking, harrowing, or by the use of rota-tillage machinery until the condition of the soil is acceptable. The work shall be performed only during periods when beneficial results are likely to be obtained. When drought, excessive moisture, or other unsatisfactory conditions prevail, the work shall be stopped when directed. Undulations or irregularities in the surface shall be leveled before the next specified operations.

6.3 Application of fertilizer and lime:

6.3.1 A minimum 8-8-8 fertilizer shall be applied at the rate of 1,500 pounds per acre. Other fertilizer and application rates may be used with approval.

6.3.2 Lime: Ground agricultural limestone shall be applied at the rate of 4,000 pounds per acre. Crushed marl lime shall be applied at the rate of 4,000 pounds per acre.

6.3.3 All fertilizers and ground limestone shall be incorporated into the soil to a depth of at least 4 inches and may be incorporated as part of the tillage operations hereinbefore specified. Immediately before seeding, the soil shall be restored to an even condition.

7. APPLICATION

7.1 Seeding:

7.1.1 Broadcast seeding: Seed shall be broadcast either by hand crank seeders or with approved hydraulic seeding equipment, as specified hereinbefore, in combination with fertilizer, or with the approved hydraulic seeding equipment in combination with fiber mulch and fertilizer as specified hereinbefore, or with other approved sowing equipment. Seed shall be distributed uniformly over designated areas. Half of seed shall be sown with

sower moving in one direction, and the remainder with sower moving right angle to first sowing. Seed shall be covered to an average depth of 1/4 inch by brush harrow, spike-tooth harrow, chain harrow, cultipacker, hand rake with wood tines, or other approved device. Seed shall not be broadcast during windy weather.

7.1.2 Seeding rates:

Special Urban Seed Mixes

March thru June

Bermudagrass (Hulled)	20 lbs. per acre
Kobe Lespedeza	45 lbs. per acre

July and August

Bermudagrass (Hulled)	20 lbs. per acre
Reseeding Crimson Clover	60 lbs. per acre

September thru December

Bermudagrass (Unhulled)	30 lbs. per acre
Reseeding Crimson Clover	60 lbs. per acre

January and February

Bermudagrass (Unhulled)	30 lbs. per acre
Reseeding Crimson Clove	40 lbs. per acre
Kobe Lespedeza	45 lbs. per acre

7.1.3 Mulch shall be spread uniformly in a continuous blanket, using 2 tons per acre. Mulch shall be spread by hand or by a manure spreader, a modified grain combine with straw-spreader attachment, or a blower-type mulch spreader. Mulching shall be started at the windward side and continued uniformly until the area is covered. The mulch shall not be bunched. Immediately following spreading, the mulch shall be anchored to the soil by a V-type-wheel land packer, a scalloped-disk land packer designed to force mulch into the soil surface, or other suitable equipment.

7.2 Watering: Watering shall be required as necessary to obtain a suitable stand of grass.

7.3 Restoration and clean-up: Excess and waste material shall be removed daily. When turfing in an area that has been completed, the areas shall be cleaned of all debris and excess material. Where existing turf areas have been damaged during turfing operations, the contractor shall restore the areas to their original condition at his expense.

END OF SECTION

SECTION 0500

WATER LINES AND APPURTENANCES

1. SCOPE

This section shall include the work, materials, and construction of all piping, valves, and appurtenances required for the water main construction to be constructed by a developer or other party and turned over to South Alabama Utilities for operation and maintenance.

2. MANUFACTURER DATA AND RECOMMENDATIONS

The contractor shall *submit the Certificate of Compliance for materials prepared by the supplier to South Alabama Utilities.*

3. MATERIALS

Material shall conform to the respective specifications and their requirements specified below:

3.1 Polyvinyl Chloride (PVC) pipe: Polyvinyl chloride pipe shall be designed in accordance with ASTM D1784 for Rigid Polyvinyl Chloride Compounds and ASTM D2241-65 for Polyvinyl Chloride Plastic Pipe SDR-21 (200 psi) with integral thickness wall bells. Gaskets shall be in accordance with ASTM F477. All pipe must meet requirements as set forth in Commercial Standard CS256-63 with Standard Foundation Seal for potable water pipe. Provisions must be made for contraction and expansion at each joint with a rubber ring and integral bell as part of each joint. Pipe and fittings must be assembled with a non-toxic lubricant. Pipe lengths shall be 20 feet.

3.2 Ductile Iron Pipe:

3.2.1 Buried below ground piping: All below ground piping shall be ductile iron mechanical joint water piping, thickness Class 350 meeting the requirements of ANSI/AWWA C150/A21.50 and C111/A21.11. Through encasement pipe or beneath paved areas, piping shall be mechanical joint or field lock type gasket for push-on joint. Below streambeds or as directed, piping shall be mechanical joint with retainer glands and set-screws or Clow "Super-Lock Joint" restrained joint pipe.

3.3 High Density Polyethylene (HDPE) Pipe 4" to 10" Diameter: Pipe shall be a PE 3408 high density very high molecular weight pipe having a cell classification of PE 345544C in accordance with ASTM D3350. Pipe shall be SDR 9 supplied in minimum 40-foot

lengths. Dimensions and workmanship shall be in accord with ASTM F714. Pipe shall be approved by ADEM and have NSF approval for potable water service. Pipe shall be black and have a continuous blue stripe painted on the surface identifying the pipe as carrying potable water. Special transition couplings/fittings and concrete anchorage shall be supplied with the pipe as indicated on the attached drawings. **Consult South Alabama Utilities for continuous main line runs exceeding 500 feet.** The following sizes shall be required for HDPE pipe runs exceeding 500 feet in length:

<u>Water Main Size</u>	<u>Required HDPE Pipe Size</u>
8"	10"
6"	8"
3"	4"

3.4 Fittings:

3.4.1 Buried below ground fittings: All below ground fittings shall be cast or ductile iron mechanical joint fittings rated for 250 psi working pressure meeting the requirements of ANSI/AWWA C110/A21.10 and C111/A21.11. Compact fittings may be used unless otherwise directed by the Board. Transition sleeves and other fittings shall also be ductile iron and be provided with all components required to complete the construction. At all fitting joints, restrained joint type retainer glands shall be as detailed by the attached drawings.

3.5 Detection wire: Detection wire shall be an insulated *solid* 12 gage copper wire with blue insulation for open cut installation; 10 gage for directionally bored installation.

3.6 Pipe and fitting lining: All ductile or cast iron pipe and fittings shall be cement lined as required by ANSI/AWWA C104/A21.4.

3.7 Gate valves: Above ground gate valves shall be AWWA approved NRS, iron body bronze mounted, "resilient wedge", with joint ends and with a 2-inch square operating nut, rated for a 200 psi non-shock cold water working pressure and 400 psi hydrostatic test pressure. Valves shall be Clow or equal.

All valves on which the operating nut is greater than two (2) feet below the normal ground or street surface shall be provided with extension stems to bring the operating nut to within two feet of the finished grade. The extension stem shall be provided with a 2-inch square operating nut on top and a coupling to connect the extension to the operating nut of the valve stem extension concentric with the valve box. Extension stems shall be of the same diameter as the valve stem unless otherwise specified.

Cast iron valve boxes shall be provided for all valves installed underground and shall consist of a base covering the operation nut and head of the valve, a vertical shaft at least 5-1/4 inches in diameter, and a top section extending to a point even with the finished ground surface, provided with a cast iron cover marked "WATER", and placed concentrically over the operating nut. A pre-cast concrete valve box collar shall be provided as indicated by the attached drawing.

3.8 Hydrants and flush stations:

3.8.1 "Main Line" hydrants: Hydrants shall be the improved AWWA Compression Type (traffic model) with 5-1/4 inch valve opening, one 4-1/2 inch and two 2-1/2 inch hose connectors manufactured by M&H, Mueller, American, Clow, or Board-approved equal. The fire hydrants shall have a minimum bury of 42 inches with mechanical joint inlet. Extension shall be included if required. All hydrants shall have a hydrant valve.

3.8.2 "Flush" hydrants: Hydrants shall be non-freezing type with one 2-1/2 inch nozzle for 42-inch bury manufactured by M&H, Eclipse, or Mueller. Inlet shall be for 3-inch mechanical joint with retainer gland and have 2-1/4 inch main valve opening. Extension shall be included if required.

3.8.3 "Flush" stations: Flush stations shall be non-freezing type with cast iron box and traffic cover and having one 2-1/2 inch nozzle for 42-inch bury manufactured by M&H, Eclipse, or Mueller. Inlet shall be for 3-inch mechanical joint with retainer gland and have 2-1/4 inch main valve opening.

3.8.4 All hydrants shall receive a shop coat of primer and one coat of polyurethane paint applied by the manufacturer. The paint shall be red in color. A significant quantity of red and white paint shall be provided with each hydrant to complete the required field painting.

3.9 Miscellaneous:

3.9.1 Pressure gauge: Gauges shall be 4-inch diameter of the direct-reading type, equipped with a shut-off cock. The pressure gauge shall have an iron body, and shall be calibrated in pounds per square inch in not more than 2-pound increments from zero to 150 psi (unless otherwise directed) with an accuracy of reading within one pound of the correct reading. A galvanized steel pipe with shut-off valve shall connect the pressure gauge to the main. Valve shall be protected with a shut-off valve and "snubber" to protect against pressure surge.

3.9.2 Steel pipe and fittings: Galvanized steel pipe shall conform to ASTM Standard A 120, standard weight. Steel fittings

shall be galvanized. Screwed fittings shall conform to ANSI Standard B16.3.

3.9.3 Water meter boxes: All water service meter boxes shall be plastic with cast iron cover with galvanized steel rod, hinged case and iron reading lid. The cover shall be entirely removable to provide full access to the meter. Slots for service pipe shall be provided at the ends of the box. Meter boxes shall be rectangular in cross section and shall measure not less than 10 inches by 20 inches inside at the bottom. Outside walls of meter boxes shall be tapered from top to bottom. All corners shall be rounded and all edges beveled.

3.9.4 Corporation stops, curb stops, and tapping saddles: Corporation stops shall be Ford, Mueller, or Board-approved equal, sized for copper tubing size outside diameter tubing outlet. Tapping saddles shall be service clamp type construction. Curb stop shall be the Angle Meter Valve style. Tapping saddles and curb stops shall be Ford, Mueller, or Board-approved equal.

3.9.5 Backflow preventer valve shall be ASSE approved double check valve; Ford, Mueller, or Board-approved equal.

3.9.6 Water service pipe: *When crossing cul-de-sacs or other locations deemed necessary by the Board, service tubing shall be Type "K" copper water tubing. At other locations, service tubing shall be SDR 9 High Density Polyethylene meeting the requirements of AWWA C901 with NSF approval. High density polyethylene tubing shall be Plexco Blue Strip, Drisco Pipe, or Board-approved equal.*

3.9.7 Waterline encasement pipe: Encasement pipe for boring shall be welded steel pipe meeting ASTM A-252, Grade 2. Pipe shall receive a factory (shop) applied coal tar epoxy coating outside. A wall thickness of 0.25 inches shall be required for all encasement pipe.

3.9.8 Tapping sleeves and valves: Main line tapping sleeves and valves shall be Ford style "Fast" or Board-approved equal.

