INVITATION TO BID

PROPOSAL

BID NO. 12-0004-4

CHATHAM COUNTY FLEET OPERATIONS - PHASE I - SITE WORK

PREBID CONF: 2:00PM, JANUARY 31, 2012

BID OPENING: 2:00PM, FEBRUARY 14, 2012

THE COMMISSIONERS OF CHATHAM COUNTY, GEORGIA

PETE LIAKAKIS, CHAIRMAN

COMMISSIONER HELEN J. STONE	COMMISSIONER HARRIS ODELL JR.
COMMISSIONER JAMES J. HOLMES	COMMISSIONER DAVID M. GELLATLY
COMMISSIONER PATRICK O. SHAY	COMMISSIONER DEAN KICKLIGHTER
COMMISSIONER PATRICK J. FARRELL	COMMISSIONER PRISCILLA D. THOMAS

R. JONATHAN HART, COUNTY ATTORNEY

CHATHAM COUNTY, GEORGIA
DOCUMENT CHECK LIST

The following documents, when marked, are contained in and made a part of this Bid Package or are required to be submitted with the bid. It is the responsibility of the bidder to read, complete and sign, where indicated, and return these documents with his/her bid. **FAILURE TO DO SO MAY BE CAUSE FOR DISQUALIFYING THE BID.**

__X GENERAL INFORMATION AND INSTRUCTIONS TO BID WITH ATTACHMENTS

__X SURETY REQUIREMENTS (A Bid Bond of 5% with this ITB)

__X PROPOSAL

__PLANS/DRAWINGS - **Plans and specifications must be purchased at Clayton Digital Reprographics by logging into www.cdrepro.com. Login to DFS. New users must register. For technical support contact Roger Oliver at (912) 352-3880, fax (912) 352-3881 or email: cdrsouth@cdrepro.com.**

__X BID SCHEDULE

___PERFORMANCE BOND - **UPON AWARD OF CONTRACT**

___PAYMENT BOND - **UPON AWARD OF CONTRACT**

___CONTRACT

__X LEGAL NOTICE

__X ATTACHMENTS: A. DRUG FREE WORKPLACE; B. NONDISCRIMINATION STATEMENT; C. DISCLOSURE OF RESPONSIBILITY STATEMENT; D. CONTRACTOR/SUBCONTRACTOR AFFIDAVIT & AGREEMENT; E. DEBARMENT CERTIFICATION; F. CAP AGREEMENT; G. M/WBE PARTICIPATION COMPLIANCE REPORT; H. *SAVE* AFFIDAVIT.

____DOCUMENTATION OF ABILITY TO PERFORM BID REQUIREMENTS. THIS MAY BE REQUIRED OF BIDDERS AFTER SUBMISSION OF BIDS.

COUNTY TAX CERTIFICATE REQUIREMENT - Contractor must supply a copy of their Tax Certificate from their location in the State of Georgia, as proof of payment of the occupational tax where their office is located.

CURRENT TAX CERTIFICATE NUMBER
CITY_____
COUNTY_____
OTHER_____

The Chatham County of Commissioners have established goals to increase participation of minority and female owned businesses. In order to accurately document participation, businesses submitting bids or proposals are encouraged to report ownership status. A minority or female business is defiued as a business with 51% or greater minority of female ownership. Please check ownership status as applicable:

African-American _____ **Asian American** _____ **Hispanic** _____

Native American or Alaskan Indian _____ **Female** _____

In the award of "Competitive Sealed Proposals", minority/female participation may be one of several evaluation criteria used in the award process when specified as such in the Request for Proposal.

RECEIPT IS HEREBY ACKNOWLEDGED OF ADDENDA NUMBERS_____

The undersigned bidder certifies that he/she has received the above listed and marked documents and acknowledges that his/her failure to return each, completed and signed as required, may be cause for disqualifying his/her bid.

BY:_____
DATE

_____
SIGNATURE

TITLE:_____

COMPANY:_____

CHATHAM COUNTY, GEORGIA
OFFICE OF THE PURCHASING AGENT
1117 EISENHOWER DRIVE, SUITE C
SAVANNAH, GEORGIA 31406
(912) 790-1622

Date: January 9, 2012 **BID NO. 12-0004-4**

GENERAL INFORMATION FOR INVITATION FOR BID/PROPOSAL

This is an invitation to submit a bid or proposal to supply Chatham County with construction, equipment, supplies and/or services as indicated herein. Sealed bids or proposals will be received at the Office of the Purchasing Agent, **at The Chatham County Citizens Service Center, 1117 Eisenhower Drive, Suite C, Savannah, Georgia, up to 2:00PM, FEBRUARY 14, 2012** at which time they will be opened and publicly read. **The County reserves the right to reject all bids or proposals for any bid or proposal that is non-responsive or not responsible.**

Instructions for preparation and submission of a bid or proposal are contained in this Invitation For Bid/Proposal package. Please note that specific forms for submission of a bid/proposal are required. Bids must be typed or printed in ink. If you do not submit a bid/proposal, return the signed bid invitation sheet and state the reason; otherwise, your name may be removed from our bidders list.

A **pre-bid conference** has been scheduled to be conducted **and held at The Chatham County Citizens Service Center, 1117 Eisenhower Drive, Suite C, Savannah, Georgia**, at **2:00PM, JANUARY 31, 2012** to discuss the specifications and resolve any questions and/or misunderstanding that may arise. **You are encouraged to attend.**

Any changes to the conditions and specifications must be in the form of a written addendum to be valid; therefore, the Purchasing Agent will issue a written addendum to document each approved change. Generally when addenda are required, the bid opening date will be changed.

Chatham County has an equal opportunity purchasing policy. Chatham County seeks to ensure that all segments of the business community have access to supplying the goods and services needed by County programs. The County affirmatively works to encourage utilization of disadvantaged and minority business enterprises in our procurement activities. The County provides equal opportunity for all businesses and does not discriminate against any persons or businesses regardless of race, color, religion, age, sex, national origin or handicap. The terms "disadvantaged business," "minority business enterprise," and "minority person" are more specifically defined and explained in the Chatham County Purchasing Ordinance and Procedures Manual, Article VII - Disadvantaged Business Enterprises Program.

This project is Special Purpose Local Option Sales Tax (SPLOST) Project. See paragraph 2.22 for MBE/WBE participation goals.

INSTRUCTIONS TO BIDDERS/PROPOSERS

1.1 **Purpose:** The purpose of this document is to provide general and specific information for use in submitting a bid or proposal to supply Chatham County with equipment, supplies, and/or services as described herein. All bids/proposals are governed by the Code of Chatham County, Chapter 4, Article IV, and the laws of the State of Georgia.

1.2 **How to Prepare Bid Proposals: All bid proposals shall be:**

a. Prepared on the forms enclosed herewith, unless otherwise prescribed, and **all documents must be submitted.**

b. Typewritten or completed with pen and ink, signed by the business owner or authorized representative, with all erasures or corrections initialed and dated by the official signing the proposal. ALL SIGNATURE SPACES MUST BE SIGNED.

Bidders are encouraged to review carefully all provisions and attachments of this document prior to submission. Each bid constitutes an offer and may not be withdrawn except as provided herein.

1.3 **How to Submit Bid Proposals:** All bid proposals shall be:

a. Submitted in sealed opaque envelopes, plainly marked with the bid number and title, date and time of bid opening, and company name.

b. Mailed or delivered as follows in sufficient time to ensure receipt by the Purchasing Agent on or before the time and date specified above.

1. Mailing Address: Purchasing Agent, 1117 Eisenhower Drive, Suite C, Savannah, Georgia 31406.

2. Hand Delivery: Purchasing Agent, Chatham County Citizens Service Center, 1117 Eisenhower Drive, Suite C, Savannah, Georgia.

BIDS NOT RECEIVED BY THE TIME AND DATE SPECIFIED WILL NOT BE OPENED OR CONSIDERED.

1.4 **How to Submit an Objection:** Objections from bidders to this invitation to bid and/or these specifications should be brought to the attention of the County Purchasing Agent in the following manner:

a. When a pre-bid conference is scheduled, bidders shall either present their oral objections at that time or submit their written objections at least two (2) days prior to the scheduled pre-bid conference.

b. When a pre-bid conference is not scheduled, the bidder shall submit any objections he may have in writing not less than five (5) days prior to the opening of the bid.

c. The objections contemplated may pertain to form and/or substance of the invitation to bid documents. Failure to object in accordance with the above procedure will constitute a waiver on the part of the business to protest this invitation to bid.

1.5 **Failure to Bid:** If a bid is not submitted, the business should return this invitation to bid document, stating reason therefore, and indicate whether the business should be retained or removed from the County's bidders list.

1.6 **Errors in Bids:** Bidders or their authorized representatives are expected to fully inform themselves as to the conditions, requirements, and specifications before submitting bids. Failure to do so will be at the bidder's own risk. In case of error in extension of prices in the bid, the unit price will govern.

1.7 **Standards for Acceptance of Bid for Contract Award:** The County reserves the right to reject any or all bids and to waive any irregularities or technicalities in bids received whenever such rejection or waiver is in the best interest of the County. The County reserves the right to reject the bid of a bidder who has previously failed to perform properly or complete on time contracts of a similar nature, or a bid from a bidder whom investigation shows is not in a position to perform the contract.

1.8 **Bidder:** Whenever the term "bidder" is used it shall encompass the "person," "business," "contractor," "supplier," "vendor," or other party submitting a bid or proposal to Chatham County in such capacity before a contract has been entered into between such party and the County.

1.9 **Responsible / Responsive Bidder:** *Responsible Bidder* means a person or entity that has the capability in all respects to perform fully and reliably the contract requirements. *Responsive Bidder* means a person or entity that has submitted a bid or proposal that conforms in all material respects to the requirements set forth in the invitation for bids or request for proposals.

1.10 **Compliance with Laws:** The bidder and/or contractor shall obtain and maintain all licenses, permits, liability insurance, workman's compensation insurance and comply with any and all other standards or regulations required by federal, state or County stature, ordinances and rules during the performance of any contract between the contractor and the County. Any such requirement specifically set forth in any contract document between the contractor and the County shall be supplementary to this section and not in substitution thereof.

1.11 **Contractor:** Contractor or subcontractor means any person or business having a contract with Chatham County. The Contractor/Vendor of goods, material, equipment or services certifies that they will follow equal employment opportunity practices in connection with the awarded contract as more fully specified in the contract documents.

1.12 ***Local Preference:** On 27 March, 1998 the Board of Commissioners adopted a Local Vendor Preference Ordinance. This Ordinance does not apply to construction contracts. However, contractors are encouraged to apply the same method when awarding bids to local and local M/WBE businesses when ever possible in order to promote growth in Chatham County's economy. **NOTE:** Local Preference **does not apply to Public Works Construction contracts.**

1.13 **Debarred Firms and Pending Litigation:** Any potential proposer/firm listed on the Federal or State of

Georgia Excluded Parties Listing (Barred from doing business) **will not** be considered for contract award. Proposers **shall disclose** any record of pending criminal violations (Indictment) and/or convictions, pending lawsuits, etc., and any actions that may be a conflict of interest occurring within the past five (5) years. Any proposer/firm previously defaulting or terminating a contract with the County will not be considered. Also, any contractor or subcontractor that has pending litigation with the County will not be considered for contract award.

** All bidders or proposers are to read and complete the Disclosure of Responsibility Statement enclosed as an Attachment to be returned with response. Failure to do so may result in your solicitation response being rejected as non-responsive.

Bidder acknowledges that in performing contract work for the Board, bidder shall not utilize any firms that have been a party to any of the above actions. If bidder has engaged any firm to work on this contract or project that is later debarred, Bidder shall sever its relationship with that firm with respect to Board contract.

1.14 **Performance Evaluation:** On April 11, 2008, the Chatham County Board of Commissioners approved a change to the County Purchasing Ordinance requiring Contractor/Consultant Performance Evaluations, as a minimum, annually, prior to contract anniversary date.

Should Contractor/Consultant performance be unsatisfactory, the appointed County Project Manager for the contract may prepare a Contractor/Consultant Complaint Form or a Performance Evaluation to the County Purchasing Agent.

1.15 **Payment of Taxes**: No contract shall be awarded unless all real and personal property taxes have been paid by the successful contractor and/or subcontractors as adopted by the Board of commissioners on April 8, 1994.

1.16 **State Licensing Board for General Contractors:** Pursuant to Georgia law, the following types of contractors **must obtain a license from the State Licensing Board of Residential and General Contractors by July 1, 2008:**

* **Residential - Basic Contractor** (Contractor work relative to detached one-family and two-family residences and one-family townhouses not over three stories in height).

* **Residential - Light Commercial Contractor** (Contractor work or activity related to multifamily and multiuse light commercial buildings and structures).

* **General Contractor** (Contractor work or activity that is unlimited in scope regarding any residential or commercial projects).

See *Checklist for Submitting Bid* (page 22) for the type of license required for this project.

GENERAL CONDITIONS

2.1 **Specifications:** Any obvious error or omission in specifications shall not inure to the benefit of the bidder but shall put the bidder on notice to inquire of or identify the same from the County. Whenever herein mention is made of any article, material or workmanship to be in accordance with laws, ordinances, building codes, underwriter's codes, A.S.T.M. regulations or similar expressions, the requirements of these laws, ordinances, etc., shall be construed to be the minimum requirements of these specifications.

2.2 **Multiple Bids:** No vendor will be allowed to submit more than one bid. Any alternate proposals must be brought to the Purchasing Agent's attention during the Pre-bid Conference or submitted in writing at least five (5) days preceding the bid opening date.

2.3 Not Used.

2.4 **Prices to be Firm:** Bidder warrants that bid prices, terms and conditions quoted in his bid will be firm for acceptance for a period of sixty (60) days from bid opening date, unless otherwise stated in the bid.

2.5 **Completeness:** All information required by Invitation for Bids/Proposals must be completed and submitted to constitute a proper bid or proposal.

2.6 **Quality:** All materials, or supplies used for the construction necessary to comply with this proposal shall be of the best quality, and of the highest standard of workmanship.

Workmanship employed in any construction, repair, or installation required by this proposal shall be of the highest quality and meet recognized standards within the respective trades, crafts and of the skills employed.