3.9.9 Pipe backfill material (borrow): Backfill, where required to backfill waterline trenches where excavated materials are not suitable for backfill material, shall be suitable non-cohesive soil, soil aggregate, or aggregate materials which can be utilized to backfill the pipeline trench. Material shall be readily compatible with the maximum aggregate size of 3/4" diameter. When placed below the water table, material shall have less than 15 percent passing the #200 sieve and shall meet the requirements of underwater backfill as detailed by the Alabama Department of Transportation "Standard Specifications for Highway Construction", 2002 Edition, hereinafter abbreviated ALDOT.

3.9.10 Foundation backfill: Foundation backfill material shall be approved gravel or crushed stone materials meeting the gradation requirements for ALDOT coarse aggregate size #4.

3.11 Disinfection: Chlorinating materials shall conform to the following:

Chlorine, Liquid: AWWA B301

Hypochlorite, Calcium and Sodium: AWWA B300

4. CONSTRUCTION REQUIREMENTS

4.1 Trench excavation and backfill:

4.1.1 General: Clearing and grubbing shall be as required for construction of the pipe line; however, not less than 10 feet in width. Topsoil, organic matter, and vegetation shall be stripped and stockpiled beyond the cleared area.

Trenches shall be backfilled as soon as possible after the pipe has been laid and has been inspected by the Owner.

The excavation of trenches shall be properly sheathed and braced in accordance with OSHA specifications, as now exist. Such sheathing or bracing shall be so arranged as not to place any stress on any portion of the work until the general construction thereof has proceeded far enough to provide ample strength. Any damage occurring to structures due to failure or lack of sheathing, or due to water or earth pressures, floating, slides, cave-ins, or other causes, or due to negligence or fault of the contractor, shall be repaired by the contractor at his own expense.

The contractor shall, at all times during construction, provide and maintain adequate means to promptly remove and dispose of all water entering the excavation, and shall keep the excavation sufficiently dry to satisfactorily complete the work. Such water shall be disposed of in a suitable manner without damage to adjacent property.

The trench, unless otherwise specified, shall have a flat bottom conforming to the grade to which the pipe is to be laid. The pipe shall be laid upon sound soil cut true and even so that the barrel of the pipe will have a bearing for its full length. All excavated materials that are left over from construction or are otherwise unsuitable for backfill shall be removed from the site by the contractor.

Adequate provisions shall be made for the flow of sewers, drains, and water courses encountered during construction, and the

structures which may have been disturbed shall be satisfactorily restored upon completion of the work.

Excavation for pipe laying operations shall be conducted in a manner to cause the least interruption to traffic. Where traffic must cross open trenches, the contractor shall provide suitable bridges at street intersections and driveways. Hydrants under pressure, valve boxes, curb stop boxes, or other utility controls shall be left unobstructed and accessible during the construction period.

Trees, fences, poles, and all other property shall be protected unless their removal is authorized, and any property damage shall be satisfactorily restored by the contractor.

To protect persons from injury and to avoid property damage, adequate barricades, construction signs, lighting, and flag personnel as required shall be placed and maintained during the progress of the construction work and until it is safe for traffic to use the trenched highway. Rules and regulations of the local authorities respecting safety provisions shall be observed.

The contractor shall cooperate with the local utility in repairs and maintaining continuous service. The repair of damaged utility facilities shall be paid for by the contractor.

4.1.2 Encased crossings of roads: At locations shown on the plans, the contractor shall construct a bored undercrossing. At crossing locations, installation of smooth wall new steel pipe shall be installed by suitable equipment providing a mechanically augered bore followed immediately by the casing pipe, without the use of water at any time during the work, to produce firm and continuous contact with the unremoved earth in the highway subgrade or fill. Minimum cover over casing pipe shall be not less than 4 feet, but shall be as required by the permit drawings. Access pits, head and tail ditches shall be protected by sheeting and bracing as required to provide safe working conditions during progress of job.

4.2 Laying of pipe: The bedding for each piece of pipe shall be shaped either by trimming the bottom of the trench or by filling select earth therein and tamping it so that each piece of pipe shall have uniform bearing. The pipe shall be laid in a workmanlike manner and must be laid to a straight line and grade indicated by the drawings without kinks or sags in the line. Each piece of pipe shall be swabbed out to insure its being clean just before it is lowered into the trench. Water present in the excavation shall not be allowed to enter the pipe. Great care shall be taken to prevent the pipe or special casting from being injured. No pipe or special casting known to be defective shall be placed or laid in any line. If any defective pipe or special

casting should be discovered after laying, it shall be removed and replaced without extra cost to the Owner. Whenever a length of pipe requires cutting to fit in the line, it shall be done in a manner that will leave a smooth end at a right angle to the axis of the bore.

All angles or bends in the pipeline shall be securely braced against movement by placing restrained type joints and by construction of concrete thrust blocks. All pipe shall be laid in accordance with the pipe manufacturer's requirements. Open ends of the unfinished pipe shall be securely plugged or closed when the work is left temporarily at night or at other times.

4.3 Detection wire *and tape*: Detection wire will be placed in the trench with the pipe after the initial backfill, such that there is 12" to 18" of soil between the pipe and detection wire. Detection wire will be spliced with "gel nuts". Detection wire shall be looped up into valve boxes and tied off and looped through hydrant runs and reaches of ductile iron pipe. Where pipe is directionally bored, the wire shall be taped to the pipe. Detection wire shall be placed with main line and service tubing. *Wire shall be terminated in the meter box for long side services. Detection tape shall be placed 12" to 18" below finish grade in the pipe trench line.*

4.4 Pipe clearance in rocks or unyielding materials: Ledge rock, boulders, and large stones shall be removed to provide a clearance of at least 6 inches below and 9 inches on each side of all pipe, valves, and fittings. The specified minimum clearances are the minimum clear distances which will be permitted between any part of the pipe and appurtenances being laid and any part, projection, or point of such rock, boulder, or stone.

4.5 Subgrade in rock trenches: Where excavation is made in rock or boulders and the specified clearance is provided, the subgrade shall be made by backfilling with an approved material in 6 inch layers, uncompacted. The layers shall be thoroughly tamped as directed by the Engineer so as to provide a uniform and continuous bearing and support for the pipe at every point between bell holes, except that it will be permissible to disturb and otherwise damage the finished surface over a maximum length of 18 inches near the middle of each pipe length by the withdrawal of pipe slings or other lifting tackle. The finished subgrade shall be prepared accurately with hand tools.

4.6 Excavation in poor soil and refilling to grade: Where the bottom of the trench at subgrade is found to be unstable or to include ashes, cinders, all types of refuse, vegetable or other organic material, or large pieces or fragments of inorganic material which in the judgment of the Engineer should be removed, the contractor shall excavate and remove such unsuitable material to the width and depth ordered by the Engineer. Before the pipe

is laid, the subgrade shall be made by backfilling with an approved material in 6-inch uncompacted layers. The layers shall be thoroughly tamped as directed by the Engineer so as to provide a uniform and continuous bearing and support for the pipe at every point between bell holes, except that it will be permissible to disturb and otherwise damage the finished surface over a maximum length of 18 inches near the middle of each length of pipe by the withdrawal of pipe slings and other lifting tackle.

4.7 Compaction of trench backfill: Water lines in other areas shall be backfilled and compacted by methods acceptable to the Engineer which will produce in-place densities comparable to the surrounding soils and will not produce excessive erosion or settlement during the construction period. The backfill and compaction will allow for the proper placement of the detector tape and other water line appurtenances. Prior to final acceptance, all excavations and trenchlines shall be graded level with surrounding soils and be free from settlement. In the event compaction does not meet the minimum standard set forth herein, the contractor shall immediately take the necessary steps to bring the backfill up to the minimum requirements.

4.8 Setting valves and fittings: All valves and fittings shall be properly secured by use of mega lugs, anchoring type fittings, and/or concrete thrust blocks sized and constructed in accordance with the drawings. Where concrete is placed, the fittings or valve shall be protected from direct contact with the concrete by 6 mil polyethylene sheeting.

Cast iron valve boxes shall be firmly supported and maintained centered and plumb over the wrench nut of the gate valve, with box cover flush with the surface of the finished pavement or at such other level as may be directed. Concrete pads shall be constructed as detailed by the plans.

4.9 Setting hydrants: Hydrants and flush hydrants shall be located in a manner to provide complete accessibility and in such a manner that the possibility of damage from vehicles or injury to pedestrians will be minimized. All hydrants shall stand plumb and shall have their nozzles parallel with the roadway. They shall conform to the established grade, with nozzles at least 12 inches above the ground. Extensions shall be provided as necessary and the drainage pit shall be constructed as indicated by the drawings. In no case shall the waste opening be obstructed from free drainage.

Hydrants shall receive two field coats of paint after installation. The paint shall match the type coating applied by the manufacturer. The hydrant body shall be red in color with the bonnet and nozzle cap(s) white.

4.10 Installation of customer service tubing, meters, and appurtenances: All service tubing shall be installed in strict accordance with the manufacturer's standard specifications and ASTM Specification D-2321. Service line or tubing shall be installed with a minimum of 36" of cover at all points. *To the greatest extent possible, service lines shall be oriented at a right angle to the roadway center line.* Where rock or angular rock material is encountered, the tubing shall be bedded in compacted fine selected soil, 6 inches above and below the tubing before any other soil is added. No rocks or other sharp materials shall be placed in the trench. Service tubing shall be bored beneath existing paved roads. No splices of service tubing or service taps will be allowed beneath paved roads or the traveled way of dirt roads where pavement may be constructed in the future. Valves on corporation stops and curb and similar appurtenances shall be pointed upward. All threaded pipe joints shall be cleaned, taped, and otherwise made up to insure a watertight connection in strict accordance with the manufacturer's recommendation. Meter boxes shall be firmly supported and maintained centered and plumb over the new meter with box cover set flush with the surface of adjacent materials or at such other level as may be directed.

A 6-foot long treated wood 4" x 4" marking post painted blue shall be set on the customer's side of the meter box. (*Landscape timbers or metal fence post are also acceptable.*)

5. PRESSURE TESTS AND PERMISSIBLE LEAKING

All pipe, including service pipe, shall be hydrostatically tested at a pressure of 150 psi for a minimum duration of 6 hours. Testing shall not be commenced after 12:00 noon. Pipe shall not be tested until all services are in place and all other utility construction in the subdivision is complete. Sections of water main shall be tested in lengths not to exceed 2,000 feet. Temporary plugs, blocking, taps, and other items shall be provided as required to accomplish this requirement.

The contractor must contact Brian Robinson or Speaks & Associates to schedule the test. Speaks & Associates' inspector must be present for start and completion of test. Suitable means shall be provided by the contractor for determining the quantity of water lost by leakage under normal operating pressure. No pipe installation will be accepted until or unless this leakage (evaluated on a pressure basis of 150 psi) is less than 10 U.S. gallons per 24 hours per mile of pipe per inch nominal diameter of pipe. All visible or detectable leakage shall be repaired. *Contractor must make sure all service taps have been completed prior to pressure testing.*

Should any test of combined sections of pipe laid disclose leakage per mile of pipe greater than that specified, or if individual sections show leakage greater than the specified limit, the contractor shall, at his own expense, locate and repair the defective joints until the leakage is within the specified allowance.

Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valued section of it, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled.

Pipe may be subjected to hydrostatic pressure, inspected, and tested for leakage at any convenient time after partial completion of backfill and installation of services is completed.

All other utilities must be present prior to pressure test being conducted.