2.7 **Guarantee:** Unless otherwise specified by the County, the bidder shall unconditionally guarantee the materials and workmanship on all material and/or services. If, within the guarantee period any defects occur which are due to faulty material and or services, the contractor at his expense, shall repair or adjust the condition, or replace the material and/or services to the complete satisfaction of the County. These repairs, replacements or adjustments shall be made only at such time as will be designated by the County as being least detrimental to the operation of County business.

2.8 **Liability Provisions:** Where bidders are required to enter or go onto Chatham County property to take measurements or gather other information in order to prepare the bid or proposal as requested by the County, the bidder shall be liable for any injury, damage or loss occasioned by negligence of the bidder, his agent, or any person the bidder has designated to prepare the bid and shall indemnify and hold harmless Chatham County from any liability arising therefrom. The contract document specifies the liability provisions required of the successful bidder in order to be awarded a contract with Chatham County.

2.9 **Cancellation of Contract:** The contract may be canceled or suspended by Chatham County in whole or in part by written notice of default to the Contractor upon non-performance or violation of contract terms. An award may be made to the next low bidder, for articles and/or services specified or they may be purchased on the open market and the defaulting Contractor (or his surety) shall be liable to Chatham County for costs to the County in excess of the defaulted contract prices. See the contract documents for complete requirements.

2.10 **Patent Indemnity:** Except as otherwise provided, the successful bidder agrees to indemnify Chatham County and its officers, agents and employees against liability, including costs and expenses for infringement upon any letters patent of the United States arising out of the performance of this Contract or out of the use or disposal for the account of the County of supplies furnished or construction work performed hereunder.

2.11 **Certification of Independent Price Determination:** By submission of this bid, the bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, that in connection with this procurement:

(1) The prices in this bid have been arrived at independently, without consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;

(2) Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly to any other bidder or to any competitor; and

(3) No attempt has been made or will be made by the bidder to induce any other person or firm to submit or not be submit a bid for the purpose or restricting competition.

2.12 **Award of Contract:** The contract, if awarded, will be awarded to that responsible bidder whose bid/proposal will be most advantageous to Chatham County, price and other factors considered. The Board of Commissioners will make the determination as to which bid or proposal that serves as the best value to Chatham County.

2.13 **Procurement Protests:** Objections and protests to any portion of the procurement process or actions of the County staff may be filed with the Purchasing Agent for review and resolution. The Chatham County Purchasing Procedures Manual, Article IX - Appeals and Remedies shall govern the review and resolution of all protests.

2.14 **Qualification of Business (Responsible Bidder or Proposer):** A responsible bidder or proposer is defined as one who meets, or by the date of the bid acceptance can meet, certifications, all requirements for licensing, insurance, and registrations, or other documentation required by the Design Professional engaged to develop Scope of work, specifications and plans. These documents will be listed in the Special Conditions further on in this solicitation. Chatham County has the right to require any or all bidders to submit documentation of the ability to perform, provide, or carry out the service or provide the product requested.

Chatham County has the right to disqualify the bid or proposal of any bidder or proposer as being unresponsive or unresponsible whenever such bidder/proposer cannot document the ability to deliver the requested product.

2.15 **Chatham County Tax Certificate Requirement:** A current Chatham County Tax Certificate is required unless otherwise specified.

Please contact the Building Safety and Regulatory Services (912) 201-4300 for additional information.

2.16 Insurance Provisions, General: The selected CONTRACTOR shall be required to procure and maintain for the duration of the contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Contractor, his agents, representatives, employees or subcontractors. The cost of such insurance shall be included in the Bid. It is every contractor's responsibility to provide the County Purchasing and Contracting Division current and up-to-date Certificates of Insurance for multiple year contracts before the end of each term. **Failure to do so may be cause for termination of contract.**

2.16.1 General Information that shall appear on a Certificate of Insurance:

I. Name of the Producer (Contractor's insurance Broker/Agent).
II. Companies affording coverage (there may be several).
III. Name and Address of the Insured (this should be the Company or Parent of the firm Chatham County is contracting with).
IV. A Summary of all current insurance for the insured (includes effective dates of coverage).
V. A brief description of the operations to be performed, the specific job to be performed, or contract number.
VI. Certificate Holder (This is to always include Chatham County).

Chatham County as an Additional Insured: Chatham County invokes the defense of sovereign immunity. In order not to jeopardize the use of this defense, the County **is not** to be included as an Additional Insured on insurance contracts.

2.16.2 **Minimum Limits of Insurance** to be maintained for the duration of the contract:

a. **Commercial General Liability:** Provides protection against bodily injury and property damage claims arising from operations of a Contractor or Tenant. This policy coverage includes: premises and operations, use of independent contractors, products/completed operations, personal injury, contractual, broad form property damage, and underground, explosion and collapse hazards. Minimum limits: $1,000,000 bodily injury and property damage per occurrence and annual aggregate.

b. **Worker's Compensation and Employer's Liability:** Provides statutory protection against bodily injury, sickness or disease sustained by employees of the Contractor while performing within the scope of their duties. Employer's Liability coverage is usually included in Worker's Compensation policies, and insures common law claims of injured employees made in lieu of or in addition to a Worker's Compensation claim. Minimum limits: $500,000 for each accident., disease policy limit, disease each employee and Statutory Worker's Compensation limit.

c. **Business Automobile Liability:** Coverage insures against liability claims arising out of the Contractor's use of automobiles. Minimum limit: $1,000,000 combined single limit per accident for bodily injury and property damage. Coverage should be written on an Any Auto basis.

2.16.3 Special Requirements:

a. **Claims-Made Coverage:** The limits of liability shall remain the same as the occurrence basis, however, the Retroactive date shall be prior to the coincident with the date of any contract, and the Certificate of Insurance shall state the coverage is claims-made. The Retroactive date shall also be specifically stated on the Certificate of Insurance.

b. **Extended Reporting Periods**: The Contractor shall provide the County with a notice of the election to initiate any Supplemental Extended Reporting Period and the reason(s) for invoking this option.

c. **Reporting Provisions:** Any failure to comply with reporting provisions of the policies shall not affect coverage provided in relation to this request.

d. **Cancellation:** Each insurance policy that applies to this request shall be endorsed to state that it shall not be suspended, voided, or canceled, except after thirty (30) days prior to written notice by certified mail, return receipt requested, has been given to the County.

e. **Proof of Insurance:** Chatham County shall be furnished with certificates of insurance and with original endorsements affecting coverage required by this request. The certificates and endorsements are to be signed by a person authorized by the insurer to bind coverage on its behalf. All certificates of insurance are to be submitted prior to, and approved by, the County before services are rendered. The Contractor mus ensure Certificate of Insurance are updated for the entire term of the County.

f. **Insurer Acceptability:** Insurance is to be placed with an insurer having an A.M. Best's rating of A and a five (5) year average financial rating of not less than V. If an insurer does not qualify for averaging on a five year basis, the current total Best's rating will be used to evaluate insurer acceptability.

g. **Lapse in Coverage:** A lapse in coverage shall constitute grounds for contract termination by the Chatham County Board of Commissioners.

h. **Deductibles and Self-Insured Retention**: Any deductibles or self-insured retention must be declared to, and approved by, the County. At the option of the County, either: the insurer shall reduce or eliminate such deductibles or self-insured retention as related to the County, its officials, officers, employees, and volunteers; or the Contractor shall procure a bond guaranteeing payment of related suits, losses, claims, and related investigation, claim administration and defense expenses.

2.16.4 **Additional Coverage for Specific Procurement Projects:**

a. **Professional Liability:** Insure errors or omission on behalf of architects, engineers, attorneys, medical professionals, and consultants.

Minimum Limits:	$1 million per claim/occurrence
Coverage Requirement:	If claims-made, retroactive date must precede or coincide with the contract effective date or the date of the Notice to

Proceed. The professional must state if tail coverage has been purchased and the duration of the coverage.

b. **Builder's Risk: (For Construction or Installation Contracts)** Covers against insured perils while in the course of construction.
Minimum Limits: All-Risk coverage equal 100% of contract value
Coverage Requirements: Occupancy Clause - permits County to use the facility prior to issuance of Notice of Substantial Completion.

2.17 **Compliance with Specification - Terms and Conditions:** The Invitation to Bid, Legal Advertisement, General Conditions and Instructions to Bidders, Specifications, Special Conditions, Vendor's Bid, Addendum, and/or any other pertinent documents form a part of the bidders proposal or bid and by reference are made a part hereof.

2.18 **Signed Bid Considered Offer:** The signed bid shall be considered an offer on the part of the bidder, which offer shall be deemed accepted upon approval by the Chatham County Board of Commissioners, Purchasing Agent or his designee. In case of a default on the part of the bidder after such acceptance, Chatham County may take such action as it deems appropriate, including legal action for damages or lack of required performance.

2.19 **Notice to Proceed:** The successful bidder or proposer shall not commence work under this Invitation to Bid until a written contract is awarded and a Notice to Proceed is issued by the Purchasing Agent or his designee. If the successful bidder does commence any work or deliver items prior to receiving official notification, he does so at his own risk.

2.20 **Payment to Contractors:** Instructions for invoicing the County for products delivered to the County are specified in the contract document.

a. Questions regarding payment may be directed to the Finance Department at (912) 652-7905 or the County's Project Manager as specified in the contract documents.

b. Contractors will be paid the agreed upon compensation upon satisfactory delivery of the products or completion of the work as more fully described in the contract document.

c. Upon completion of the work or delivery of the products, the Contractor will provide the County or contractor with an affidavit certifying all suppliers, persons or businesses employed by the Contractor for the work performed for the County have been paid in full.

d. Chatham County is a tax exempt entity. Every contractor, vendor, business or person under contract with Chatham County is required by Georgia law to pay State sales or use taxes for products purchased in Georgia or transported into Georgia and sold to Chatham County by contract. Please consult the State of Georgia, Department of Revenue, Sales and Use Tax Unit in Atlanta (404) 656-4065 for additional information.

2.21 **County's Rights Concerning Award:**

The County reserves the right, and sole and complete discretion to waive technicalities and informalities. The County further reserves the right, and sole and complete discretion to reject all bids and any bid that is not responsive or that is over the budget, as amended. In judging whether the bidder is responsible, the County will consider, but is not limited to consideration of, the following:

(a) Whether the bidder or principals are currently ineligible, debarred, suspended, or otherwise excluded from bidding or contracting by any state or federal agency, department, or authority;

(b) Whether the bidder or principals have been terminated for cause or are currently in default on a public works contract;

(c) Whether the bidder can demonstrate sufficient cash flow to undertake the project as evidenced by a Current Ratio of 1.0 or higher;

(d) Whether the bidder can demonstrate a commitment to safety with regard to Workers' Compensation by having an Experience Modification Rate (EMR) over the past three years not having exceeded an average of 1.2; and

(e) Whether the bidder's past work provides evidence of an ability to successfully complete public works projects within the established time, quality, or cost, or to comply with the bidder's contract obligations.

(f) Whether the bidder has made a **Good Faith Effort** to meet local participation goals as set forth herein in Paragraph 2.22.

2.22 The Chatham County Board of Commissioners has adopted an aggressive program that establishes goals for minority/female, small and disadvantaged business participation in construction, professional services, and general procurement.

a. The Chatham County Board of Commissioners under Georgia law may reject any bid as non-responsive if they feel a bidder did not exercise **"Good Faith Effort"** in obtaining the goal established for M/WBE participation.

b. The Chatham County Board of Commissioners adopted a policy establishing goals oriented to increase participation of minority and female owned businesses, through MBE/WBE certification and development. In order to accurately document participation, businesses submitting bids, quotes or proposals are encouraged to report ownership status. A bidder or vendor that is certified by any agency of the Federal Government or State of Georgia may submit a copy of their certification with their bid as proof of qualifications. Bidders that intend to engage in joint ventures or utilize subcontractors must submit to the County Contracts Administrator, a report on Minority/Woman Business Enterprise participation.

Goals established for this project is <u>30% MBE/ WBE combined</u>.

c. A Minority/Woman Business Enterprise (M/WBE) is a business concern that is at least 51% owned by one or more minority/female individuals (2) and whose daily business operations are managed and directed by one

or more of the minority/female owners.

2.23 Bidders or proposers are required to make a **Good Faith Effort,** where subcontracting is to be utilized in performing the contract, to subcontract with or purchase supplies from qualified M/WBEs. Bidders or proposers are required to state if they intend to subcontract any part of the work. Goals will be established for each contract at the onset. **Forms** requiring the signatures of bidders or proposers are enclosed as **Attachments** and must be completed and returned with your bid response. If forms are not completed and submitted, the bid may be considered nonresponsive.

Each bidder or proposer is required to maintain records of such efforts in detail adequate to permit a determination of compliance with these requirements. All contracts will reflect **Good Faith Efforts** and reporting requirements for the term of the contract. The County particularly urges general contractors to give emphasis to subcontracting with local area firms. **For all questions regarding M/WBE participation and Good Faith Effort only,** contact : **Arneja Riley, Chatham County M/WBE Coordinator, 124 Bull Street, Suite 310 Savannah, Ga. 31401. Ph 912-652-7860; fax 912-652-7849; e-mail alriely@chathamcounty.org or http://purchasing.chathamcounty.org**

2.24 **GEORGIA OPEN RECORDS ACT** - The responses will become part of the County's official files without any obligation on the County's part. Ownership of all data, materials and documentation prepared for and submitted to Chatham County in response to a solicitation, regardless of type, shall belong exclusively to Chatham County and will be considered a record prepared and maintained or received in the course of operations of a public office or agency and subject to public inspection in accordance with the Georgia Open Records Act, Official Code of Georgia Annotated, Section 50-18-70, et. Seq., unless otherwise provided by law.

Responses to RFPs shall be held confidential from all parties other than the County until after the contract is awarded by the Board of Commissioners.

The vendor and their bid price in response to IFBs will be read allowed at public bid openings. After Bid Tabulations, the IFB shall be available for public viewing.

Chatham County shall not be held accountable if material from responses is obtained without the written consent of the vendor by parties other than the County, at any time during the solicitation evaluation process.

2.25 **GEORGIA TRADE SECRET ACT of 1990-** In the event a Bidder/Proposer submits trade secret information to the County, the information must be clearly labeled as a Trade Secret. The County will maintain the confidentiality of such trade secrets to the extent provided by law.