A record of all tests shall be made with the use of a pressure recording gauge provided by the contractor. The contractor shall provide all other taps, connections, valves, and piping required for connection of the recording gauge. The contractor will provide all temporary valves, plugs, or other material, labor, and equipment as required to complete the testing in accordance with the contract documents for the work under his contract.

6. CHLORINATION OF INSTALLED PIPE

After pressure tests have been made, all pipe shall be thoroughly flushed with water until all entrained dirt and foreign matter have been removed before introducing the chlorinating material. The chlorinating material shall be either liquid chlorine or hypochlorite and shall provide a dosage of not less than 50 parts per million and shall be introduced into the waterlines in an approved manner. The retention time shall be 24 hours and shall produce not less than 10 ppm of chlorine at the extreme ends of the lines at the end of the retention period. The line shall then be flushed with clean water until the residual chlorine is reduced to less than 1.0 ppm. During the flushing period, each valve shall be closed and opened several times. *When flushing is completed, valves to new system must be closed and the new lines isolated from the existing distribution system. The contractor for the new lines shall bear full responsibility for all damages due to contamination of existing potable water lines.*

The contractor shall draw samples of water from each dead-end main for bacteriological examination by the Alabama Department of Public Health. All samples must gain acceptance of the Health Department. Should any sample indicate four or more coliform per

100 ml., it shall be judged contaminated and corrective work shall be done.

7. FINAL DRESS-UP

Upon completion of all construction of new water lines, the trench lines shall be redressed and flush with adjacent surfaces.

END OF SECTION

SECTION 0600

EFFLUENT SEWER LINES AND APPURTENANCES

1. SCOPE

This section shall include the work, materials, and construction of all effluent sewer piping, valves, and appurtenances required for effluent sewer main construction.

2. MANUFACTURER DATA AND RECOMMENDATIONS

The Contractor shall *provide the Certificate of Compliance for materials from the supplier.*

3. MATERIALS

Materials shall conform to the respective specifications and their requirements specified below:

3.1 Mains: High Density Polyethylene (HDPE) Pipe 2" to 6" Diameter. Pipe shall be a PE 3408 high density very high molecular weight pipe having a cell classification of PE 345544C in accordance with ASTM D3350. Pipe shall be DR 11, black, supplied in 40-foot lengths or on spools acceptable to the manufacturer. Pipe on spools must be straightened to allow proper placement in the pipe trench. Dimensions and workmanship shall be in accordance with ASTM F714. Special transition couplings/fittings and concrete anchorage shall be supplied with the pipe as indicated on the attached drawings. Consult South Alabama Utilities for sizing recommendations of all mains. *Couplings must be electro-fused couplings or butt-fused by certified personnel approved by the Board.*

3.2 Fittings: All fittings shall be H.D.P.E. with fuse joints. Transition sleeves and other fittings shall be ductile iron and be provided with all components required to complete the construction. At all fitting joints, restrained joint retainer glands shall be as detailed by the attached drawings.

3.3 Detection wire: Detection wire shall be an insulated *solid* 12 gage copper wire with green insulation for open-cut installation; 10 gage for directionally drilled installation.

3.4 Gate valves: Below ground gate valves shall be AWWA approved NRS, iron body bronze mounted, "resilient wedge", with joint ends and with a 2-inch square operating nut, rated for a 200 psi non-shock cold water pressure and 400 psi hydrostatic

test pressure. Valves shall be Clow or equal, or approved polyvalve (1/4 turn).

All valves on which the operating nut is greater than two (2) feet below the normal ground or street surface shall be provided with extension stems to bring the operating nut to within two feet of the finished grade. The extension stem shall be provided with a 2-inch square operating nut on top and a coupling to connect the extension to the operating nut of the valve stem extension concentric with the valve box. Extension stems shall be of the same diameter as the valve stem unless otherwise specified.

Cast iron valve boxes shall be provided for all valves installed underground and shall consist of a base covering the operation nut and head of the valve, a vertical shaft at least 5-1/4 inches in diameter, and a top section extending to a point even with the finished ground surface, provided with a cast iron cover marked "SEWER", and placed concentrically over the operating nut. A pre-cast concrete valve box collar shall be provided as indicated by the attached drawing.

3.5 Air release valves: Air release valves will be as indicated on the drawings. Each air release valve shall include a corrosion resistant enclosure that is equipped with an activated carbon filter.

3.6 Check valves:

3.6.1 Check valves used on main lines shall be constructed with a ductile iron body and bonnet designed for buried service. The valves shall be rated for 250 p.s.i.g. pressures and be drip-tight at pressures above 5 p.s.i.g. The valves shall be American Flow Control Series 2100 RSCV1 or Board-approved equal.

3.6.2 Check valves used on service lines will be a PVC tee or wye pattern swing check valve. It shall have a working pressure of 150 psi and shall be designed for use with corrosive fluids.

3.7 Valve box: Cast iron valve boxes shall be provided for all valves installed and shall consist of a base covering the valve, a vertical shaft at least 5-1/4 inches in diameter, and a top section extending to a point even with the finished ground surface, provided with a cast iron cover marked "SEWER". A precast concrete valve box collar shall be furnished with each valve.

3.8 Tapping tees: Tapping tees shall be electrofusion type, Frialen DAA High Pressure Tapping Tee or Board-approved equal.

3.9 Sewer service pipe: Service tubing shall be SDR 9 High Density Polyethylene service tubing meeting the requirements of AWWA C901. Pipe shall be Drisco Pipe, Endopoly, or a Board-approved equal.

3.10 Pipe backfill material (borrow): Backfill, where required to backfill sewerline trenches where excavated materials are not suitable for backfill material, shall be suitable non-cohesive soil, soil aggregate, or aggregate materials which can be utilized to backfill the pipeline trench. Material shall be readily compatible with the maximum aggregate size of 3/4" diameter. When placed below the water table, material shall have less than 15 percent passing the #200 sieve and shall meet the requirements of underwater backfill as detailed by the Alabama Department of Transportation "Standard Specifications for Highway Construction", 2002 Edition, hereinafter abbreviated ALDOT.

3.11 Foundation backfill: Foundation backfill material shall be approved gravel or crushed stone materials meeting the gradation requirements for ALDOT coarse aggregate size #4.

4. CONSTRUCTION REQUIREMENTS

4.1 Trench excavation and backfill:

4.1.1 General: Clearing and grubbing shall be as required for construction of the pipeline and appurtenances; however, not less than 10 feet in width. Topsoil, organic matter, and vegetation shall be stripped and stockpiled beyond the cleared area.

Trenches shall be backfilled as soon as possible after the pipe has been laid and has been inspected by the Owner. The Owner reserves the right to limit the amount of trench that will be opened ahead of the pipe laying operation.

The excavation of trenches shall be properly sheathed and braced in accordance with OSHA specifications, as now exist. Such sheathing or bracing shall be so arranged as not to place any stress on any portion of the work until the general construction thereof has proceeded far enough to provide ample strength. Any damage occurring to structures due to failure or lack of sheathing, or due to water or earth pressures, floating, slides, cave-ins, or other causes, or due to negligence or fault of the contractor, shall be repaired by the contractor at his own expense.

The contractor shall, at all times during construction, provide and maintain adequate means to promptly remove and dispose of all water entering the excavation, and shall keep the excavation sufficiently dry to satisfactorily complete the work. Such water

shall be disposed of in a suitable manner without damage to adjacent property.

The trench, unless otherwise specified, shall have a flat bottom, conforming to the grade to which the pipe is to be laid. The pipe shall be laid upon sound soil cut true and even so that the barrel of the pipe will have a bearing for its full length. All excavated materials that are left over from construction or are otherwise unsuitable for backfill shall be removed from the site by the contractor.

Adequate provisions shall be made for the flow of sewers, drains, and water courses encountered during construction, and the structures which may have been disturbed shall be satisfactorily restored upon completion of the work.

Excavation for pipe laying operations shall be conducted in a manner to cause the least interruption to traffic. Where traffic must cross open trenches, the contractor shall provide suitable bridges at street intersections and driveways. Hydrants under pressure, valve boxes, curb stop boxes, or other utility controls shall be left unobstructed and accessible during the construction period.

Trees, fences, poles, and all other property shall be protected unless their removal is authorized and any property damage shall be satisfactorily restored by the contractor.

To protect persons from injury and to avoid property damage, adequate barricades, construction signs, lighting, and flag personnel as required shall be placed and maintained during the progress of the construction work and until it is safe for traffic to use the trenched highway. Rules and regulations of the local authorities respecting safety provisions shall be observed.

The contractor shall cooperate with the local utility in repairs and maintaining continuous service. The repair of damaged utility facilities shall be paid for by the contractor.

4.2 Detection wire *and tape*: Detection wire will be placed in the trench with the pipe after the initial backfill such that there is 12" to 18" of soil between the pipe and detection wire. Detection wire will be spliced with "gel nuts" or other acceptable manufactured splicing devices suitable for underground splices. Detection wire shall be looped up into valve boxes and tied off. Where pipe is directionally bored, the wire shall be taped to the pipe. Detection wire shall be placed with main line and service tubing or lines. *Detection tape shall be placed 12" to 18" below finish grade in the pipe trenchline.*

4.3 Excavation in poor soil and refilling to grade: Where the bottom of the trench at subgrade is found to be unstable or to include ashes, cinders, all types of refuse, vegetable or other organic material, or larges pieces or fragments of inorganic material which in the judgment of the Board should be removed, the contractor shall excavate and remove such unsuitable material to the width and depth ordered by the Board. Before the pipe is laid, the subgrade shall be made by backfilling with an approved material in 6-inch uncompacted layers. The layers shall be thoroughly tamped as directed by the Board so as to provide a uniform and continuous bearing and support for the pipe at every point between bell holes, except that it will be permissible to disturb and otherwise damage the finished surface over a maximum length of 18 inches near the middle of each length of pipe by the withdrawal of pipe slings or other lifting tackle. The finished subgrade shall be prepared accurately by means of hand tools.

4.4 Setting valves and boxes: Cast iron valve boxes shall be firmly supported and maintained centered and plumb over the valve, with box cover flush with the surface of the finished pavement or at such other level as may be directed. Concrete pads shall be constructed as detailed by the plans.

4.5 Installation of customer service pipe and appurtenances: All service pipe shall be installed in strict accordance with the manufacturer's standard specifications. Service line or tubing shall be installed with a minimum of 48" of cover at all points. *To the greatest extent possible, service lines shall be oriented at a right angle to the roadway center line.* Where rock or angular rock material is encountered, the tubing shall be bedded in compacted fine selected soil, 6 inches above and below the tubing before any other soil is added. No rocks or other sharp materials shall be placed in the trench. Service pipe shall be bored beneath paved roads. No splices will be allowed beneath paved roads or the traveled way of dirt roads where pavement may be constructed in the future. All splice points shall be approved by the Board representative. Valves and similar appurtenances shall be pointed upward. The locations for all services shall be field staked for review prior to placing and shall be placed as approved by the Board.

A 6-foot long treated wood 4" x 4" marking post painted green shall be set at the end of the service stub-out. (*Landscape timbers or metal fence post are also acceptable.*)

5. PRESSURE TESTS AND PERMISSIBLE LEAKING

All pipe, including service pipe, shall be hydrostatically tested at a pressure of 120 psi for a minimum duration of 6 hours. Testing shall not be commenced after 12:00 noon. Pipe shall not be tested until all services are in place and all other utility

construction in the subdivision is complete. Sections of sewer main shall be tested in lengths not to exceed 2,000 feet. Temporary plugs, blocking, taps, and other items shall be provided as required to accomplish this requirement.

All other underground utilities must be in place prior to conducting the pressure test.

The contractor must contact Brian Robinson or Speaks & Associates to schedule the test. Speaks & Associates' inspector must be present for start and completion of test.

Suitable means shall be provided by the contractor for determining the quantity of water lost by leakage under normal operating pressure. No pipe installation will be accepted until or unless this leakage (evaluated on a pressure basis of 120 psi) is less than 10 U.S. gallons per 24 hours per mile of pipe per inch nominal diameter of pipe. All visible leakage shall be repaired.

Should any test of combined sections of pipe laid disclose leakage per mile of pipe greater than that specified, or if individual sections show leakage greater than the specified limit, the contractor shall, at his own expense, locate and repair the defective joints until the leakage is within the specified allowance.

Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valued section of it, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled.

Pipe may be subjected to hydrostatic pressure, inspected, and tested for leakage at any convenient time after partial completion of backfill and installation of services is completed.

A record of all tests shall be made with the use of a pressure recording gauge provided by the contractor. The contractor shall provide all other taps, connections, valves, and piping required for connection of the recording gauge. The contractor will provide all temporary valves, plugs, or other material, labor, and equipment as required to complete the testing in accordance with the contract documents for the work under his contract.

6. FINAL DRESS-UP

Upon completion of all construction of new sewer lines, the trench lines shall be redressed and flush with adjacent surfaces.

END OF SECTION

SECTION 0650

CONCRETE INTERCEPTOR TANKS AND EFFLUENT PUMP SYSTEM

1. SCOPE

This section shall cover the construction of concrete interceptor (septic) tanks and pumping systems for residential and small commercial establishments utilizing 1000 to 3000 gallon tanks.

2. PRIMARY INTERCEPTOR TANK ACCESSORIES

Watertight risers with grommets for electrical and plumbing access and a latchable lid with gasket shall be provided to permit easy access to the equipment for maintenance and simplifying pumping of the primary screened effluent. Two (2) risers are required for all tanks.

3. MATERIALS

The watertight interceptor tanks shall be constructed of concrete which meets the requirements detailed herein and the Mobile County Public Health Department.

4. TANK DESIGN AND CONSTRUCTION

4.1 In areas where burial depth is greater than four feet or where traffic or other loading is expected, additional support may be necessary.

4.2 The interceptor tank top design 400 lbs/ft² loading.

4.3 Lateral load shall be a minimum of 62.4 lbs/ft³.

4.4 The interceptor tank shall be capable of withstanding long-term hydrostatic loading, in addition to soil loading, due to a water table maintained at ground surface.

4.5 Allowable Soil Bearing Value: 1,500 lbs/ft².

4.6 Tanks shall be guaranteed by the tank manufacturer for a period of 12 months from the date of installation.

4.7 Tanks shall successfully withstand an above-ground static hydraulic test with zero leakage.

4.8 Tanks shall be installed in strict accordance with the manufacturer's instructions.

4.9 Inlet plumbing shall penetrate 18 inches into the liquid from the inlet flow line.

5. CONCRETE CONSTRUCTION GUIDELINES

The walls, bottom, and top of the reinforced-concrete tanks shall be designed spanning the shortest dimension using one-way slab analysis. Stresses in each face of monolithically-constructed tanks are determined by analyzing the tank cross-section as a continuous fixed frame.

The walls and bottom slab shall be required to be poured monolithically. The top slab must be poured on the walls with wall reinforcement extending into the top slab.

The method of connecting the top of the walls of the tank is critical to the structural strength of the tank. Casting the top in place with the bottom and sides of the tank is required.

The concrete shall achieve a minimum compressive strength of 4,000 psi in 28 days. The design of the concrete mix will depend on the gradation of the aggregate and should be determined by a professional engineer. The mix design shall provide for a cement content of 6.5 sacks per yd³ and maximum aggregate size of 3/4 inch.

A water to cement ratio of approximately 0.35 shall be maintained. Fiber additives may be used to enhance watertightness by controlling concrete shrinkage. A protective sealant such as "Thoroseal" shall be used inside and out. The manufacturer's directions for the sealant shall be adhered to at all times.

Form release shall be Nox-Crete or equal. Diesel or other petroleum products are not acceptable.

Tank molds must have attached vibrators to ensure adequate flow of concrete down the walls and across the bottom. Excess vibration will, however, cause aggregate to segregate. Proper curing techniques are necessary to ensure watertight tanks. Tanks shall not be moved until they have cured for seven days or have reached two-thirds of the design strength.

Test cylinders must be taken from each batch of concrete and tested until the minimum compression strength has been obtained.

Reinforcing steel shall be grade 60, yield strength 60,000 psi. Size and placement must be determined by a licensed structural engineer. Wire fabric is not acceptable.

6. TESTING GUIDELINES

Follow the following test procedures to ensure water-tightness. Every tank should be tested at the factory and a certification form shall be attached at the time of delivery.

6.1 Fill the tank to its brim with water and let it stand for 24 hours. To expedite larger orders a vacuum test may be substituted at the factory, and again after the tanks have been delivered to the job site. A vacuum test may not, however, take the place of the final installed static water test.

6.2 Measure the water loss. If there is no water loss during these first 24 hours, the tank is acceptable for installation. Some water absorption, however, may occur during this first time period. If so, refill the tank and determine any exfiltration by measuring the water loss over the next two (2) hours. Any water loss is cause for rejection.

6.3 For field testing, install the tank and repeat steps 1 and 2. Test the seal between the riser and the tank top for water-tightness by filling the riser with water to a level 4" above the top brim of the tank. To prevent hydrostatic uplift damage to the top joint of the tank, do not allow the level of water in the riser to exceed the level of the backfill.

6.4 South Alabama Utilities reserves the right to conduct tests in the field, and should the tank not meet the test requirements, the tank will be repaired or replaced by the manufacturer.

7. PUMPING SYSTEMS AND EQUIPMENT

All pumping systems shall be supplied by a reputable supplier with at least five years of experience in supplying equipment for effluent sewer systems. References must be available on request from the Engineer. Systems shall be Orenco Systems®, Inc. High-Head Pumping Assemblies or an Engineer-approved equal.

8. TANK RISERS

Risers shall be required for access to internal vaults and access into the interceptor tanks for pumping of primary screened effluent. All risers shall be constructed watertight. The risers shall be attached to the tanks such that a watertight seal is provided. Risers shall extend three inches (3") above original grade to allow for settlement and to ensure a positive drainage away from the access. Risers for inspection ports shall be a minimum of 18 inches in nominal diameter. Risers containing pumping assemblies or electrical splice boxes shall be a minimum of 24 inches in diameter and shall be of sufficient diameter to

allow removal of internal vaults without removing splice boxes, etc. Risers shall be a minimum of 30 inches in nominal diameter when the depth of bury is 36 inches or greater. All other risers shall be a minimum of 24 inches in nominal diameter and shall vary in height depending on the depth of bury on the various tanks. Adhesive required to adhere the PVC or fiberglass risers to either fiberglass or ABS tank adapter shall be either a two-part epoxy, Model MA320 or equal, or a single component adhesive Model ADH100 or equal.

9. OUTLET RISERS

Outlet risers shall be ribbed PVC as manufactured by Orenco Systems®, Inc. or Engineer-approved equal. The material shall be PVC as per ASTM D-1784 and tested in accordance with AASHTO M304M-89. Risers shall be at least 12 inches high, shall have a minimum nominal diameter of 24 inches for simplex pumping applications, or 30 inches when used in a duplex application, and shall be factory-equipped with the following:

9.1 Electrical and Discharge Grommets: When applicable, Orenco Systems' EPDM grommets shall be installed by the manufacturer for discharge piping, vent piping, and/or the electrical conduit to assure a watertight seal. The grommets shall be installed at the factory by the manufacturer of the access risers.

9.2 Adhesive: When bonding to concrete or fiberglass grooves, a two-part epoxy, one pint required per 18-inch or 24-inch diameter riser and one quart required per 30-inch diameter riser, Model ADHP10 or ADHQ10, or equal shall be used. When bonding to a flanged riser tank adapter, either a two-part epoxy, Model MA320 or equal, or a single component adhesive Model ADH100 or equal shall be used.

10. RISER LIDS

10.1 One riser lid shall be furnished with each access riser. Riser lids shall be Orenco Systems®, Inc. Model FL21G, FL24-4B, FL30G, or Engineer-approved equal, as appropriate; fiberglass with green non-skid finish, and provided with stainless steel bolts and wrench. The riser and lid combination shall be gasketed and able to support a 2500 lb. wheel load. (Note: This is not to imply that PVC risers are intended for traffic areas.)

10.2 Traffic bearing lid: The traffic bearing lid shall be a cast iron frame and cover, part number 6024, 3060, 4036, as manufactured by Sather Manufacturing Co., Inc., or equal, which will fit over a standard lid. The cover shall have the word "SEWER" cast into it.

11. RISER INSTALLATION

Riser installation shall be accomplished according to the manufacturer's instructions.

12. SCREENED PUMP VAULT

Orenco Systems®, Inc. Model X4S1254-1819 (external flow inducer) Biotube® Pump Vault or Engineer-approved equal, installed in conformance with the Engineer's plans. The filter shall have a minimum effective screen area of no less than 16.8 square feet. (Note: Commercial and multiple-user tanks may require a larger or duplex Biotube® Pump Vault, the sizes of which must be individually determined and spelled out in the specifications.) The Biotube® Pump Vault shall consist of a 12-inch diameter, 54-inch deep PVC vault with eight (8) 1-3/8-inch diameter holes evenly spaced around the perimeter, located approximately to allow for maximum sludge and scum accumulation before requiring pumping (approximately 70% of minimum liquid level). Housed inside the PVC vault shall be the Biotube® assembly consisting of 1/8-inch mesh polypropylene tubes. Attached to the vault is a 4-inch diameter flow inducer to accept the high-head effluent pump.

13. DISCHARGE HOSE AND VALVE ASSEMBLY

Orenco Systems®, Inc. Model HV100BC, 1-inch diameter, 150 psi PVC ball valve, 150 psi PVC check valve, PVC flex hose with working pressure rating of 100 psi, and Schedule 40 PVC pipe. When pumping downhill, include anti-siphon assembly (Model HVAS100). Six gpm flow controllers (Model FC) are available, if necessary.

14. FLOAT SWITCH ASSEMBLY

Orenco Systems®, Inc. Model MFABT with three switch floats mounted on a PVC stem attached to the filter cartridge. The floats must be adjustable and must be removable without removing the pump vault. The high- and low-level alarms and on/off function shall be preset as shown in the Engineer's plans. Each float lead shall be secured with a nylon strain relief bushing at the splice box. The floats shall be UL or CSA listed and shall be rated for a minimum of 5.0A @ 120 VAC.

15. HIGH-HEAD EFFLUENT PUMP

Must be approved for use in pump vault as described in paragraph 12. The high head effluent pump shall be, for most applications, an Orenco Systems®, Inc. Model P100511, 1/2 hp, 115 VAC, single phase, 60 Hz, two-wire motor, with 10-foot long extra heavy duty

(S0) electrical cord with ground. Pump shall be capable of providing a flow rate of 5 gpm against a head of 200 feet, or 10 gpm against a head of 135 feet. When used in conjunction with a flow controller, the pump shall be capable of providing 5 gpm against a head of 160 feet. Pump shall be UL and CSA listed as an effluent pump. Pump shall be provided with a non-prorated five-year warranty. Larger horsepower units shall be available (3/4 to 1-1/2 hp, 230 VAC).