2.26 **CONTRACTOR RECORDS**-The Georgia Open Records Act is applicable to the records of all contractors and subcontractors under contract with the County. This applies to those specific contracts currently in effect and those which have been completed or closed for up th three (3) years following completion. Again, this is contract specific to the County contracts only.

2.27 **EXCEPTIONS**-All proceedings, records, contracts and other public records relating to procurement

transactions shall be open to the inspection of any citizen, or any interested person, firm or corporation, in accordance with the Georgia Open Records Act except as provided below:

a. Cost estimates relating to a proposed procurement transaction prepared by or for a public body shall not be open to public inspection.

b. Any competitive sealed bidding bidder, upon request, shall be afforded the opportunity to inspect bid records within a reasonable time after the opening of all bids but prior to award, except in the event that the County decides not to accept any of the bids and to rebid the contract. Otherwise, bid records shall be open to public inspection only after award of the contract. Any competitive negotiation offeror, upon request, shall be afforded the opportunity to inspect proposal records within a reasonable time after the evaluation and negotiations of proposals are completed but prior to award except in the event that the County decides not to accept any of the proposals and to reopen the contract. Otherwise, proposal records shall be open to the public inspection only after award of the contract except as provided in paragraph "c" below. Any inspection of procurement transaction records under this section shall be subject to reasonable restrictions to ensure the security and integrity of the records.

c. Trade secrets or proprietary information submitted by a bidder, offeror or contractor in connection with a procurement transaction shall not be subject to public disclosure under the Georgia Open Records Act; however, the bidder, offeror or contractor must invoke the protections of this section prior to or upon submission of the data or other materials, and must identify the data or other materials to be protected and state the reasons why protection is necessary.

d. Nothing contained in this section shall be construed to require the County, when procuring by "competitive negotiation" (Request for Proposal), to furnish a statement of the reasons why a particular proposal was not deemed to be the most advantageous to the County.

2.28 **DEBARRED OR SUSPENDED SUBCONTRACTORS:** CONTRACTOR shall not subcontract, and shall ensure that no subcontracts are awarded at any tier, to any individual, firm, partnership, joint venture, or any other entity regardless of the form of business organization, that is on the Federal Excluded Parties List System (EPLS) at https://www.epls.gov or the State of Georgia, DOAS, State Purchasing Exclusion listing. Contractor shall immediately notify County in the event any subcontractor is added to either Federal or State listing after award of the subcontract.

2.29 **CONE OF SILENCE:**

Lobbying of Procurement Evaluation Committee members, County Government employees, and elected officials regarding this product or service solicitation, Invitation to Bid (ITB) or Request for Proposal (RFP) or contract by any member of a proposer's staff, or those people employed by any legal entity affiliated with an organization that is responding to the solicitation is strictly prohibited. Negative campaigning through the mass media about the current service delivery is strictly prohibited. Such actions may cause your proposal to be rejected.

2.30 **OWNER'S RIGHT TO NEGOTIATE WITH THE LOWEST BIDDER:**

In the event *all* responsive and responsible bids are in excess of the budget, the Owner, in its sole and absolute discretion and in addition to the rights set forth above, reserves the right either to (i) supplement the budget with additional funds to permit award to the lowest responsive and responsible bid, or (ii) to

negotiate with the lowest responsive and responsible bidder (after taking all deductive alternates) only for the purpose of making changes to the Project that will result in a cost to the Owner that is within the budget, as it may be amended.

2.31 **REFERENCES - $500,000 or more:** On July 25, 2003 the Board of Commissioners directed that all construction projects with a bid of $500,000 or more, for bidders to be responsive each must provide information on the most recent five (5) projects with similar scope of work as well as other information to determine experience and qualifications as follows:

a. Project Name:_____
Location:_____
Owner:_____
Address:_____
City and State:_____
Contact:_____
Phone & Fax:_____
*Architect or Engineer:_____
Contact:_____
Phone & Fax:_____
Email:_____

b. The awarded bid amount and project start date.
c. Final cost of project and completion date.
d. Number of change orders.
e. Contracted project completion in days.
f. Project completed on time. Yes____ No____ Days exceeded_____.
g. List previous contracts your company performed for Chatham County by Project Title, date and awarded/final cost.
h. Has contractor ever failed to complete a project? If so, provide explanation.
i. Have any projects ever performed by contractor been the subject of a claim or lawsuit by or against the contractor? If yes, please identify the nature of such claim or lawsuit, the court in which the case was filed and the details of its resolution.

$499,000 and less: Provide references from owners of at least three (3) projects of various sizes for which contractor was the prime contractor. Include government owners if possible. If the contractor has performed any work for the Chatham County Board of Commissioners within the last five (5) years, at least one (1) of the three (3) owner references must be from the appropriate party within the Chatham County Government. provide in the format as in (a) above on the attached form.

Failure to provide the above information may result in your firm's bid being rejected and ruled as non-responsive.

NOTE: FORMS FOR YOU TO FILL OUT FOR YOUR REFERENCES ARE ATTACHED TO THE BACK OF THIS BID PACKAGE.

2.32 **CONSTRUCTION APPRENTICE PROGRAM HIRING**:

Chatham County has established a Construction Apprentice Program (CAP) to train area residents in the building trades. Successful Contractor shall be required to make a good faith effort to utilize labor from the CAP Program on this project when feasible. A Good Faith Effort will be demonstrated by documentation of inquiry into CAP labor available and resulting hiring of CAP labor or providing reasons for Contractor not utilizing any CAP labor. Form demonstrating Good Faith Effort is enclosed as Attachment F. Contractor shall complete the form and return with their first pay request. All questions regarding CAP student hiring should be directed to Construction Program Manager, Tara Sinclair at (912) 604-9574.

2.33 **SECURITY AND IMMIGRATION COMPLIANCE ACT AND SYSTEMATIC ALIEN VERIFICATION FOR ENTITLEMENTS (SAVE):**On July 1, 2008, the Georgia Security and Immigration Compliance Act (SB 529, Section 2) became effective. All contractors and subcontractors entering into a contract or performing work must sign an affidavit that he/she has used the E-Verify System. E- Verify is a no-cost federal employment verification system to insure employment eligibility. Affidavits are enclosed in this solicitation. You may download M-274 Handbook for Employers at http://www.dol.state.ga.us/spotlight/employment/rules.You may go to http://www.uscis.gov., to find the E-Verify information.

O.C.G.A. § 50-36-1, requires Georgia's counties to comply with the federal **Systematic Alien Verification for Entitlements (SAVE) Program.** SAVE is a federal program used to verify that applicants for certain "public benefits" are legally present in the United States. Contracts with the County are considered "public benefits." Therefore, the successful bidder will be required to provide the Affidavit Verifying Status for Chatham County Benefit Application prior to receiving any County contract. The affidavit is included as part of this bid package(Attachment H) but is only required of the successful bidder.

ADDITIONAL CONDITIONS

3.1 **Firm Fixed Price:** Contractor shall provide a firm fixed price which will be valid for acceptance within 90 days of receipt of bid

3.2. **METHOD OF COMPENSATION**. The compensation provided for herein shall include all claims by the CONTRACTOR for all costs incurred by the CONTRACTOR in the conduct of the Project as authorized by the approved Project Compensation Schedule and this amount shall be paid to the CONTRACTOR after receipt of the invoice and approval of the amount by the COUNTY. The COUNTY shall make payments to the CONTRACTOR within thirty (30) days from the date of receipt of the CONTRACTOR's acceptable statement on forms prepared by the CONTRACTOR and approved by the COUNTY.

Should the Project begin within any one month, the first invoice shall cover the partial period from the beginning date of the Project through the last day of the month (or on a mutually agreeable time) in which it began. The invoices shall be submitted each month until the Project is completed. Invoices shall be itemized to reflect actual expenses for each individual task; also refer to the requirements concerning changes, delays and termination of work under Sections I-8, 9, and 10 of the contract. Each invoice shall be accompanied by a summary progress report which outlines the work accomplished during the billing period and any problems that may be inhibiting the Project execution. The terms of this contract are intended to supersede all provisions of the Georgia Prompt Pay Act.

As long as the gross value of completed work is less than 50% of the total contract amount, or if the contractor is not maintaining his construction schedule to the satisfaction of the engineer, the County shall retain 10% of the gross value of the completed work as indicated by the current estimate approved by the engineer.

After the gross value of completed work becomes to or exceed 50% of the total contract amount within a time period satisfactory to the County, then the total amount to be retained may be reduced to 5% of the gross value of the completed work as indicated by the current estimate approved by the engineer, until all pay items are substantially completed.

When all work is completed and time charges have ceased, pending final acceptance and final payment the amount retained may be further reduced at the discretion of the County.

The CONTRACTOR may submit a final invoice to the County for the remaining retainage upon COUNTY'S acceptance of the Certificate of Substantial Completion. Final payment constituting the entire unpaid balance due shall be paid by the COUNTY to the CONTRACTOR when work has been fully completed and the contract fully performed, except for the responsibilities of the CONTRACTOR which survive final payment. The making of final payment shall constitute a waiver of all claims by Chatham County except those arising from unsettled liens, faulty or defective work appearing after substantial completion, failure of the work to comply with the requirements of the Contract Documents, or terms of any warranties required by the Contractor Documents or those items previously made in writing and identified by the COUNTY as unsettled at the time of final application for payment. Acceptance of final payment shall constitute a waiver of all claims by the CONTRACTOR, except those previously made in writing and identified by the CONTRACTOR as unsettled at the time of final application for payment.

3.2.1. **FORCE ACCOUNT:** When no agreement is reached for additional work to be done at Lump Sum or Unit Prices, then such additional work shall be done based on the following Cost-Plus-Percentage basis of payment. The Georgia Department of Transportation specifications for the use of a force account will not be used.

a. For work performed by the prime contractor/general contractor, the contractor shall be reimbursed for actual cost incurred in doing the work, and an additional payment of 15% to cover overhead and profit.

b. For work performed by a sub-contractor, the sub-contractor shall be reimbursed for actual cost incurred in doing the work, and an additional payment of 10% to cover overhead and profit. The contractor shall be allowed an overhead and profit mark-up not to exceed 7% on the subcontractor's price. The County shall not recognize subcontractors of subcontractors.

c. The term "Actual Cost" shall include the cost of material and labor as follows:

i. Material cost - Direct cost of material, sales tax, freight and equipment rental.

ii. Labor cost - Man hour cost listed separately by trade, payroll costs including workman's compensation, social security, pension and retirement.

d. The term "Overhead and Profit" shall include bonds (Payment & Performance, Roof & Wall), insurance (Liability, Builders Risk), permits, supervision costs (cost of subcontractor to supervise own work, cost of contractor to supervise work of sub-contractor), proposal preparation and all administrative costs.

3.2.2. N/A

3.3 **SURETY REQUIREMENTS and Bonds:** (Check where applicable)

X **A.** **Such bidder shall post a bid bond, certified check or money order made payable to the Chatham County Finance Department in the amount of 5% of the bid price.**

X **B.** **Contractor(s) shall post a payment/performance bond, certified check or money order made payable to the Chatham County Finance Department in the amount of 100% of the bid price if awarded the purchase. Such bond(s) are due prior to contract execution as a guarantee that goods meet specifications and will be delivered per contract. Such bonds will also guarantee quality performance of services and timely payment of invoices to any subcontractors.**

X **C.** **Whenever a bond is provided, it shall be executed by a surety authorized to do business in the State of Georgia and approved by Chatham County.**

X **D.** **Bidder acknowledges Chatham County's right to require a Performance and Payment Bond of a specific kind and origin. "Performance Bond" means a bond with good and sufficient surety or surities for the faithful performance of the contract and to indemnify the governmental entity for any damages occasioned by a failure to perform the same within the prescribed time. Such bond shall be payable to, in favor**

of, and for the protection of the governmental entity for which the work is to be done. "Payment Bond" means a bond with good and sufficient surety or sureties payable to the governmental entity for which the work is to be done and intended for the use and protection of all subcontractors and all persons supplying labor, materials, machinery, and equipment in the prosecution of the work provided for in the public works construction contract.

X **E. Forfeit the amount of the Bid Bond if he/she fails to enter into a contract with Chatham County to do and/or furnish everything necessary to provide service and/or accomplish the work stated and/or specified in this bid proposal for the bid amount, and;**

3.4 **Warranty Requirements:** (Check where applicable):

a. Provisions of item 2.12 apply.

b. Warranty required.

X 1. Standard warranty shall be offered with bid.

2. Extended warranty shall be offered with bid. The cost of the extended warranty will be listed separately on the bid sheet.

3.5 **Terms of Contract:** (check where applicable):

a. Annual Contract

b. One-time Purchase

X c. Other **ONE TIME CONTRACT**

CONVERSATIONS OR CORRESPONDENCE REGARDING THIS SOLICITATION OR REPORT BETWEEN PROSPECTIVE OFFERORS AND PERSONS OUTSIDE THE CHATHAM COUNTY PURCHASING OFFICE WILL NOT BE CONSIDERED OFFICIAL OR BINDING UNLESS OTHERWISE SPECIFICALLY AUTHORIZED WITHIN THIS DOCUMENT.

The undersigned bidder or proposer certifies that he/she has carefully read the preceding list of instructions to bidders and all other data applicable hereto and made a part of this invitation; and, further certifies that the prices shown in his/her bid/proposal are in accordance with all documents contained in this Invitation for Bids/ Proposals package, and that any exception taken thereto may disqualify his/her bid/proposal.

This is to certify that I, the undersigned bidder, have read the instructions to bidder and agree to be bound by the provisions of the same.

This _____ day of _____ 20 ____.

BY _____

SIGNATURE

_____

TITLE

_____

COMPANY

_____

Phone / Fax No's.

CHECKLIST FOR SUBMITTING BID

Sign below and submit this sheet with Bid

NOTE: All of the following items must be submitted with your Bid to be considered "responsive".

1. ACKNOWLEDGMENT OF ANY/ALL ADDENDUMS (Page 3 of ITB)

2. ORIGINAL SURETY BOND (5% OF BID) ALONG WITH *SURETY REQUIREMENTS* SHEET FILLED OUT (page 23 of ITB)

3. BID SHEET COMPLETELY FILLED OUT AND SIGNED.

4. "LIST OF SUBCONTRACTORS" SHEET FILLED OUT WITH ALL SUBCONTRACTORS AND SUPPLIERS.