16. ELECTRICAL SPLICE BOX

Orenco Systems®, Inc. Model SB4, UL approved for wet locations, equipped with four electrical cord grips and a 3/4-inch outlet fitting. Also included shall be UL listed waterproof butt splice connectors.

17. CONTROLS AND ALARMS

Controls and alarms shall be listed per UL 508. Panels shall be repairable in the field without the use of soldering irons or substantial disassembly. Panel shall be Orenco Systems®, Inc. Model S1ROETMCT control panel meeting the following:

17.1 Standard Components:

17.1.1 Motor-Start Contactor: 115 VAC: 14 FLA, 3/4 hp, 60 Hz; 2.5 million cycles at FLA (10 million at 50% of FLA). 230 VAC: 14 FLA, 2 hp, 60 Hz; 2.5 million cycles at FLA (10 million at 50% FLA).

17.1.2 Toggle Switch: Single-pole, double-throw HOA switch; 20 amps, 1 hp.

17.1.3 Intrinsically Safe Control Relays: 115 VAC. Listed per UL 913, for Class 1 Div. 1, Groups A, B, C, D hazardous locations. Larger enclosure required.

17.1.4 Controls Circuit Breaker: 10 amps, OFF/ON switch. Single-pole 115 VAC. DIN rail mounting with thermal magnetic tripping characteristics.

17.1.5 Pump Circuit Breaker: 20 amps, OFF/ON switch. Single-pole 115 VAC, double-pole 230 VAC. DIN rail mounting with thermal magnetic tripping characteristics.

17.1.6 Audio Alarm: 80 dB at 24", warble-tone sound.

17.1.7 Visual Alarm: 7/8" diameter red lens, "Push-to-Silence". NEMA 4, 1-watt bulb, 115 VAC.

17.1.8 Panel Enclosure: Measures 11.52" high x 9.31" wide x 5.43" deep. NEMA 4X rated, constructed of UV-resistant fiberglass; hinges and latch are stainless steel. Conduit couplings provided.

17.1.9 S1RO Panel Ratings: 115 VAC, 3/4 hp, 14 amps, single phase, 60 Hz.

17.1.10 S2RO Panel Ratings: 230 VAC, 2 hp, 14 amps, single phase, 60 Hz.

17.1.11 Event Counter: 115 VAC, 6-digit, non-resettable.

17.1.12 Elapsed Time Meter: 115 VAC, 7-digit, non-resettable. Limit of 99,999 hours; accurate to 0.01 hours.

18. INSTALLATION

All pumping system components shall be installed in accordance with the manufacturer's recommendations, the Engineer's plans, and all state and local regulations.

19. LOCATION

The pump control panel shall be mounted on an exterior wall nearest the tank and pump if possible. If not mounted to a garage or outbuilding where the sound of the motor contactor engaging will not be noticed, installation should include use of sound-deadening insulation. Post and panel mounting assemblies are also available where specifically called for. The control panel shall be located within 50 feet and in sight of the pump motor or shall be provided with a lockable disconnect switch. The panel, when possible, should be mounted in the shade and protected from the weather. The panel should be located about 42" above the ground and where it will be accessible for maintenance.

END OF SECTION

**SOUTH ALABAMA UTILITIES
P. O. Box 428
Citronelle, Alabama 36522-0428**

APPLICATION FOR UTILITY SERVICES

Subdivision Name: _____

Owner/Developer: _____

Address: _____

Telephone No: _____

Contact Person: _____ **Telephone No:** _____

Property Location: _____

Number of lots: _____

Services Desired: Water Sewer Gas

Date service is desired: _____

NOTE: Attach Preliminary Subdivision Layout

To: SOUTH ALABAMA UTILITIES

I hereby apply for utility service(s) for the project as indicated above. I understand that utility service to the project is subject to the Board's Rules and Regulations and "Standard Specifications for Water System and Effluent Sewer System Construction," dated January, 2007.

Applicant's Signature

Printed Name

Date

SOUTH ALABAMA UTILITIES

PLAN REVIEW AND PROJECT CHECKLIST FOR UTILITY SERVICES

I. Prior to approval for service:

- Applicant or their Project Engineer has obtained and reviewed Board's Standard Specifications**
- One (1) copy of plans for subdivision showing water and sewer system construction as applicable**
- Plans are signed and sealed by registered engineer**
- Plans are prepared to conform with the Board's specifications including proper scale, elevation contours, etc.**
- One (1) copy of Master Development Plan for subdivision – if applicable**
- Vicinity Map**
- Draft copies of any easements required for the development**
- Applicant has an executed Utility Service Agreement and has paid the required Construction Fee**

A letter stating the review process has been completed, the conditions under which utility service(s) will be provided, and that the construction plans are approved, if applicable, will be sent to the applicant once the above referenced items are provided.

II. Prior to start of construction:

- Letter of service conditions from Board**
- Two (2) sets of revised/corrected construction plans**
- Contractor name and license number**
- Executed waterline easements**

Checklist – page 2

Prior to start of construction – cont'd

- Mobile County or Alabama Dept. of Transportation permits
- Certificates of Compliance for materials
- Meeting on-site with the Board Representative

No utility work shall begin on the site until the above detailed work is completed and approved by the Board Representative. Inspection by the Board's Representative of all work is required. The Owner is responsible for notifying South Alabama Utilities of the need for an inspector at least two (2) working days prior to beginning construction. The Owner will be billed by the Board for all inspection costs incurred as per the Standard Specifications.

III. Prior to work being accepted:

- Letter requesting acceptance of the completed project and 12-month guarantee
- Two (2) copies of record drawings
- Bacteriological test reports
- Hydrostatic test charts for water and sewer
- Itemized final cost of water and sewer construction including engineering and inspection
- Payment of construction inspection fees as applicable
- Payment of re-inspection fees or other cost as detailed in the Board's Letter of Conditions
- 12-month maintenance bond for new facilities (if required)
- Copies of record plat, restrictive covenants, and other items required by the Utility Service Agreement

No meter or service will be allowed or made available from the Board until all conditions of service are met and fees have been paid. A final walk-through of the job with the Owner, Contractor, Inspector, and Board Superintendent will then be required before final acceptance. A letter of notification will be provided by the Board advising that conditions of service have been met and service is available. The date of final acceptance shall be the start of the 12-month warranty period.

**MATERIAL SUPPLIER'S CERTIFICATION FOR
WATER AND SEWER SYSTEM MATERIALS**

STATE OF _____
COUNTY OF _____

I, _____, as representative of
_____, hereby state the following:
(Company Name)

I reviewed and am familiar with the "Standard Specifications for Water System and Effluent Sewer System Construction" of South Alabama Utilities dated January, 2007, and to the best of my knowledge, information, and belief, the materials furnished for _____
(Project Name)

comply with those specifications. This certification is made solely to South Alabama Utilities.

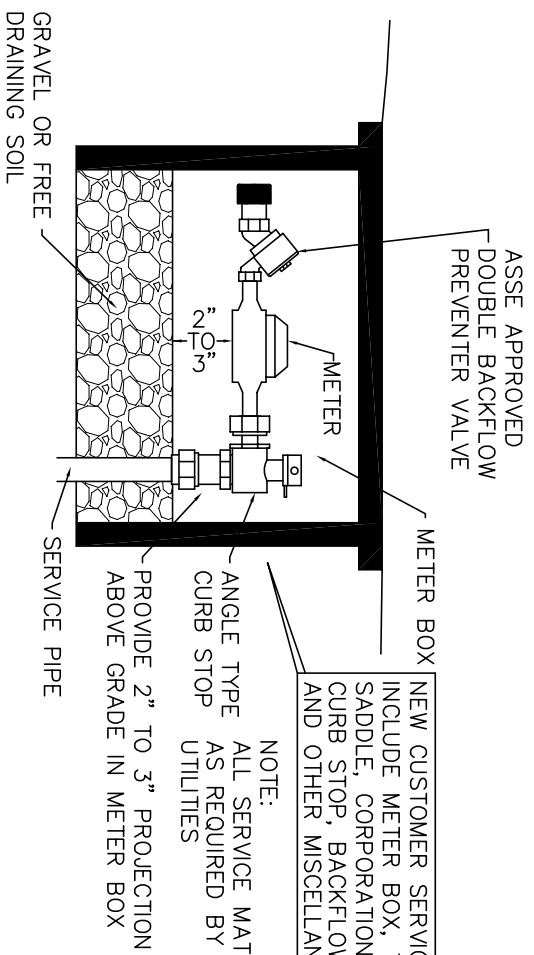
Company Name

Signature

Typed or Printed Name

Title

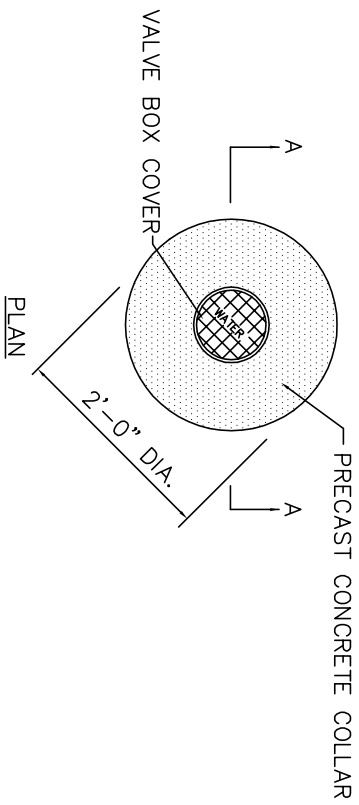
Date



NOTE:
ALL SERVICE MATERIALS TO BE AS REQUIRED BY SOUTH ALABAMA UTILITIES

NEW CUSTOMER SERVICE TO INCLUDE METER BOX, TAPPING SADDLE, CORPORATION STOP, CURB STOP, BACKFLOW PREVENTER AND OTHER MISCELLANEOUS ITEMS

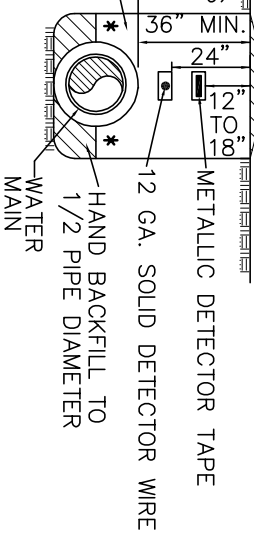
PROVIDE 2" TO 3" PROJECTION ABOVE GRADE IN METER BOX



BACKFILL TO BE MACHINE PLACED AND COMPACTED. ALL WATERLINE TRENCHES SHALL BE REGRADED AND RECOMPACTED NO LESS THAN 60 DAYS AFTER INITIAL BACKFILL. SOIL CROWN SHALL BE REESTABLISHED ALSO DURING GRADING.

CROWN SOIL BACKFILL 1" TO 3" ABOVE ADJACENT GRADE

DEPTH VARIES SEE PLAN SHEETS



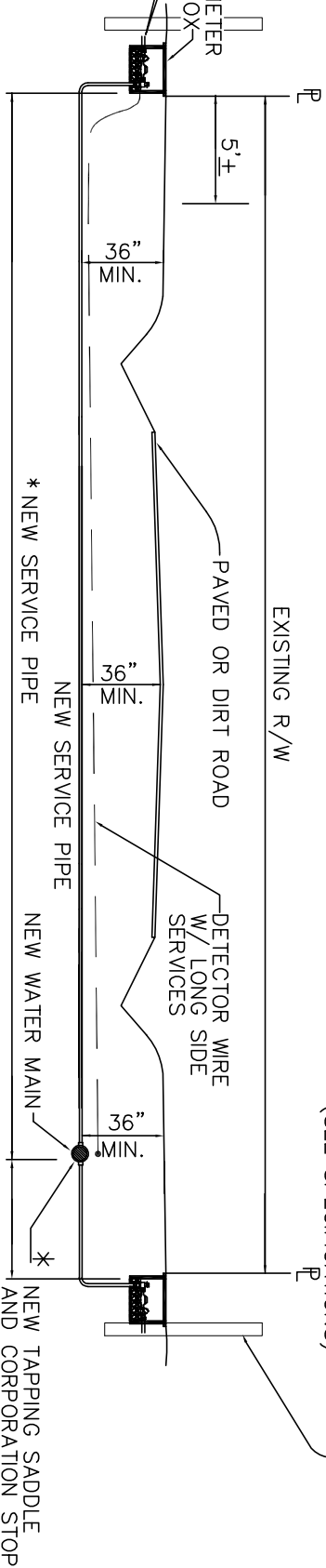
WATER MAIN INSTALLATION

N.T.S.

* NOTE:

MACHINE TRENCHING WILL BE ALLOWED; HOWEVER, SUFFICIENT CLEAR DISTANCE WILL BE REQUIRED SUCH THAT THE PIPE REST ON TRENCH BOTTOM AT ALL LOCATIONS.

THIS REQUIREMENT WILL BE STRICTLY ENFORCED.

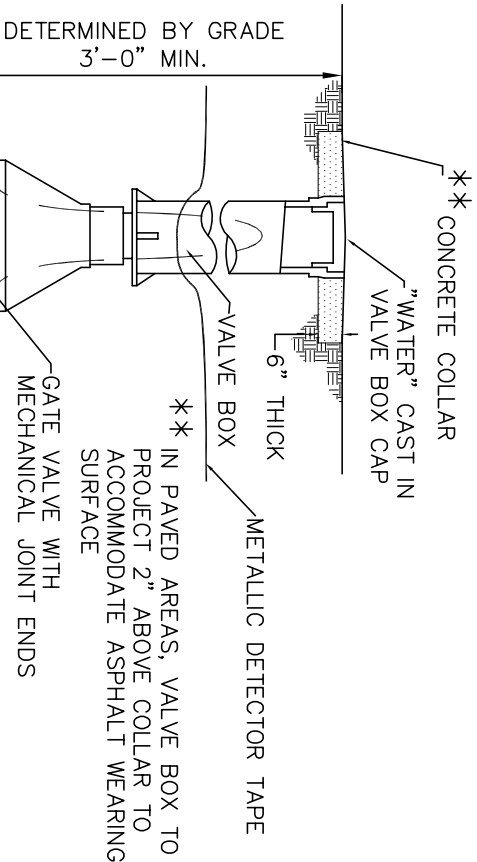


TYPICAL SERVICE CONNECTION

N.T.S.

ALL SERVICE PIPE TO BE BORED BENEATH EXISTING PAVED ROADS. (WHERE APPLICABLE.)

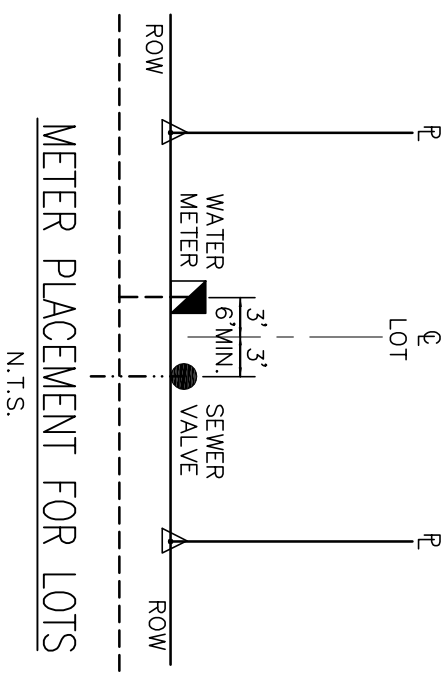
NOTES:
* SERVICE PIPE SHALL BE SDR 9 HDPE WATER SERVICE PIPE OR TYPE "K" COPPER TUBING. (SEE SPECIFICATIONS)



SECTION "A-A"

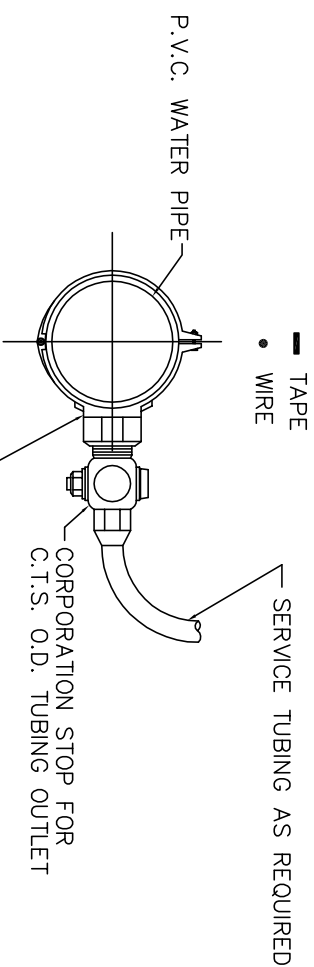
GATE VALVE & BOX

N.T.S.



METER PLACEMENT FOR LOTS

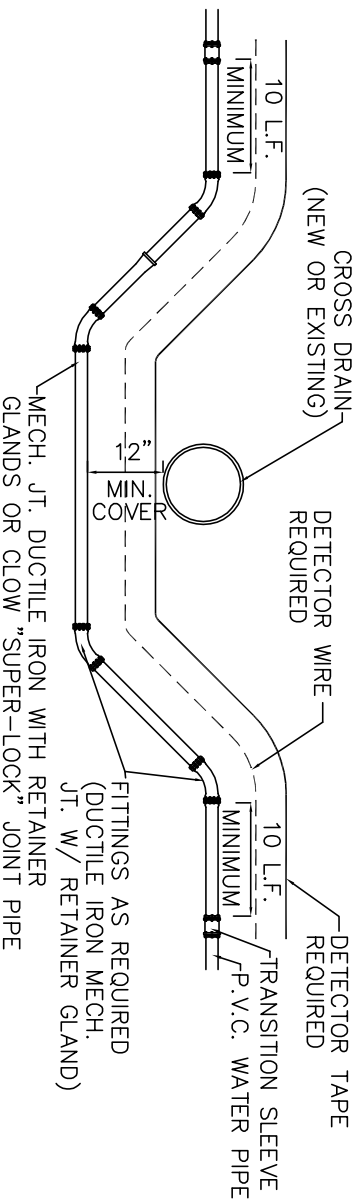
N.T.S.



SADDLE TAP FOR P.V.C. PIPE

N.T.S.

REQ'D: TOTAL LENGTH OF DUCTILE IRON PIPE CALLED FOR BY THE PLANS - FIELD VERIFY WITH WATER BOARD EACH LOCATION PRIOR TO STARTING CROSSING



DRAINAGE WAY CROSSING

N.T.S.

MISCELLANEOUS WATER DETAILS

NO.	DATE	DESCRIPTION	BY
1	3/13/07	SOLID DETECTION WIRE	WGL

SPEAKS & ASSOCIATES
CONSULTING ENGINEERS, INC.
732 OAK CIRCLE DRIVE WEST
MOBILE, ALABAMA 36609
PHONE: (251)666-4646, FAX: (251)666-8868

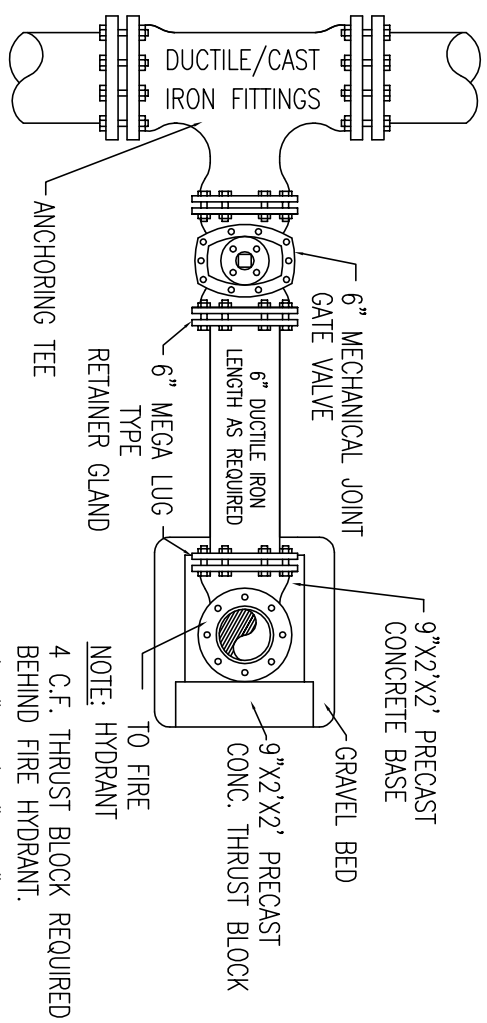


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DATE: JANUARY, 2007
DRAWN BY: M.B.S.
CHECKED BY:
CLIENT NAME: S.A.U.
JOB NO.:
F.B. NO.:
SHEET 1 OF 2

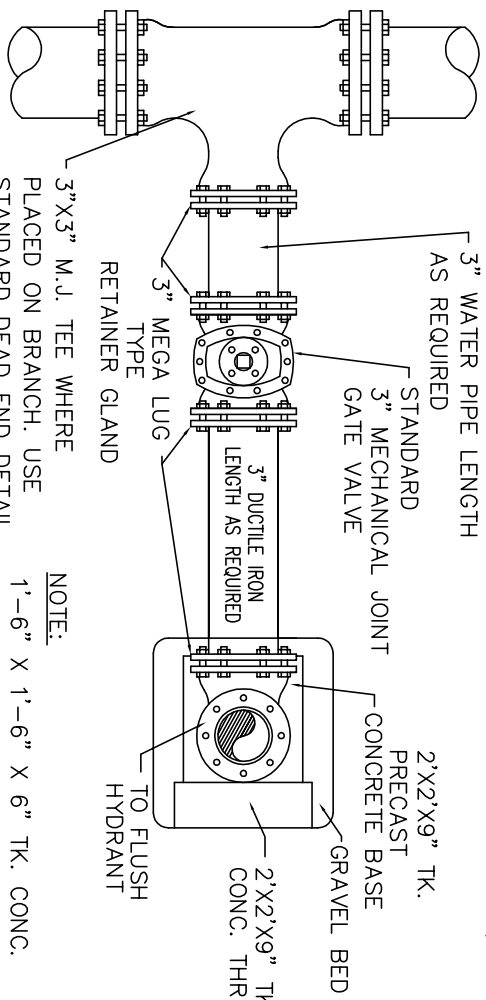
NOT TO BE USED WITHOUT APPROVAL OF THE SEAL

MINIMUM THRUST BLOCK AREA (SQUARE FEET, L X H)	PIPE DIA. (INCHES)	90° BENDS	TEES, DEAD ENDS, OR 45° BENDS	225° BENDS
	3", 6"	3.0	2.2	1.0
	8"	5.0	4.0	1.5



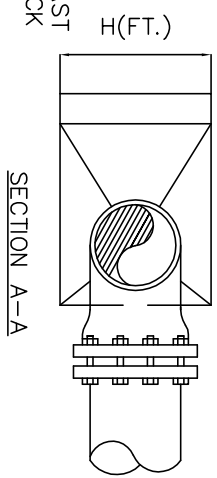
NOTE: HYDRANT TO FIRE
4 C.F. THRUST BLOCK REQUIRED BEHIND FIRE HYDRANT.
1'-6" X 1'-6" X 6" TK. CONC. BASE REQUIRED BELOW FIRE HYDRANT.
FIRE HYDRANT TO BE SET IN 9 C.F. BED OF GRAVEL. (3'X3'X3')

"MAIN LINE" HYDRANT CONNECTION DETAIL
N.T.S.