5. "% TO MBE SUBCONTRACTORS/SUPPLIERS" (ON ATTACHMENT G) SHOWING % OF PROJECT THAT IS PROJECTED TO GO TO M/WBE SUBCONTRACTORS / SUPPLIERS MUST BE COMPLETELY FILLED OUT.

6. SECTION 2.28 OF ITB (page 16) REFERENCES: Read this section and submit the correct number of "References" (based on total dollar amount of project) Note: Supply ALL the information that is requested for each Reference. NOTE: *Forms for Reference Information are attached to this Bid Package.*

7. COMPLETE AND SUBMIT ALL *ATTACHMENTS* TO THE ITB (Attachments A thru H).

8. SUBMIT A COPY OF YOUR CURRENT *STATE OF GEORGIA UTILITY CONTRACTORS LICENSE.*

_____

NAME / TITLE

_____

COMPANY

_____

ADDRESS

_____

PHONE / FAX NO'S.

CHATHAM COUNTY, GEORGIA

SURETY REQUIREMENTS

A Bid Bond for five percent (5%) of the amount of the bid **is** required to be submitted with each bid.

A Performance Bond for one hundred percent (100%) of the bid **will** be required of the successful bidder.

The Bidder certifies that he/she has examined all documents contained in this bid package, and is familiar with all aspects of the proposal and understands fully all that is required of the successful bidder. The Bidder further certifies that his/her bid shall not be withdrawn for thirty (30) days from the date on which his bid is publicly opened and read.

The Bidder agrees, if awarded this bid, he/she will:

A. Furnish, upon receipt of an authorized Chatham County Purchase Order, all items indicated thereon as specified in this bid proposal for the bid amount, or;

B. Enter a contract with Chatham County to do and/or furnish everything necessary to provide the service and/or accomplish the work as stated and/or specified in this bid proposal for the bid amount, and;

C. Furnish, if required, a Performance Bond, and acknowledges Chatham County's right to require a Performance Bond of a specific kind and origin, and;

D. Forfeit the amount of the Bid Bond as liquidated damages if he/she fails to enter a contract with Chatham County as stated in (B) above, within fifteen (15) days of the date on which he/she is awarded the bid, and/or;

E. Forfeit the amount of the Performance Bond as liquidated damages if he/she fails to execute and fulfill the terms of the contract entered. The amount of forfeiture shall be:

1. The difference between his/her bid and the next lowest, responsible bid that has not expired or been withdrawn, or;

2. The difference between his/her bid and the amount of the lowest, responsible bid received as a result of rebidding, including all costs related to rebidding.

_____ _____

COMPANY DATE

_____ _____

SIGNATURE TITLE

_____

TELEPHONE NUMBER

PROPOSAL

SPECIFICATIONS FOR:

CHATHAM COUNTY FLEET OPERATIONS - PHASE I - SITE WORK

BID NO. 12-0004-4

This project consists of the redevelopment of the former 84 Lumber site located at 4020 Ogeechee Road for use as Chatham County fleet vehicle maintenance. Work shall include clearing, pavement demolition, asphalt paving, concrete paving, grading, gravity sanitary sewer, 249 LF, 16 ft deep jack and bore deneath Ogeechee road and Shuman Blvd, domestic water service, fire suppression service lateral, pavement markings, signage, landscape restoration, erosion and sediment pollution control and traffic control during construction.

Construction shall be performed in accordance with the Georgia Department of Transportation (GDOT) *Standard Specifications for Construction of Transportation Systems* (2001 Edition), Special Provisions, Standard Details, and Construction Details and current City of Savannah Standard Construction Details and Technical Specifications..

Note: This shall be a unit price contract. Quantities are approximate and payment shall be for actual in-place work measurements.

COMMENCEMENT AND COMPLETION:

WORK SHALL BEGIN WITHIN 10 DAYS AFTER RECEIPT OF "NOTICE TO PROCEED". ALL WORK SHALL BE COMPLETED WITHIN 90 CALENDAR DAYS AFTER THE TEN DAY PERIOD.

Chatham County Fleet Services - Site improvements
BID FORM

EARTHWORK, PAVING & CONSTRUCTION					
Item	Description	Quantity	Units	Unit Price	Total
1	Pavement Subgrade Preparation	2,773	SY		
2	Grading Complete	700	CY		
3	Lagoon Excavation	830	CY		
4	Swale Excavation	600	CY		
5	Clearing	1	LS		
6	Sawcut Existing Asphalt	1,180	LF		
7	Remove Asphalt	4,007	SY		
8	Remove Pavement Base	4,007	SY		
9	Remove Existing Fence	470	LF		
10	Removed Concrete Pads & Bollards	1	LS		
11	8" Granite Aggregate Base Course	860	SY		
12	1-1/2" Asphaltic Concrete Surface Course	860	SY		
13	3" Asphaltic Concrete Binder	860	SY		
14	Prime Coat	860	SY		
15	Tack Coat	860	SY		
16	8" Concrete Pavement	1,913	SY		
17	24" Reinforced Flush Header Curb	55	LF		
18	Handicap Ramp and Landing	1	LS		
19	4" Schedule 40 Conduit	320	LF		
20	Concrete Wheel Stops	18	EA		
21	Signage and Striping	1	LS		
				Subtotal, EARTHWORK, PAVING & CONSTRUCTION	

WATER SYSTEM					
22	Cap Existing 1" Water Service Lateral	1	LS		
23	4" Water Service Lateral	120	LF		
24	2" Meter & Backflow	1	LS		
25	Water Service Connection	1	EA		
26	6" Fire Line	115	LF		
27	6" RPZ	1	LS		
28	Fire Main Connection	1	EA		
				Subtotal, WATER SYSTEM	

SANITARY SEWER SYSTEM					
Item	Description	Quantity	Units	Unit Price	Total
29	Remove Existing Septic System	1	LS		
30	Connection to Existing Manhole	1	LS		
31	Jack and Bore 18" Steel Casing (14'-16')	240	LF		
31	8" Ductile Iron Sanitary Sewer (14-16')	240	LF		
32	8" PVC sanitary sewer (14-16')	89	LF		
33	8" PVC sanitary sewer (10-12')	400	LF		
34	Standard Manhole (14' - 16')	2	EA		
35	Standard Manhole (10' - 12')	2	EA		
36	6" Service Lateral Connection with Cleanout	2	EA		
37	6" PVC Lateral	170	LF		
				Subtotal, SANITARY SEWER SYSTEM	
STORM DRAINAGE SYSTEM					
38	Oil Separator Baffle	1	LS		
				Subtotal, STORM DRAINAGE SYSTEM	

Chatham County Fleet Services - Site improvements
BID FORM

EROSION CONTROL					
Item	Description	Quantity	Units	Unit Price	Total
39	Erosion Control	1	LS		
				SubTotal, EROSION CONTROL	

LANDSCAPING					
Item	Description	Quantity	Units	Unit Price	Total
40	Landscaping	1	LS		
				Subtotal, LANDSCAPING	

BASE BID	
Subtotal, EARTHWORK, PAVING & CONSTRUCTION	
Subtotal, WATER SYSTEM	
Subtotal, SANITARY SEWER SYSTEM	
Subtotal, STORM DRAINAGE SYSTEM	
Subtotal, EROSION CONTROL	
Subtotal, LANDSCAPING	
TOTAL	

NAME / TITLE

COMPANY

ADDRESS

PHONE / FAX NO'S.

LIST OF SUBCONTRACTORS

I do _____, do not _____, propose to subcontract some of the work on this project. I propose to subcontract work to the following subcontractors:

NAME AND ADDRESS	TYPE OF WORK

SIGNED: _____

CONTRACTOR

Specification Information for
Chatham County Fleet Services

Project Name:

Chatham County Fleet Services

Project Summary:

The project consists of the redevelopment of the former 84 Lumber site located at 4020 Ogeechee Road for use as Chatham County fleet vehicle maintenance. Work shall include clearing, pavement demolition, asphalt paving, concrete paving, grading, gravity sanitary sewer, 240 LF, 16-ft deep jack and bore beneath Ogeechee Road & Shuman Blvd, domestic water service, fire suppression service lateral, pavement markings, signage, landscape restoration, erosion and sediment pollution control and traffic control during construction.

Technical Specifications:

Construction shall be performed in accordance with:

The Georgia Department of Transportation's Standard Specifications for Construction of Transportation Systems (2001 Edition), Special Provisions, Standard Details, and Construction Details.

Current City of Savannah Standard Construction Details and Technical Specifications

Project Duration

Contractor shall have and aggregate time of 90 days to substantially complete the scope of work. Contractor shall be required to coordinate with the construction and renovation of the service building. Such coordination may be require portions of work to be performed prior to and following building construction.

Traffic Control

All work performed and encroaching into GDOT right of way shall be in compliance with requirements.
Contractor shall be responsible for maintaining safe access and egress for businesses serviced by Shuman Blvd at all times.

INDEX TO

SECTION 01700 - MEASUREMENT AND PAYMENT

PART 1 - MEASUREMENT

PART 2 - PAYMENT

SECTION 01700
MEASUREMENT AND PAYMENT

PART 1 - MEASUREMENT

1.01 The items listed in the proposal shall be considered as sufficient to complete the work in accordance with the plans and specifications. Any portion of the work not listed in the bid form shall be deemed to be a part of the item which it is associated with and shall be included in the cost of the unit shown on the bid form. Payment for the unit shown on the bid form shall be considered to cover the cost of all labor, material, equipment and performing all operations necessary to complete the work in place. The unit of measurement shall be the unit shown on the bid form. Payment shall be based upon the actual quantity multiplied by the unit prices. Where work is to be performed at a lump sum price, the lump sum shall include all operations and elements necessary to complete the work. No payment will be made for any material wasted, unused, rejected, or used for the convenience of the Contractor.

PART 2 - PAYMENT

2.01 **CLEARING:**

A. Clearing and Grubbing for the construction of roadways, driveways, sidewalks, drainage pipes, water mains, lift stations, sanitary sewer force mains, and sanitary pipes will be included in the lump sum price for "Clearing".

B. Remove and Replace/Relocate Fence - Payment will be made at the contract unit price per linear foot for the amount actually installed. Payment will include all costs for removing, storing and reinstalling the existing fence or furnishing and installing a new fence as required by the Engineer or the Owner.

C. Remove and Replace/Relocate Mailboxes and Signs - There will be no separate payment for mailboxes and signs. Removal and replacement/relocation of mailboxes and signs shall be a subsidiary obligation of the contractor in the restoration of disturbed areas and will include the removal, installing in a temporary location and reinstallation after construction is completed.

D. Remove and replace Hedges and Shrubs - There will be no separate payment for hedges and shrubs, unless otherwise stipulated. Removal and replacement of hedges and shrubs will be included in the lump sum price for "Clearing".

2.02 EARTHWORK:

A. Grading of Roadways, construction of ditches, dressing of shoulders, removing and replacing topsoil, and all excavation, backfill, compaction, borrow, testing, staking, and construction supervision shall be included in the contract lump sum price for "Grading".

B. Mucking - Payment will be made on a contract unit price for each cubic yard removed and replaced. Payment will include excavation, disposal of unsuitable material, borrow, backfilling, compaction and testing.

2.03 EROSION AND SEDIMENTATION CONTROL:

A. Measurement for erosion and sedimentation control shall be based on the lump sum price as shown on the bid proposal. The cost of erosion control shall include all equipment, labor and materials necessary to comply with the State of Georgia Erosion and Sediment Control Manual. Should there be no item in the bid proposal for the Contractor to bid on for erosion control, the Contractor must incorporate the cost of complying with federal, state, and local agencies in their price for the job.

2.04 STORM DRAINAGE:

A. Pipe Culverts and Storm Drains - The length of pipe will be paid for on a linear foot basis, as measured along the centerline, from end of pipe to end of pipe. Payment will constitute full compensation for all pipe, joints, filter fabric, bedding, trenching, excavation, backfill, compaction, televising and all incidental labor and material necessary to complete the construction of pipe as required by this section of the specifications.

B. Manholes and Drainage Structures - Payment will be made on a contract unit price basis. Payment will constitute full compensation for all excavation, formwork, backfill, bedding, compaction, frames, gratings, covers, concrete, brick, all miscellaneous materials and labor necessary to complete the construction.

C. Headwalls - Payment will be made on a contract unit price of each type. Payment will constitute full compensation for the excavation, formwork, all materials and incidentals necessary to complete the construction.

D. Sheeting and Bracing - Will not be measured for direct payment and all costs and charges in connection therewith shall be reflected and included in the item of work to which it pertains.

E. Subgrade Drain - Payment for subgrade drain will be made at the contract unit price per linear foot. Payment will constitute full payment for trenching, furnishing and installing the perforated drain pipe, furnishing and placing the stone backfill, proper backfilling, furnishing and installing the fabric, surface clean-up, acceptable connection to structures, and all work necessary to make the installation complete.

F. Stone Backfill - Stone backfill will be measured by using the length for which stone is ordered by the Engineer, times a depth of 6-inches, times a width of 2 feet wider than the outside diameter of the pipe barrel. Payment will include the cost of removing and disposing of the unsuitable material and furnishing and placing the stone for area outside of the template described in Item AA@.

G. Sand Backfill - Sand backfill will be measured by using the length for which sand is ordered by the Engineer, times a depth of 1 foot, times a width of 2 feet wider than the outside diameter of the pipe barrel. Payment will include the cost of removing and disposing of the unsuitable material and furnishing and placing the sand for area outside of the template described in Item AA@.

H. Borrow - Payment shall be made for the compacted volume of the borrow material. Compacted volume shall be calculated using a maximum width of 2 feet wider than the outer diameter of the pipe and the depth shall be based on the approved construction plans. If additional width is excavated, it shall be backfilled at Contractor's expense. Payment will include furnishing, hauling, placing and compacting the "borrow" material. Payment will also include disposing of the unsuitable material in an area furnished by the Contractor.

I. Ditch Excavation - Excavations required for the construction of new ditches and regrading of existing ditches will be paid for under the lump sum items for "Ditch Excavation". The quantity to be paid for periodically will be determined by the ratio of the linear feet completed to the total linear feet required by the contract. If any ditch construction is added to or deleted from the contract, up to a 25% difference in

contract amount, the lump sum amount will be adjusted by the ratio of the linear feet added or deducted to the linear feet required by the contract. The ratio shall be determined by the Engineer.