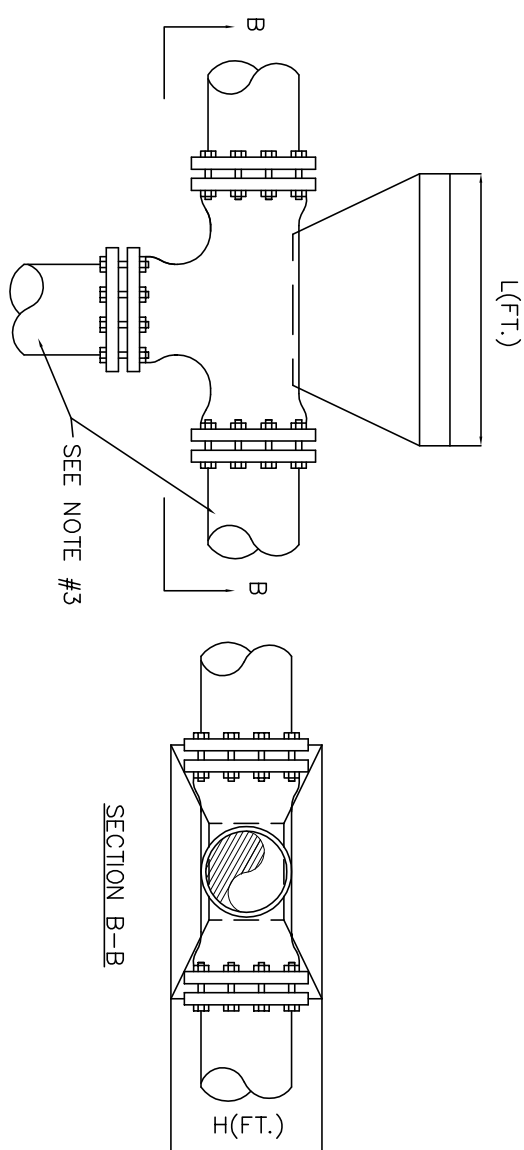


NOTE:
1'-6" X 1'-6" X 6" TK. CONC. BASE EACH REQUIRED BELOW AND BEHIND FLUSH HYDRANT.
FLUSH HYDRANT TO BE SET IN 9 C.F. BED OF GRAVEL. (3'X3'X3')
FLUSH STATION WILL TYPICALLY BE REQUIRED CONNECTED TO "STANDARD DEAD END".

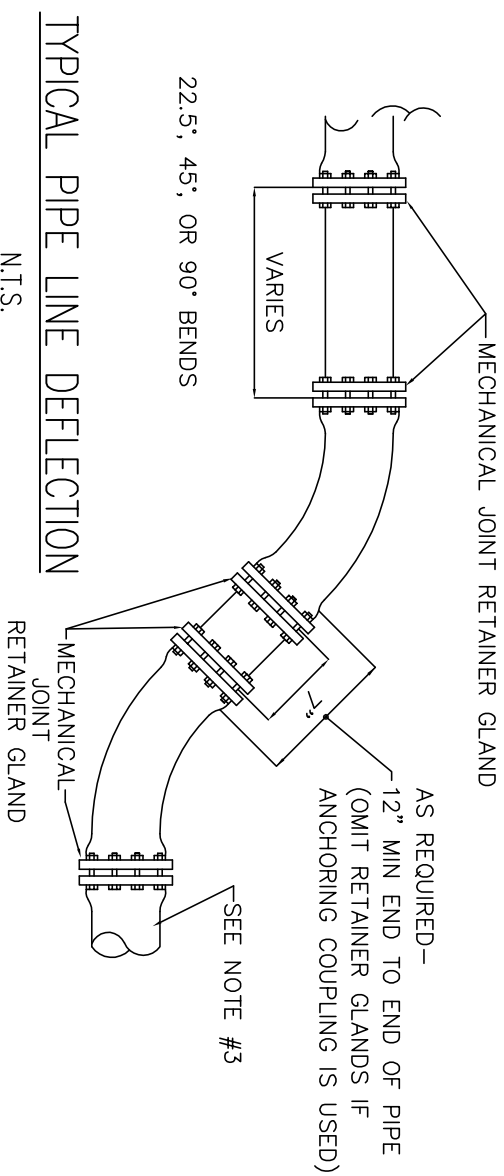
"FLUSH" HYDRANT CONNECTION DETAIL
N.T.S.



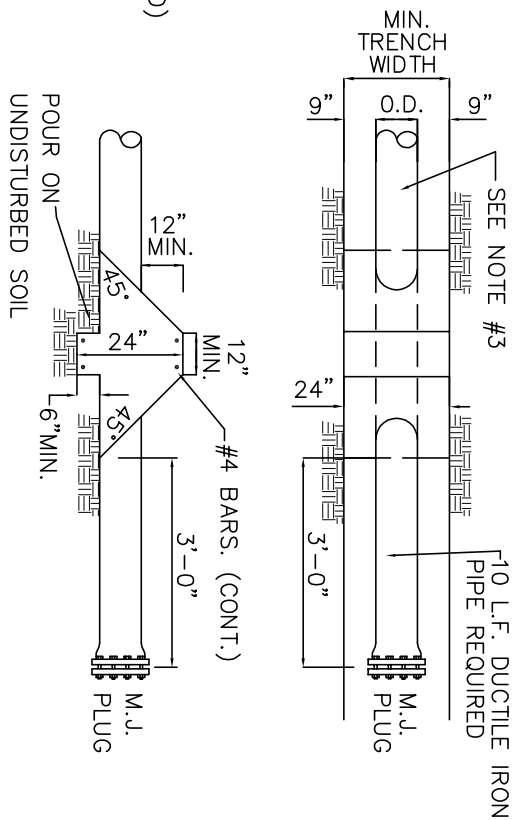
TYPICAL THRUST BLOCK FOR BENDS
N.T.S.



TYPICAL THRUST BLOCK FOR TEES
N.T.S.



TYPICAL PIPE LINE DEFLECTION
N.T.S.



STANDARD DEAD END ANCHOR BLOCK
N.T.S.

- NOTES:
1. ALL FITTINGS SHALL BE MECHANICAL JOINT CAST OR DUCTILE IRON WITH A MINIMUM OF 250 P.S.I. PRESSURE RATING MEETING THE REQUIREMENTS OF ANSI/AWMA-C110/A21.11 STANDARDS.
 2. TRANSITION SLEEVES FOR DUCTILE IRON TO P.V.C. SHALL BE MECHANICAL JOINT CAST IRON WITH ALL REQUIRED GASKETS AND OTHER COMPONENTS.
 3. IN ADDITION TO THRUST BLOCKS JOINT RESTRAINTS SHALL BE PROVIDED AT ALL JOINT CONNECTIONS. THE JOINT RESTRAINTS SHALL BE MEGA LUG RETAINER GLANDS AS MANUFACTURED BY EBBA IRON SALES, INC. OR S.A.U. APPROVED EQUAL.
 4. THRUST BLOCKS SHALL BE UTILIZED AT THE LOCATION OF TEES, DEAD ENDS, AND OTHER LOCATIONS AS INDICATED HEREON. THRUST BLOCKS SHALL BE PLACED ON UNDISTURBED EARTH NEATLY TRIMMED COMPACTED AND PREPARED TO RECEIVE CONCRETE. CONCRETE SHALL BE 2,500 P.S.I. MINIMUM AT 28 DAYS TEST.

MISCELLANEOUS WATER DETAILS

SPEAKS & ASSOCIATES CONSULTING ENGINEERS, INC.
732 OAK CIRCLE DRIVE WEST
MOBILE, ALABAMA 36609
PHONE: (251)666-4646, FAX: (251)666-8868

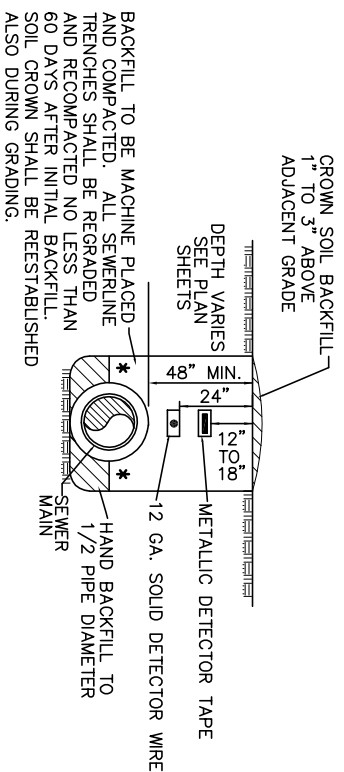


NO.	DATE	DESCRIPTION	BY

DATE: JANUARY, 2007
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CHECKED BY:
CLIENT NAME: S.A.U.
JOB NO.:
F.B. NO.:
SHEET 2 OF 2

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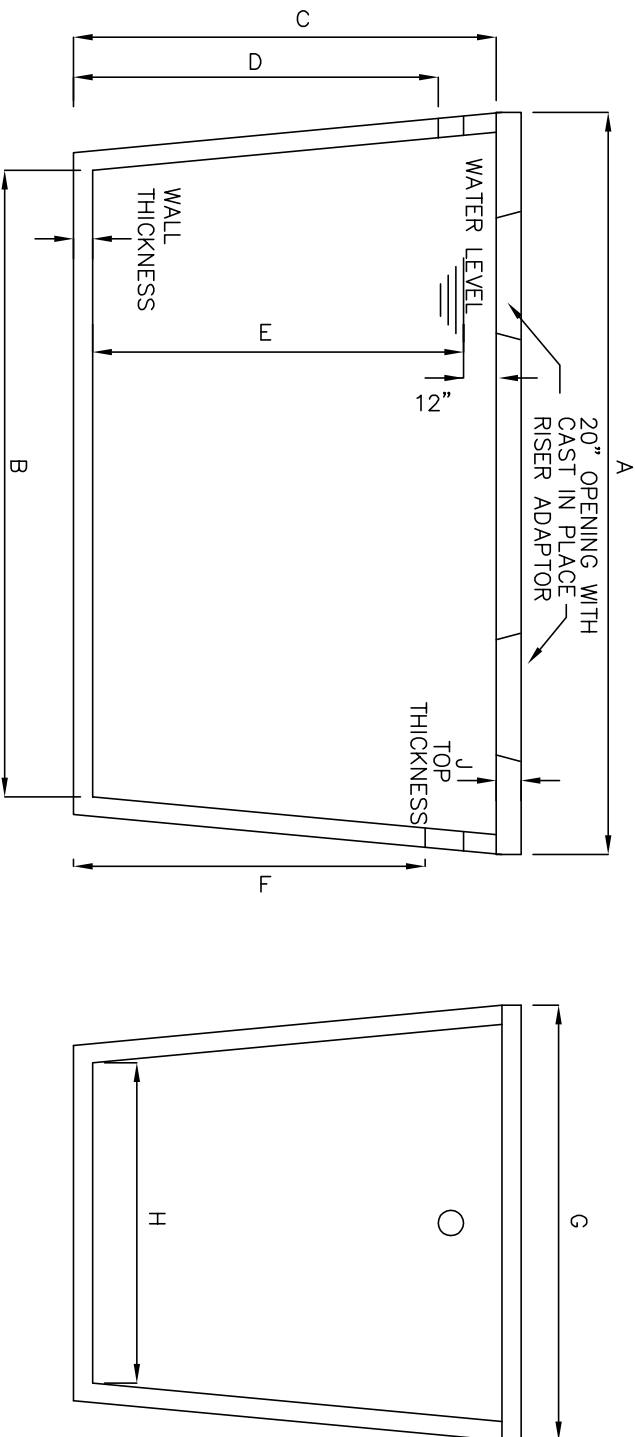
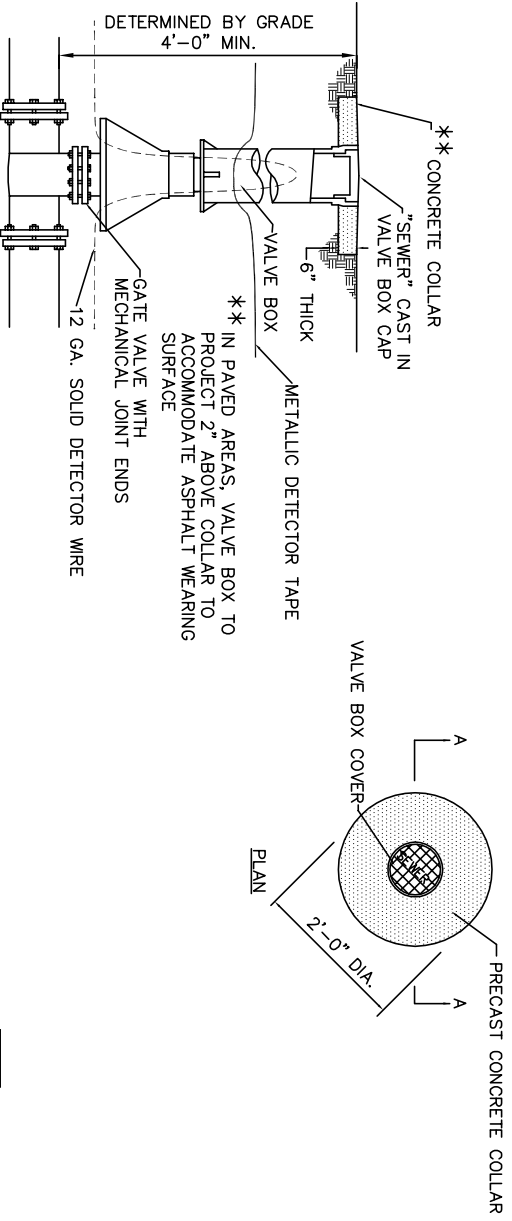
NOT VALID WITHOUT THIS SEAL



SEWER MAIN INSTALLATION

N.T.S.

*NOTE:
MACHINE TRENCHING WILL BE ALLOWED. HOWEVER, SUFFICIENT CLEAR DISTANCE WILL BE REQUIRED SUCH THAT THE PIPE REST ON TRENCH BOTTOM AT ALL LOCATIONS.
THIS REQUIREMENT WILL BE STRICTLY ENFORCED.

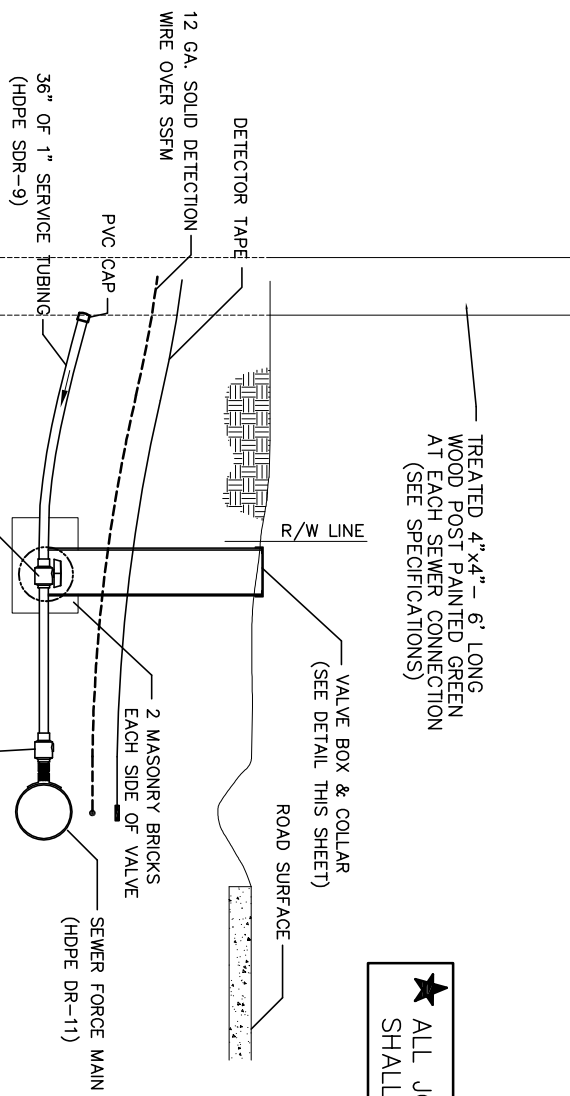


TANK SIZE	LENGTH	HEIGHT	INFLUENT HEIGHT	LIQUID LEVEL	EFFLUENT HEIGHT	WIDTH	WALLS & BTM. THICKNESS	TOP THICKNESS
1000 GALLON	8'-8"	5'-0"	4'-6"	4'-4"	4'-3"	5'-6"	4'-2"	4"
1500 GALLON	9'-11 1/4"	5'-7"	4'-9 1/4"	4'-4"	4'-6 1/2"	5'-7"	4'-7"	4"
2000 GALLON	14'-0"	4'-7"	4'-0"	3'-3"	3'-9"	6'-8"	4"	6"
3000 GALLON	14'-0"	12'-8"	6'-11 1/2"	5'-9"	5'-6"	6'-8"	4"	6"

SEPTIC TANK DETAIL

N.T.S.

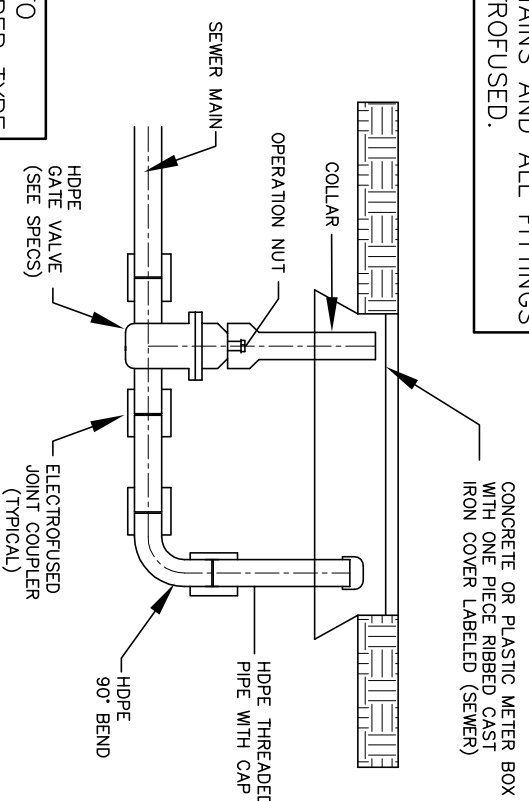
★ ALL JOINTS IN MAINS AND ALL FITTINGS SHALL BE ELECTROFUSED.



SERVICE CONNECTION DETAIL

N.T.S.

* CONTRACTOR SHALL DELIVER TO S.A.U.'S INSPECTOR A 1" FLAPPER TYPE P.V.C. CHECK VALVE WITH THREADED ENDS FOR EACH INSTALLED SERVICE.



FLUSHING ASSEMBLY

N.T.S.

MISCELLANEOUS EFFLUENT SEWER DETAILS

NO.	DATE	DESCRIPTION	BY
1	3/13/07	SOLID DETECTION WIRE	WGL

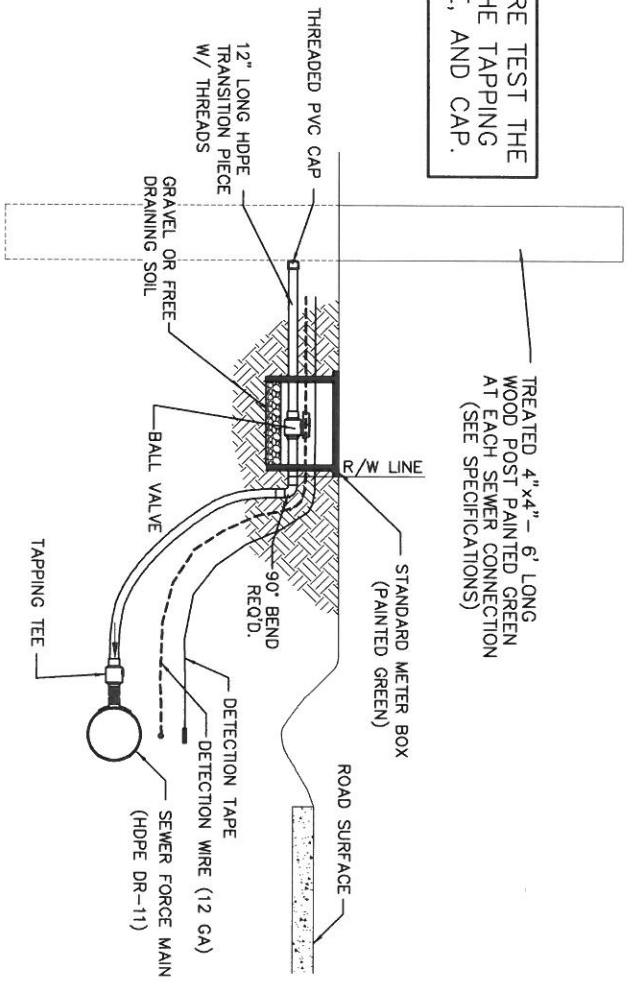
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CLIENT NAME: S.A.U.
JOB NO.:
F.B. NO.:
SHEET 1 OF 1

CONTRACTOR SHALL PRESSURE TEST THE ENTIRE SYSTEM INCLUDING THE TAPPING TEE, VALVE, TRANSITION PIPE, AND CAP.



TREATED 4" x 4" - 6' LONG WOOD POST PAINTED GREEN AT EACH SEWER CONNECTION (SEE SPECIFICATIONS)

SEWER SERVICE CONNECTION DETAIL

N.T.S.

* CONTRACTOR SHALL DELIVER TO S.A.U.'S INSPECTOR A 1" FLAPPER TYPE P.V.C. CHECK VALVE WITH THREADED ENDS FOR EACH INSTALLED SERVICE.