2.05 GRASSING:

A. When the season or stage of the project is such that the results of the grassing work cannot be determined, conditional acceptance will be made on the work done. When conditional acceptance is made for the items of work covered, the Contractor shall be entitled to 50% of his bid price for the actual work placed and shall receive the remaining 50% of his bid price when final acceptance is made. Conditional acceptance shall not apply to the remaining items of work, and full bid price payment shall be made when the work is acceptably placed and completed in accordance with the specifications.

B. Payment for grassing will be made at the contract unit price for the item "Grassing" and such payment shall constitute full compensation for furnishing and placing seed and fertilizer or sod where directed and protecting and maintaining seed or sod in all graded and disturbed areas.

2.06 WATER DISTRIBUTION SYSTEM:

A. Clearing - There will be no separate measurement for clearing for water lines. Payment will be included in the project lump sum item for "Clearing".

B. Pipe and Tubing - Payment for pipe and tubing will be made at the applicable unit price per linear foot for the various types and sizes of pipe or tubing which are actually placed, as shown on the plans, or as directed by the Engineer. Excavation, backfill, compaction, testing, and all other incidentals to the placing of the pipe and tubing shall be considered as subsidiary obligations of the Contractor for the completion of the line in place. The length of mains and branch lines to be paid for will be determined by measurement along the centerline of the various sizes and types of pipe actually furnished and installed, from the center of fitting, and from the center of the main to the end of the branch connection. No deduction will be made for the space occupied by valves and fittings.

C. Restrained Joints - Shall be paid for by the number of joints for each size actually installed in accordance with the manufacturer's specifications. Payment shall include all material, labor, excavation, accessories and incidentals required to make the installation.

D. Fittings - Fittings for ductile iron and plastic pipe in the distribution system will be paid for on the basis of the unit price per pound of ductile iron fittings at the weights listed in ANSI/AWWA C153/A21.53 for mechanical joint fittings 4" - 16" and in ANSI/AWWA C110/A21.10 for mechanical joint fittings larger than 16". The adapters necessary to connect to valves shall be considered a part of the line in which they are installed.

E. Concrete Thrust Blocking - Payment shall be at the contract unit price per cubic yard placed in accordance with the details. Payment shall include all excavation, formwork, concrete, backfill and incidental construction necessary to complete the concrete thrust blocking.

F. Concrete Thrust Collar - Payment shall be at the contract unit price per installation. Payment shall include the cost of supplying the mechanical joint plug, intermediate flange, reinforced concrete collar and all excavation, backfill formwork and incidental construction necessary to complete the concrete thrust collars.

G. Polyethylene Tube Encasement - Will be paid for at the contract unit price per linear foot along the centerline of the particular size pipe. Where polyethylene tubing is called for from station to station, this will include polyethylene tubing around all fittings exposed to the soil.

H. Metallic Detector Tape - No separate payment will be made for tape. The cost of furnishing and placing metallic detector tape shall be included in the contract unit price for installing the pipe.

I. Tracing Wire - No separate payment will be made for tracing wire. Cost of furnishing and placing tracing wire shall be included in the contract unit price for installing the pipe.

J. Steel Casing (Jacked or Bored) - Will be paid for at the contract unit price per linear foot for each size of casing installed, which payment shall be full

compensation for furnishing all materials, excavation, installation, backfilling, and all incidentals necessary to complete the item.

K. Valves - Valves in the distribution system will be paid for at the contract unit price for each size and type. Payment will include furnishing and installing the valves, valve boxes, concrete collars, manholes, or vaults.

L. Connections to Existing Mains with Tapping Sleeves - Payment will be made at the contract unit price. Such payment will include all labor, materials, and equipment necessary to locate, excavate, furnish and install the sleeve, valve, valve box or manhole, concrete collar, the existing main, thrust blocking, backfilling and compaction.

M. Dry Connections to Existing Mains - Payment for connections of new mains to existing mains will be made at the contract unit price for each type connection and will include all labor and materials required to locate, excavate, cut and connect in an acceptable and workmanlike manner.

N. Post Hydrants - Payment for post hydrants will be made at the contract unit price. Payment will include furnishing and installing the 2" ball valve, valve box, post hydrant, the concrete collar, thrust block and gravel.

O. Fire Hydrants - Payment for new fire hydrants will be made at the contract unit price for fire hydrants. Payment will include the cost of furnishing and installing the hydrant, stone reaction blocking and backfilling. The 6-inch pipe from the main line to the hydrant will be paid for separately as 6-inch pipe.

P. House Service Connections - Payment for House Service Connections will be made at the contract unit price. Payment will include the cost of furnishing and installing the tapping saddle, pipe tap or tee, marking stake, corporation stop and the curb stop at the property line. The service tubing will be paid for separately at the contract unit price for 1-inch tubing.

Q. Lower Existing Water Main - Payment will be made at the contract unit prices for the various sizes. Payment will be full compensation for all labor, equipment and materials necessary to lower the main and reconnect existing service laterals.

R. Offset Existing Water Main - Payment will be made at the contract unit prices for the various sizes. Payment for the offset will be full compensation for all labor, materials and equipment necessary to expose and cut the existing pipe, construct the offset, and reconnect existing service laterals.

S. Relocate Water Meters - Payment for relocating water meters will be made at the contract unit price. Payment shall include the cost of materials, equipment, and labor necessary for removing and reinstalling the meter and box, reconnecting to existing service, excavating, backfilling and compaction.

T. Grassing - Payment for Grassing will be paid under the contract item "Grassing". Cost shall include all grassing to restore the disturbed areas.

U. Cleaning and Disinfecting - No separate payment will be made for cleaning and disinfecting. Cleaning and disinfecting piping in the distribution system will be included in the lump sum and unit prices for the appropriate items.

2.07 WASTEWATER COLLECTION SYSTEM:

A. Clearing - There will be no separate measurement for clearing for sanitary sewers. Payment will be included in the project lump sum items for "Clearing".

B. Sewer Pipe - Measurements will be made for the actual linear foot of pipe. No deduction will be made for the space occupied by fittings. Payment for sewers will include cost of excavating all material, testing, backfilling, compaction, cleaning, televising and all work necessary to complete the sewer lines. Payment shall be based on the size and cut which is defined as the distance from the pipe invert to the existing grade above the pipe.

C. Sheeting and Bracing - No separate payment will be made for bracing and sheeting.

D. Manholes - Payment for manholes will be made at the unit price for various types. Payment shall include the cost of excavating, dewatering, constructing the manholes in accordance with the plans, furnishing and installing a frame and cover and steps, backfilling and compacting the material around the manhole. Payment shall be based on the diameter and cut which is defined as the distance from the manhole invert to the top of the manhole cover.

E. Steel Casing (Jacked or Bored) - Will be paid for at the contract unit price per linear foot for each size of casing installed, which payment shall be full compensation for furnishing all materials and including excavation, backfilling, and all incidentals necessary to complete the item.

F. Tees - Payment will be made at the contract unit price. Payment shall include the fitting, plug and flag stake.

G. Laterals - Shall be measured from the end of the tee to the point where the lateral reaches the property line. Payment will include furnishing the pipe, backfilling, compaction, plug, marking stake and all items necessary to complete the laterals.

H. Metal Detector Tape - No separate payment will be made for Tape. Cost of furnishing and placing Metal Detector Tape shall be included in the contract unit price for installing metallic/PVC pipe.

I. Stubs and Plugs - Shall be paid for at the contract unit price for each stub of the designated diameter. Payment shall include one (1) 4-foot length of pipe, connection to the manhole and a plug suitable for the type of pipe being installed.

J. Stone Backfill - Stone backfill will be measured by using the length for which stone is ordered by the Engineer, times a depth of 6-inches times a width of 2 feet wider than the barrel of the pipe. Payment will include the cost of removing the unsuitable material below the invert and furnishing and placing the stone. Payment for stone shall only be made when dewatering by well points, or by other means, is not attainable.

K. Sand Backfill - Sand backfill will be measured and paid by using the length for which sand is ordered by the Engineer, times a depth of 12-inches, times a width of 2 feet wider than the barrel of the pipe. Payment will include excavating the unsuitable material below the invert, furnishing and compacting the sand backfill. Payment will be made for sand borrowed from off-site. If on-site sand is available, it shall be used at no additional cost to the Owner. Payment will also include disposal of unsuitable material off-site.

L. Borrow - Payment shall be made for the compacted volume of the borrow material. Compacted volume shall be calculated using a maximum width of 2 feet wider than the outer diameter of the pipe and the depth shall be based on the approved construction plans. If additional width is excavated, it shall be backfilled at Contractor's expense. Payment will include furnishing, hauling,

placing and compacting the "borrow" material. Payment will also include disposing of the unsuitable material in an area furnished by the Contractor.

M. Grassing - Payment for grassing will be paid under the contract item "grassing". Cost shall include all grassing to restore disturbed areas.

N. Connect Gravity Sewer to Existing Manhole - Payment will be made at the contract unit price and will include all materials and work required to make the connection, backfilling, compaction and clean up.

O. Mandrel, Lateral and Infiltration Tests - No separate payment will be made for these tests.

2.08 LIFT STATION AND FORCE MAIN:

A. Lift Stations - All work except the force main covered in this subsection will be paid for under the lump sum item for the Lift Station(s). Work described in other sections necessary to make the Lift Station complete will also be included in the lump sum payment for the "Lift Station." Such work will include submersible pumps, site preparation, access road, fencing, grassing, potable water system, electrical, control system, hoist system and clean-up.

B. Force Mains - Shall be paid for at the contract unit price per linear foot for the various sizes. Payment will include the pipe, fittings, thrust blocking, excavation, backfilling, compaction, testing, grassing, tracing wire and warning tape. Satisfactory tests must be completed before payment is made.

C. Air Release Valve and Manhole - Payment will be made at the contract unit price and will include furnishing and installing the valve and manhole, ball valve, piping, saddle, backfilling, compacting, grassing and clean-up.

D. Sheeting and Bracing - No separate payment will be made for bracing and sheeting.

E. Steel Casing (Jacked or Bored) - Will be paid for at the contract unit price per linear foot for each size of casing installed, and shall include the furnishing of all materials, excavation, backfilling, and all incidentals necessary to complete the item.

F. Restrained Joints - Shall be paid for by the number of joints for each size actually installed in accordance with the manufacturer's specifications. Payment shall include all material, labor, excavation, accessories and incidentals required to make the installation.

G. Polyethylene Tube Encasement - Will be paid for at the contract unit price per linear foot along the centerline of the particular size pipe. Where polyethylene tubing is required from station to station, this will include polyethylene tubing around all fittings exposed to the soil.

H. Connect Force Mains to Existing Structures - Payment for connections of the new force mains with existing structures will be made at the contract unit price for each type connection and will include all labor and materials required to locate, excavate, cut and connect in an acceptable and workmanlike manner.

I. Borrow - Payment shall be made for the compacted volume of the borrow material. Compacted volume shall be calculated using a maximum width of 2 feet wider than the outer diameter of the pipe and the depth shall be based on the approved construction plans. If additional width is excavated, it shall be backfilled at Contractor's expense. Payment will include furnishing, hauling, placing and compacting the "borrow" material. Payment will also include disposing of the unsuitable material in an area furnished by the Contractor.

J. Stone Backfill - Stone backfill will be measured by using the length for which stone is ordered by the Engineers, times a depth of 6-inches times a width of 2 feet wider than the barrel of the pipe. Payment will include the cost of removing the unsuitable material and furnishing and placing the stone.

K. Sand Backfill - Sand backfill will be measured by using the length for which sand is ordered by the Engineer, times a depth of 12-inches, times a width of 2 feet wider than the barrel of the pipe. Payment will include excavating the unsuitable material below the invert, furnishing and compacting the sand backfill.

L. Metal Detector Tape - No separate payment will be made for Tape. Cost of furnishing and placing metal detector tape shall be included in the contract unit price for installing the pipe.

M. Tracing Wire - No separate payment will be made for tracing wire. Cost of furnishing and placing tracing wire shall be included in the contract unit price for installing the pipe.

N. Grassing - There will be no separate measurement or payment. Grassing shall be a subsidiary obligation of the Contractor in the restoration of disturbed areas.

2.09 PAVEMENT:

A. Clearing - There will be no separate measurement for clearing for pavements. Payment will be included in the project lump sum item for "Clearing".

B. Proof-Rolling - Payment for proof-rolling will be made on an hourly basis. The Engineer shall direct these operations and will not order proof-rolling to be made for a period of time less than two (2) hours.

C. Filter Fabric - Will be paid for at the contract unit price per square yard of subbase or base covered.

D. Prime Coat & Tack Coat - Will be paid for at the contract unit price per square yard of base course or pavement covered.

E. Base Course - Will be paid for at the contract unit price per square yard of completed and accepted base course.

F. Surface Course - Will be paid for at the contract unit price per square yard of completed and accepted surface course payment.

G. Remove and Replace Pavement - Payment will be made at the contract unit prices for the various pavement replaced. Where a pipe crosses a street or driveway, payment will be made for the number of square yards of pavement removed and replaced, as described below:

The width of the pavement cut shall be twice the pipe diameter in feet times the depth to invert of pipe from ground surface in yards. Pavement removed beyond this limit will be replaced at the Contractor's expense.

H. Adjust Existing Inlets, Manholes and Valve Boxes - Payment will be made at contract unit price per each structure adjusted. Price will be full compensation for removal and replacement of castings, adequately adjusting the tops of the structure, properly anchoring the castings, restoring the surface and clean up.

I. Stone Stabilization for Streets - Payment will be made at the contract unit price for the work authorized and accepted by the Engineer.

J. Traffic Line Painting - Will be paid for at the contract unit price per linear foot of traffic line painted. Payment will include the cleaning and preparing of surfaces, furnishing of all materials, the application, curing and protection of the painted line, the protection

of traffic including necessary warning signs, the furnishing of all tools, machines and all other equipment necessary to complete the striping.

K. Concrete Pervious Pavement - Payment will be made at the unit price per square yard in place and shall include all base preparation and surface finishing and curing.

2.10 CAST-IN-PLACE CONCRETE:

A. Curb and Gutter - Payment for concrete curb and gutter sections will be made at the unit price per linear foot for the amount actually installed. Measurement will be along the centerline of the completed and accepted curb.

B. Paved Drives, Walks, and Fillets - Payment will be made at the unit price per square yard which includes full compensation for grading to a satisfactory section, compaction of subgrade, forming, pouring, tinting and finishing of concrete and clean up. Payment to replace existing sidewalk will be made at the unit price per square yard.

C. Concrete Steps - Payment will be made at the concrete unit price per riser regardless of width. Payment shall include shaping and compacting the subgrade, forms, tinting, furnishing, placing and finishing the concrete, dressing the area and clean-up.

D. Removal of Sidewalks, Driveways and Steps - Removal of walks, driveways and steps to be replaced, shall be included in the grading operation. Payment for such removal will be included in the lump sum bid item "Grading".

E. Concrete Block Retaining Walls - Payment will be made at the contract unit price per linear foot for the various heights constructed and accepted. Payment will be full compensation for all labor, equipment, and materials necessary to perform the necessary excavations, construct the wall, including footing, and backfill behind the wall.

F. Curing Compound - No separate payment will be made for curing compound. All costs and charges in connection therewith shall be included and reflected in the payment for each type of concrete work.

G. Flowable Fill - Payment will be made at the unit price per cubic yard in place.

2.11 REHABILITATION PROCEDURES TO RESTORE CONCRETE AND MASONRY STRUCTURES

Payment shall be based on a vertical foot for manholes and on a square foot for all other structures. Depth of manholes shall be measured from the top of the ring and cover to the top of the bench.

END OF SECTION

INDEX TO

SECTION 02100 - CLEARING

SECTION 02100

CLEARING

PART 1 - PRODUCTS

NONE IN THIS SECTION.

PART 2 - EXECUTION

2.01 CLEARING:

A. Clearing shall consist of the felling, and cutting of trees into sections, and the satisfactory disposal of the trees and other vegetation designated for removal, including down timber, snags, brush, fences, rubbish and other objectionable material occurring within the area of construction, except such trees and vegetation as may be indicated or directed to be left standing. Only those trees, shrubs, lawns, sidewalks, fences, etc. that fall within the limits of construction or that interfere with proper construction practices shall be removed. Trees designated to be left standing within the cleared areas shall be trimmed of dead branches 1-1/2 inches or more in diameter. Limbs and branches to be pruned shall be cut to Natural Target Pruning standards by a certified arborist. Trees and vegetation to be left standing shall be protected from damage incident to clearing, grubbing, and construction operations, by the erection of timber 4' high chain link fencing barriers. Such barriers must be placed and be approved by the Owner before construction operations can proceed. Clearing shall also include the removal and disposal of structures that obtrude, encroach upon, or otherwise obstruct the work. Clearing operations shall be conducted so as to prevent damage by falling trees to trees left standing, to existing structures and installation, and to those under construction, and so as to provide for the safety of employees and others.

2.02 TREE REMOVAL:

A. Where indicated or directed, trees and stumps shall be removed from areas outside those areas designated for clearing and grubbing. This work shall include the felling of such trees and the removal of their stumps and roots. Trees shall be disposed of as hereinafter specified.

2.03 DISPOSAL:

A. Disposal of trees, branches, snags, brush, stumps, etc., resulting from the clearing and grubbing shall be the responsibility of the Contractor and shall be disposed of by removal from the site of this work. All costs in connection with disposing of the material will be at the Contractor's expense. All liability of any nature resulting from the disposal of the cleared and grubbed material shall become the responsibility of the Contractor. The disposal of all materials cleared and grubbed will be in accordance with the rules and regulations of the local, State, and Federal authorities.

2.04 GRUBBING:

A. Grubbing shall consist of the removal and disposal of stumps, roots larger than ½ inch in diameter, and matted roots from the designated grubbing areas. This material, together with logs and other organic or metallic debris not suitable for foundation and subgrade purposes, shall be excavated and removed to a depth of not less than 18-inches below the original surface level of the ground in embankment areas and not less than 2-feet below the finished earth surface in excavated 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.

2.05 EXISTING TREE PROTECTION:

A. SITE DEVELOPMENT PROJECTS:

The following requirements pertain primarily to site development projects such as Community Centers, Fire Stations, and other projects that require Tree Quality Points:

1. Tree Protection Zones shall be established and maintained on a site for all trees which are to be awarded Tree Quality Points. A Tree Protection Zone shall be defined as one foot lateral radius per inch diameter breast height (dbh) surrounded by a 4' high chain link fence. All tree protection shall be done in compliance with Section VII-A of the City of Savannah's Land Clearing and Tree Protection Ordinance. Tree Protection shall be installed and inspected by the City's Ordinance Administrator prior to issuance of a Land Clearing permit. Where pervious paving is allowed inside the Tree Protection Zone, it shall comply with ASTM Standards for testing and acceptance. Water compaction and hand rolling with a one ton maximum roller only shall be permitted in the installation of pervious paving within Tree

Protection Zones. No vibratory equipment shall be used to finish paving. No crusher run or other impervious materials shall be used in the subbase. The Ordinance Administrator shall be notified 24 hours prior to a pour or installation. See Section 02600, Part 3 for "Pervious Concrete Specifications."

2. The required minimum number of Tree Quality Points shall be maintained on site at all times. Any loss of Tree Quality Points that drop the site below its required minimum shall be replaced in accordance with Section VII-C of the Land Clearing and Tree Protection Ordinance. All planting shall be done in accordance with ANSI A300-1995 Standards.

3. No trenching, root raking, grading, driving or parking, storage or disposal of construction materials shall occur within any Tree Protection Zone at any time during clearing or construction of the project.

4. Trenching is not allowed within Tree Protection Zones. Tunneling shall replace trenching in all Tree Protection Zones. Tunneling shall be performed at the minimum depth of 24" below existing grade.

B. PROJECTS WITHIN CITY RIGHT-OF-WAYS

1. The following requirements pertain to Street Paving, Sidewalks, Water and Sewer, and Drainage Projects:

   Tree Protection Zones for all Street Paving, Sidewalk Construction, Water and Sewer, and Drainage Improvement Projects shall be established and maintained in compliance with Section VII of the Tree Protection Ordinance to all reasonable extents possible. All demolition, excavation, and construction within Tree Protection Zones shall be performed by hand or with light equipment whenever possible. Clean cuts to roots shall be made at all times. Wound dressing is not recommended. All cuts and pruning shall be done according to ANSI A300-1995 standards. All debris shall be pulled away from trunks during demolition to minimize root damage and compaction. All excavation shall be filled to original levels and tamped to original firmness. Contractor shall notify Park and Tree Department immediately if any roots 3/4" diameter or larger are damaged so that an inspection can be made to determine impact and whether the root(s) should be cut or the design modified. For street paving projects where tree replacement is required, the minimum replacement shall be one canopy tree per 40 linear feet of frontage. All planting shall be done in accordance with ANSI A300-1995 Standards.

2. Violations, Remedies and Penalties for Projects in which Tree Quality Points are Applicable

Encroachment into a Tree Protection Zone that results in 50% or greater loss of root system, cambium, limbs, or a combination of the above shall result in 100% loss of Tree Quality Points for the tree. Loss of less than 50% shall result in a proportional reduction of Tree Quality Points, subject to the judgment of the Administrator. If the Administrator determines that tree protection has failed to the extent that a tree meets removal criteria, the Park and Tree Department shall remove the tree, if on City property, and the contractor shall replace the Tree Quality Points (TQP) lost in accordance with Section VII of the Ordinance. The Contractor shall also reimburse the Owner for removal costs.

2.06 REMOVE AND REPLACE FENCE:

A. Where existing fences must be removed, the materials shall be removed neatly and stored carefully. Reinstallation of the fence shall match the line and height of the existing fence, except as directed by the Engineer, when fences are to be replaced. The existing materials may be used, provided they are not damaged. Any damaged materials shall be replaced with new material equal to and matching in appearance the existing material. Fences that are required for security of private or public property shall be reinstalled before the end of the workday in which they were removed.

2.07 REMOVE AND REPLACE MAILBOXES:

A. Where existing mailboxes must be removed, they shall be removed neatly and stored carefully or installed in a temporary location as directed by the Engineer. Reinstallation of the mailboxes shall match their previous location and height. The existing materials shall be used, provided they are not damaged. Any damaged materials shall be replaced with new material equal to and matching in appearance the existing material.

2.08 REMOVE AND REPLACE SHRUBS AND GROUNDCOVERS:

A. Shrubs and groundcovers that are to be retained shall be preserved and protected. Items that must be disturbed or relocated shall be carefully removed so as to prevent damage to the root systems, stored, and replanted as soon as possible after construction in the area is completed. Heeling in, mulching and regular watering are minimum preservation treatments.

2.09 REMOVE AND REPLACE SIGNS:

A. Where existing signs must be removed, they shall be removed neatly and stored carefully or installed in a temporary location a directed by the Engineer. Reinstallation of the signs shall match their previous location and height. The existing materials shall be used, provided they are not damaged. Any damaged materials shall be replaced with new material equal to and matching in appearance the existing material.

INDEX TO

SECTION 02200 - EARTHWORK

SECTION 02200

EARTHWORK

PART 1 - PRODUCTS

1.01 MATERIALS:

A. **General:** Where the terms "approved", "suitable", "unsuitable" and similar designations are used in specifications section pertaining to earthwork, it means earth or material designated as being approved, suitable or unsuitable, for their intended use by the soils technician of the Engineer.

B. **Suitable Soil Materials** are defined as those complying with ASTM D-2487 soil classification groups: GW, GP, GM, SM, SW, and SP.

C. **Unsuitable Soil Materials** are defined as those complying with ASTM D-2487 soil classification groups GC, SC, MH, ML, CL, CH, OL, OH, PT. Clays, silts, and organic soils will be considered as unsuitable materials. Excess water in materials will be a basis for establishing unsuitable material regardless of gradation.

D. **Backfill and Fill Materials** shall be suitable soil materials free of clay, rock or gravel larger than 2" in any dimension, debris, waste, frozen materials, vegetable and other deleterious matter. Suitable materials for earth fill shall generally be composed of sands, clay-sand and silt-sand mixtures and shall be approved by the soils technician or the Engineer prior to being incorporated in fills.

E. **Borrow** shall consist of sand or sand clay soils capable of being readily shaped and compacted to the required densities, and shall be free of roots, trash and other deleterious material.

PART 2 - EXECUTION

2.01 TOP SOIL

A. Contractor shall strip and stockpile topsoil.

B. Topsoil shall be placed to a depth of 4" over all disturbed areas.

C. Any remaining topsoil will be hauled off site and disposed of at the Contractor's expense.

D. Additional topsoil shall meet Georgia Department of Transportation Specification 893.01. Any additional topsoil which is required to repair disturbed areas and complete the contract shall be provided by the Contractor at his expense.

2.02 EXCAVATION

A. Excavation is unclassified and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.

B. All excavation shall be in conformity with the lines, grades and cross sections shown on the Plans or established by the Engineer. All suitable material removed in the excavation shall be used as far as practicable in formation of embankments, subgrades and shoulders, and at such other places as may be indicated on the Plans or directed by the Engineer.

C. **Unauthorized Excavation** consists of removal or loosening of materials beyond indicated subgrade elevations or dimensions without specific directions of the Engineer. Unauthorized excavation as well as remedial work directed by Engineer and as specified herein shall be at Contractor's expense.

Under footings, foundation bases, or retaining walls, fill unauthorized excavations by extending indicated bottom elevation of footing or base to the bottom of the excavation without altering required top elevation.

Elsewhere, backfill and compact unauthorized walls, fill unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by the Engineer.

D. **Additional Excavation:** When excavation has reached required subgrade elevations and unsuitable materials exist, carry excavations deeper and replace excavated materials as directed by the Engineer. Dispose of unsuitable material as directed by the Engineer.

The Contractor shall dispose of unsuitable and surplus materials except where the Engineer permits the use of such fill on slopes, or unless specific disposal areas are shown on the Plans.

E. **Dewatering:** Prevent surface water and subsurface or ground water flowing into excavations and from flooding project site and surrounding area. Do not allow water to accumulate in excavations. Remove water to prevent

softening of roadway subgrades and foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.

The Contractor will be responsible for all damage incurred in handling water conditions.

F. **Material Storage:** Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage and to minimize erosion. Locate and retain soil materials away from edge of excavations. Do not store within drip-line of trees indicated to remain.

G. **Excavation for Structures:** Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10', maintain sufficient distance from footings and foundations to permit placing and removal of concrete framework, installation of services, other construction, and for inspection.

In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.

H. Proper drainage shall be maintained at all times.

I. Perform excavation within drip-line of large trees to remain **by hand** or by other means which will result in (1) cleanly twisting, tearing, breakage or other injury to roots remaining on the tree. Protect existing trees and shrubs at all times during earthwork operations. No trees shall be removed without prior approval of the Owner.

2.03 BORROW

A. Shall be excavated and hauled by the Contractor from their own sources and shall meet the requirements as specified.

B. Borrow shall be procured by the Contractor.

C. Contractor shall bear all expenses in developing borrow sources, including drying material, haul roads, excavation and hauling.

2.04 GROUND SURFACE PREPARATION FOR FILL

A. All vegetation such as roots, brush, heavy sods, heavy growth of grass, decayed vegetation matter, rubbish, and other unsuitable material within the areas to be filled shall be stripped and removed prior to beginning the fill operation.

B. Sloped ground surfaces steeper than 1 vertical to 4 horizontal on which fill is to be placed shall be plowed, stepped, benched or broken up as directed, in such a manner that the fill material will bond with the existing surface.

C. Surfaces on which fill is to be placed and compacted shall be wetted or dried as may be required to obtain the specified compaction.

2.05 FILL

A. Shall be reasonably free from roots, organic material, trash and stones having maximum dimensions of 6 inches.

B. Shall be placed in successive horizontal layers of 8 inches (4 inches for hand tamped compaction) in loose depth for the full width of the cross-section and compacted as required with heavy compaction equipment.

2.06 FINISH GRADING

A. All areas covered by the project, including excavated and filled sections and adjacent transition areas, shall be smooth graded and free from irregular surface changes.

B. Degree of finish shall be that ordinarily obtainable from either blade-grader or scraper operations, supplemented with hand raking and finishing, except as otherwise specified.

C. The finished surface of unpaved areas shall be not more than 0.05' feet above or below the established grade or designed cross-section. Grading shall be done in order that no ponding will occur.

D. Ditches shall be finished smooth to reduce erosion and permit adequate drainage.

2.07 DISPOSAL OF WASTE MATERIAL

A. All vegetation, roots, brush, sod, broken pavements, curb and gutter, rubbish, and other unsuitable or surplus material stripped or removed from the limits of construction shall be disposed of by the Contractor.

2.08 PROTECTION

A. Protect existing trees and shrubs at all times during earthwork operations. No trees shall be removed without prior acceptance of the Owner.

B. The Contractor shall be responsible for protection of all utilities shown on the drawings or indicated by the Owner at all times during earthwork operations.

C. Graded areas shall be protected from traffic, erosion, or settlement, that may occur from any cause prior to acceptance.

D. Any repair or reestablishment of grades prior to final acceptance shall be at the Contractor's expense.

PART 3 - TESTING

3.01 COMPACTION TESTING

A. **General**: Compaction of earth fill and all pavement subgrades shall be performed to the percentage of maximum standard or modified dry densities and to the depths as indicated below:

B. Roadway Subgrades: 100% Standard (ASTM Test D-698) Compact top 12" in Parking areas and top 15" in Driveways.

C. Subgrades under pavement removed and replaced for utility installations: 100% Standard (ASTM Test D-698) to 12 inch depth.

D. Structural Fill under all structures, slabs and steps: 98% Standard (ASTM Test D-698). Compact top 12 inches of subgrade and each layer of fill.

E. Subgrade below Sidewalks and Curb and Gutters: 97% Standard (ASTM Test D-698) Compact top 6 inches.

F. Unpaved Areas to be grassed, sodded or landscaped: 90% Standard (ASTM Test D-698) full depth.

All other areas not described above: as directed by the Engineer.

G. **Moisture Control:** All compaction shall be performed at material moisture contents within 3 percentage points, plus or minus, of optimum. Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by dicing, harrowing or pulverizing until moisture content has reached a satisfactory value.

H. **Field Density Tests:** Tests shall be made in accordance with ASTM Method D-1556 and/or ASTM 2922. Minimum testing frequency shall be based on the most stringent of the following requirements (as applicable). Additional tests may be required by the Engineer in areas deemed critical.

- One every layer of fill
- One every 200 cubic yards of fill
- One every 250 square yards of roadway subgrade or fill
- One every building subgrade
- Areas where degree of compaction is in question

If in opinion of Engineer, based on testing service reports and inspection, subgrades or fills which have been placed below specified density shall require additional compaction and testing.

I. **Proof Rolling:** Proof rolling of the subbase or subgrade of all areas of new road paving will be required. Equipment shall be a single axle dump loaded with rock or crusher run with a maximum axle load of 15,000 pounds, or as determined by the Engineer. A City representative shall be on site to observe the operation.

INDEX TO

SECTION 02270 - EROSION AND SEDIMENTATION CONTROL

PART 1 - PRODUCTS

1.01 CHEMICALS FOR DUST CONTROL:

A. Calcium Chloride, Anionic Asphalt Emulsion, Latex Emulsion or Resin-in-Water Emulsion may be used for dust control.

1.02 SILT FENCE FABRIC:

A. Silt fence fabric shall be a woven fabric certified to meet FHWA's Task Force 25 minimum roll average per ASTM-D-4354. The geotextile fabric shall be a woven sheet of plastic yarn, of a long chain synthetic polymer composed of at least 85% by weight propylene, ethylene, amide, ester, or vinylidene chloride, and shall contain stabilizer and/or inhibitors added to the base plastic to make the filaments resistant to deterioration due to ultra-violet and/or heat exposure. The fabric should be finished so that the filaments will retain their relative position with respect to each other. The fabric shall be free of defects, rips, holes, or flaws.

The fabric shall meet the following requirements:

Woven Fabrics

Grab Strength	90 lbs.
Mullen Burst Strength	250 lbs.
UV Resistance	90%
Permittivity	15 gal/min/sf.

Product shall be equivalent to EXXON GTF-180 Fabric or AMOCO Woven Construction Fabric No. 1380.

Silt fencing shall not be placed in waterways or areas of concentrated flow. Type "C" wire-reinforced silt fence shall be used where fill slopes exceed 3:1.

1.03 GABIONS:

A. Gabions shall be constructed of heavy galvanized steel wire mesh with a zinc coating of triple hexagon weave. The mesh wire diameter for the galvanized gabions shall be 2.2 mm (.0866") ± 2-1/2%; the mesh edge wire shall be not less than 2.7 mm - 2-1/2%. The lacing wire for binding the netting units together shall be 2.2 mm (.0866") + 2-1/2%.

Geotextiles are recommended to be used behind all gabion structures and shall be specified in accordance with AASHTO M288-96 Section 7.5, "Permanent Erosion Control Requirements."

1.04 HAY BALES:

A. Hay bales rectangular in shape shall be bound with wire or nylon to securely contain the material. Pine straw bales may be used in lieu of hay bales. Bales shall be placed in a single row, lengthwise, on the contour and embedded in the soil to a depth of four (4) inches. Bales must be securely anchored in place by stake or bars driven through the bales.

1.05 PLASTIC FILTER FABRIC:

A. Plastic filter fabric shall be a pervious sheet of plastic yarn, of a long chain synthetic polymer composed of at least 85% by weight propylene, ethylene, amide, ester, or vinylidene chloride, and shall contain stabilizers and/or inhibitors added to the base plastic to make the filaments resistant to deterioration due to ultra-violet and/or heat exposure. The cloth should be finished so that the filaments will retain their relative position with respect to each other. The cloth shall be free of defects, rips, holes, or flaws. During shipment and storage, the filter fabric shall be wrapped in a protective material. The fabric shall meet the following requirements.

Woven Fabrics:

Tensile Strength (any direction)	200 lbs.
Bursting Strength	400 psi
Elongation Before Breaking	15%
Permittiviy	4 gal/min/sf

Product shall be equivalent to EXXON GTF-400E or AMOCO Woven Construction Fabric No. 2002.

B. Seams - Fabric may be sewn together with thread of a material having the same chemical requirements as the material forming the fabric or shall be bonded by cementing or by heat. The strength of the seams shall be equal to that of the unaged fabric. Fabrics to be used under Rip-Rap are allowed to be bonded or sewn together forming sections not less than six feet wide.

1.06 SHEET PILING:

A. Sheet piling shall be treated timber (0.5 CCA), steel (minimum 3/8-inch thick), or other material accepted on a case by case basis by the Engineer for the site at which the piling is used.

1.07 **STONE:**

A. Stone shall be hard quarry, granite or field stone and shall be of such quality that the stone will not disintegrate on exposure to water or weather. The stone size, type and weight shall be as shown in conjunction with the structure with which it is associated. The stone shall be accepted by the Engineer prior to delivery.

1.08 **TREATED TIMBERS:**

A. Treated timbers (0.5 CCA) shall be a nominal 4" by 4" and of varying length to accommodate the size of the proposed structure.

1.09 **RIP-RAP:**

A. Rip-rap shall be hard quarry or field stone, and shall be of such quality that they will not disintegrate on exposure to water and weather. The stone shall range in weight from a minimum of 25 pounds to a maximum of 150 pounds. At least 50 percent of the stone pieces shall weigh more than 60 pounds. The stone pieces shall have a minimum plane dimension of 12 inches. The stone analysis, source and other pertinent data shall be submitted for review by the Engineer prior to delivery. The filter fabric for permanent Rip-rap shall be Mirafi 140N or equivalent. Rip Rap shall not be placed on slopes steeper than 1.5 horizontal to 1.0 vertical.

PART 2 - EXECUTION

2.01 **GENERAL:**

A. Every effort shall reasonably be employed by the Contractor to control erosion with the use of, but not limited to, terraces, grassing, and silt fencing during the project. All erosion and sedimentation control measures or facilities, whether temporary or permanent, shall be continuously maintained by the Contractor so as to be effective, or as ordered by the Owner.

2.02 **BUFFER ZONE:**

A. Buffer zone is an undisturbed zone or "green belt" surrounding the site, bordering streams or environmentally sensitive areas. Contractors shall not trespass on or in these areas unless he has prior acceptance by the Owner. Trespass in these areas will not be permitted unless there is no alternative method to accomplish the task. Cost shall not come into consideration in the evaluation of this type of request.

2.03 CONSTRUCTION EXIT:

A. Construction exits shall be located at the exits of the project to remove mud from the tires of all vehicles leaving the site. The construction exit shall consist of a minimum of six (6) inch thick pad of washed stone meeting Section AASHTO M288-96, Section 7.4, Stabilization Requirements. The aggregate size shall be in accordance with National Stone Association R-2 (1 ½"-3 ½" diameter in size and of the necessary length to accomplish the task for which it is intended. The pad may require periodic top dressing with 2" of similar stone. Geotextiles are required and a Separation/ Stabilization fabric to keep the aggregate stone from becoming contaminated with subgrade soils. The geotextile shall be based on AASHTO M288-96 Specifications. The entrance area must be excavated to a depth of 3 inches and be cleaned of all vegetation and roots. Geotextile underliner must be placed the full length and width of the entrance.

2.04 DISTURBED AREA STABILIZATION:

A. Vegetative cover will be placed on completed areas. This vegetative plan will be carried out on road cut and fill slopes, shoulders, and other critical areas created by construction. Plant grass seed as soon as construction in an area is completed. Planting will be made to control erosion, to reduce damage from sediment and runoff to downstream areas and to improve the safety and beauty of the development area.

Due to grading and construction, the areas to be treated are mainly subsoil and substrate. Fertility is low and the physical characteristics of the exposed material are unfavorable to all but the most hardy plants.

Conventional Seeding Equipment - Grade, shape and smooth where needed to provide for safe equipment operation at seeding time and for maintenance purposes. The lime and fertilizer in dry form will be spread uniformly over the area immediately before seedbed preparation. A seedbed will be prepared by scarifying to a depth of 1 to 4 inches as determined on site. The seedbed must be well pulverized, smoothed and firmed. Seeding will be by either a cultipacker-seeder, drill, rotary seeder, mechanical seeder, hand seeder or hydro-seeding. Seed will be distributed uniformly over a freshly prepared seedbed and covered lightly. Within 24 hours after seeding, with exception to hydro-seeding, straw or hay mulch will be spread uniformly over the area, leaving about 25 percent of the ground surface exposed. Mulch will be spread with blower-type mulch equipment or by hand and anchored immediately after it

is spread. A disk harrow with the disk set straight or a special packer disk may be used to press the mulch into the soil.

The per acre application rates are as follows using conventional seeding equipment on slopes less than 3:1:

Soil Treatment	Application Rate/Acre
Agricultural limestone	4000 #/acre
Fertilizer, 10-10-10 (with micro-nutrients)	1500 #/acre
Mulch, straw or hay	4000 #/acre

2.

Seed Species	Application Rates/Acre	Planting Dates
Hulled common bermuda grass	10 #	3/1 - 9/30
Rye grass	50 #	10/1 - 2/28
Hay mulch for temporary cover	4000 #	N/A

Top-dressing: Apply when plants are 2 to 4 inches tall

Fertilizer (Ammonium Nitrate 33.5%) at 300 #/acre

If the projects extends in to the second year, fertilizer shall be applied at the rate of 800 #/acre.

2.05 DUST CONTROL ON DISTURBED AREAS:

A. Dust raised from vehicular traffic will be controlled by wetting down the access road with water or by the use of a deliquescent chemical, such as calcium chloride, if the relative humidity is over 30%. Chemicals shall be applied in accordance with the manufacturer's recommendations. Calcium chloride, anionic asphalt emulsion, latex emulsion or resin-in-water emulsion may be used for dust control.

2.06 DOWNDRAIN STRUCTURE:

A. Downdrain structures shall be constructed where shown on the drawings and elsewhere as necessary to carry runoff down slopes to prevent the formation of rills or gullies. Downdrain structures shall be a paved chute, steel or plastic pipe, or sectional pipe at the discretion of the contractor. Outlets of downdrains shall outfall into stabilized areas only. Soil around the inlet shall be compacted to prevent the pipe from being washed out by seepage. Rock rip-rap or other suitable materials shall be placed at the outlet for stabilization.

2.07 GABIONS:

A. Gabions shall be of the size shown on the drawing and as dimensioned in the details on the plans. The gabions shall be laced together along the perimeter of all surfaces and filled with 4" to 8" diameter stone in 3 lifts, with two connecting wires placed between each lift. Care shall be taken to protect the vertical panels from being bent during filling.

2.08 SEDIMENT BARRIER:

A. Sediment barrier shall be constructed of hay bales (pine bales) anchored and embedded into the soil to prevent washout or water washing under the barrier. A minimum of two (2) re-bars, steel pickets or 2" x 2" stakes shall be used per bale and shall be long enough to extend through the bale and be driven into the ground a minimum of 1-1/2 feet. Where two (2) rows are called for, the bales shall be staggered. Bales shall be embedded in the soil to a depth of 4 inches.

Bales shall be placed in a single row, lengthwise, on the contour and embedded in the soil to a depth of four (4) inches. Bales must be securely anchored in place by stakes or bars driven through the bales.

2.09 SILT FENCE:

A. Silt fence shall be placed at the approximate location shown on the plans and installed in accordance with the Georgia Erosion and Sediment Control Manual recommendations. Type "C" wire-reinforced silt fence shall be used where fill slopes exceeds 3:1. Silt fence shall not placed in waterways or areas of concentrated flow.

2.10 STONE PLACEMENT:

A. The minimum thickness or depth of the stone layer shall be shown on the drawings or the detail with which the device is associated. When used with a plastic filter fabric, the stone placing shall begin in a trench at the bottom of the slope with the filter fabric wrapped in stone. The entire mass of stone shall be placed so as to be in conformance with the lines, grades, and thickness shown on the drawings.

2.11 RIP-RAP:

A. Rip-rap shall be placed in accordance with the notes on the drawings. Any rip rap that shall be permanent shall have an underlayment of filter fabric.

2.12 STORM DRAIN OUTLET PROTECTION:

A. Storm drain outlets shall be paved or have a rock or other energy dispersion device associated with it, as called for on the drawings. The length shall be a minimum of six (6) times the pipe diameter and placed on a 1% grade unless otherwise specified on the drawings.

To prevent undermining of the rip-rap apron a separation geotextile shall be used beneath the entire length of apron. The geotextile shall be specified in accordance with AASHTO M288-96, Section 7.5, "Permanent Erosion Control Requirements".

2.13 INLET SEDIMENT TRAP:

A. The Contractor shall erect silt fence or hay bales at and around inlets under construction. Existing inlets in paved areas shall be protected by the use of concrete blocks wrapped with filter fabric as per detail. Sufficient quantities of selected devices shall be utilized to completely protect the entire length of the inlet. Contractor may alternately construct a temporary baffle in the inlet on the effluent pipe per detail providing that accumulated sediment be removed after each erosion event.

2.14 SITE RESTORATION:

A. The site shall be restored in a manner suitable to accommodate the erosion control device or system of devices for the use which they are intended.

2.15 TOPSOIL:

A. If topsoil is stripped and stored on site to be used after construction, the stockpile side slopes shall be 2:1 or flatter. Stockpiled topsoil shall not obstruct natural drainage. Topsoil replacement shall be spread at minimum of 4" thickness.

2.16 SITE SAFETY:

A. The Contractor shall incorporate and utilize all necessary fencing and other safety barriers as necessary, or directed by Owner, to prevent trespassing into potentially dangerous areas of the erosion control area.

END OF SECTION

INDEX TO

SECTION 02485 - GRASSING

SECTION 02485

GRASSING

PART 1 - PRODUCTS

1.01 MATERIALS GENERAL:

A. The Contractor shall, at the time of delivery, furnish the Engineer invoices of all materials, received in order that the application rate of materials may be determined.

1.02 FERTILIZER:

A. 10-10-10, commercial fertilizer of accepted type, conforming to state fertilizer laws.

1.03 LIME:

A. Lime shall be agricultural grade, ground limestone and shall conform to the requirements of the Georgia Department of Agriculture. Lime to be added based on soil tests.

1.04 SEED:

A. All seed shall conform to all State Laws and to all requirements and regulations of the Georgia Department of Agriculture.

B. The several varieties of seed shall be individually packaged or bagged, and tagged to show name of seed, net weight, origin, germination, lot number, and other information required by the Department of Agriculture.

C. The Engineer reserves the right to test, reject, or accept all seed before seeding.

D. Mixtures of different types of seed called for in the seeding schedule shall be weighted and mixed in the proper proportions at the site of the work in the presence of the Engineer.

1.05 SEEDING SCHEDULE:

A. Hulled Bermuda Seeds are to be used at a rate of 40 pounds per acre, and at a depth of 1/4 to 1/8 inch. Pure line seed to be 82% by weight, with a maximum weed seed of 0.50%.

B. In shaded areas, or other areas as directed by the Owner or Engineer, the Contractor shall use a mixture of hulled Bermuda seed at a rate of 25 pounds per acre and carpet seed at a rate of 30 pounds per acre.

C. Temporary grassing shall consist of annual rye grass seed at a rate of 75 pounds per acre.

D. In areas where existing grasses are to be matched, the Contractor shall sow the seed at the rate recommended by the seed distributor.

1.06 STRAW MULCH:

A. Straw mulch material shall consist of straw or hay. Straw shall be stalks of wheat, rye, barley, oats, or other accepted straw. Hay shall consist of timothy, peavine, alfalfa, coastal bermuda or other grasses from accepted sources. These materials shall be reasonably dry and shall be reasonably free from mature seed-bearing stalks, roots, or bulblets or Johnson Grass, Nutgrass, Sandbur, Wild Garlic, Wild Onion, Wild Mustard, Crotolaria, Pigweed, Witchweed and Coclebur. The Contractor shall also comply with all State and Federal domestic plant quarantine regulations.

1.07 EXCELSIOR MULCH:

A. Excelsior mulch shall consist of wood fibers cut from sound, green timber. The average length of the fibers shall be 4 to 6 inches. The cut shall be made in such a manner as to provide maximum strength of fiber, but at a slight angle to the natural grain of the wood so as to cause splintering of the fibers when weathering in order to provide adherence to each other and to the soil.

1.08 WOOD CELLULOSE FIBER MULCH:

A. Wood cellulose fiber mulch shall be made from wood chips particles manufactured particularly for discharging uniformly on the ground surface when dispersed by a hydraulic water sprayer. It shall remain in uniform suspension in water under agitation and blend with grass seed and fertilizer to form a homogenous slurry. The mulch fibers shall intertwine physically to form a strong moisture holding mat on the ground surface and allow rainfall to percolate the underlying soil. The mulch shall be heat processed so as to contain no germination or growth-inhibiting factors. It shall be dyed (non-toxic) an appropriate color to facilitate metering of material.

B. Suppliers shall be prepared to certify that laboratory and field testing of their project has been accomplished, and that it meets all of the foregoing requirements based upon such testing.

C. Weight specifications for this material from suppliers and for all applications shall refer only to air dry weight of fiber material. Absolute air dry weight is based on the normal weight standard of the Technical Association of the Pulp and Paper Industry for wood cellulose and is considered equivalent to 10% moisture. Each package of the cellulose fiber shall be marked by the manufacturer to show the air dry weight content.

1.09 SOD:

A. Sod shall be densely rooted, good quality centipede grass, free from noxious weeds. The sod shall be obtained from areas where the soil is reasonably fertile. The sod shall be raked free of all debris and the grass mowed to two inches before cutting. The sod shall contain practically all of the dense root system and not be less than one (1) inch thick. Sod shall be cut in uniform strips not less than twelve (12) inches in width and not less than twenty-four (24) inches in length.

1.10 PRODUCT REVIEW:

A. The Contractor shall provide the Engineer with a complete description of all products before ordering. The Engineer will review all products before they are ordered.

PART 2 - EXECUTION

2.01 STAND OF GRASS:

A. Before acceptance of the seeding performed for the establishment of permanent vegetation, the Contractor will be required to produce a satisfactory stand of perennial grass whose root system shall be developed sufficiently to survive dry periods and the winter weather and be capable of re-establishment in the spring.

B. Before acceptance of the seeding performed for the establishment of temporary vegetation, the Contractor will be required to produce a stand of grass sufficient to control erosion for a given area and length of time before the next phase of construction or the establishment of permanent vegetation is to commence.

2.02 SEEDING DATES AND RATES OF APPLICATION:

A. Seeding shall be performed during the periods and at the rates specified in the seeding schedules. Seeding work may, at the discretion of the Contractor, be performed throughout the year using the schedule prescribed for the given period. Seeding work shall not be conducted when the ground is

frozen or excessively wet. The Contractor will be required to produce a satisfactory stand of grass regardless of the period of the year the work is performed.

2.03 PREPARATION:

A. The areas to be seeded or sodded shall be made smooth and uniform and shall conform with the finished grade and cross section shown on the plans or as otherwise designated. Minor shaping and smoothing of uneven and rough areas outside the graded section shall be performed as directed by the Engineer in order to provide for more effective erosion control and for ease of subsequent mowing operations.

B. The areas to be grassed, if not loose, shall be loosened to a minimum depth of 3 inches before agricultural lime, fertilizer, seed or sod is applied. The areas to be seeded shall be cleared of stones larger than 2-1/2-inches, in any dimension, roots, and other debris.

2.04 APPLYING LIME AND FERTILIZER:

A. Following advance preparation and placing selected material for shoulders and slopes when called for in the contract, lime if called for based on soil tests and fertilizer shall be spread uniformly over the designated areas and shall be thoroughly mixed with the soil to a depth of approximately 2 inches. Fertilizer shall be applied at the rate of 500 pounds per acre for the initial application, unless otherwise directed by the Engineer. Lime shall be applied at the rate determined by the soil test. Unless otherwise provided, lime will not be applied for temporary seeding. In all cases where practicable, acceptable mechanical spreaders shall be used for spreading fertilizer. On steep slopes subject to slides and inaccessible to power equipment, the slopes shall be adequately scarified. Fertilizer may be applied on steep slopes by hydraulic methods as a mixture of fertilizer and seed. When fertilizer is applied in combination seed and fertilizer drills, no further incorporation will be necessary. The fertilizer and seed shall be applied together when the method of seeding (Wood Cellulose Fiber Mulch) is used. Any stones larger than 2-1/2 inches in any dimension, larger clods, roots, or other debris brought to the surface shall be removed.

2.05 SEEDING:

A. Seed shall be sown within 24 hours following the application of fertilizer and lime and preparation of the seedbed as specified in Section 2.04. Seed shall be uniformly sown at the rate specified by the use of acceptable mechanical seed

drills. Rotary hand seeders, power sprayers or other satisfactory equipment may be used on steep slopes or on other areas that are inaccessible to seed drills.

B. The seeds shall be covered and lightly compacted by means of a cultipacker or light roller if the drill does not perform this operation. On slopes inaccessible to compaction equipment, the seed shall be covered by dragging spiked chains, by light harrowing or by other satisfactory methods.

C. Apply water with fine spray immediately after each area has been sown.

D. Do not sow seed when ground is too dry, during windy periods or immediately following a rain.

E. All seeded areas seeded with permanent grasses shall be uniformly mulched in a continuous blanket immediately following seeding and compacting operations, using at least 2 tons of straw per acre.

2.06 SEEDING (EXCELSIOR MULCH):

A. Seed shall be sown as specified in Section 2.05. Within 24 hours after the covering of seed, excelsior mulch shall be uniformly applied at the rate of 2 tons per acre. The mulch may be applied hydraulically or by other acceptable methods. Should the mulch be placed in a dry condition, it shall be thoroughly wetted immediately after placing. The Engineer may require light rolling of the mulch to form a tight mat.

2.07 SEEDING (WOOD CELLULOSE FIBER MULCH):

A. After the lime has been applied and ground prepared as specified in Section 2.04, wood cellulose fiber mulch shall be applied at the rate of 1,500 pounds per acre in a mixture of seed and fertilizer. Hydraulic equipment shall be used for the application of fertilizer, seed and slurry of the prepared wood pulp. This equipment shall have a built-in agitation system with an operating capacity sufficient to agitate, suspend, and homogeneously mix a slurry of the specified amount of fiber, fertilizer, seed and water. The slurry distribution lines shall be large enough to prevent stoppage. The discharge line shall be equipped with a set of hydraulic spray nozzles which will provide an even distribution of the slurry on the various areas to be seeded. The slurry tank shall have a minimum capacity of 1,000 gallons.

The seed, fertilizer, wood pulp mulch, and water shall all be combined into the slurry tank for distribution of all ingredients in one operation by the hydraulic seeding method

specified herein. The materials shall be combined in a manner recommended by the manufacturer. The slurry mixture shall be so regulated that the amounts and rates of application shall result in a uniform application of all materials at rates not less than the amount specified. Using the color of the wood pulp as a guide, the equipment operator shall spray the prepared seedbed with a uniform visible coat. The slurry shall be applied in a sweeping motion, in an arched stream so as to fall like rain, allowing the wood fibers to build upon each other until an even coat is achieved.

2.08 SODDING:

A. Sod shall be placed between March 1st and December 1st.

B. Sod shall be placed within 48 hours of cutting.

C. Sod shall be moist when laid and placed on moist ground. The sod shall be carefully placed by hand, beginning at the toe of slopes and working upwards. The length of the strips shall be at right angles to the flow of surface water. All joints shall be tightly butted and end joints shall be staggered at least 12 inches. The sod shall be immediately pressed firmly into the ground by tamping or rolling. Fill all joints between strips with fine screened soil. Sod on slopes shall be pegged with sod pegs to prevent movement. The sod shall be watered, mowed, weeded, repaired or otherwise maintained, to insure the establishment of a uniform healthy stand of grass until acceptance.

2.09 MAINTENANCE:

A. Maintain seeded and sodded surfaces until final acceptance.

B. Maintenance shall consist of providing protection against traffic, watering to ensure uniform seed germination and to keep surface of soil damp, and repairing any areas damaged as a result of construction operations or erosion.

2.10 ACCEPTANCE:

A. Before release of the performance bond on the seeding and sodding performed for the establishment of permanent vegetation, the Contractor will be required to produce a satisfactory stand of perennial grass whose root system shall be developed sufficiently to survive dry periods and the winter weather and be capable of reestablishment in the spring.

END OF SECTION

INDEX TO

SECTION 02550 - WATER DISTRIBUTION SYSTEM

SECTION 02550
WATER DISTRIBUTION SYSTEM

PART 1 - PRODUCTS

Products and materials used in the work shall conform to the following:

1.01 PIPE:

A. Ductile Iron Pipe - Shall conform to ANSI/AWWA C150/A21.50 latest revision and ANSI/AWWA C151/A21.51 latest revision for laying condition two. All pipe shall be cement lined in accordance with ANSI/AWWA C104/A21.4 latest revision.

1. All Pipe Larger than 12 inches shall be ductile iron.

B. P.V.C. Pipe - All P.V.C. pipe shall bear the seal of the National Sanitation Foundation. All waterline pipe shall be the latest revision of APWA color blue in color. Certificates of conformance with the following specifications shall be furnished with each lot of pipe supplied.

Pipe 4-inches through 12-inches shall conform to all requirements of ANSI/AWWA C900, latest revision, with a minimum pressure rating of 150 psi (DR 18), and shall have the following minimum wall thickness:

4"	0.267 inches
6"	0.383 inches
8"	0.503 inches
10"	0.617 inches
12"	0.733 inches

C. Plastic Tubing - Tubing shall conform to the following:

1. Polyethylene - 1" Polyethylene tubing shall conform to all requirements of ASTM D1248, grade P34, Class C; ASTM D2737, PE3408: ASTM D3350, cell class 335424C; and AWWA C901. The tubing shall be pressure class 200 with SDR 9. Marking of the tubing shall include: nominal pipe size, PE 3408, SDR 9, PC 200, AWWA C901, Manufacturers name and seal or mark of testing agency certifying suitability of the pipe material for potable water products as per AWWA C901 Section 6.1.2.

   2" water service line shall be polyethylene conforming to AWWA C901.88/ASTM D-1248, ASTM D-2239, ASTM D-2737, ASTM D-3035. No 1.5", 2.5" or 3" will be allowed.

2. Copper Tubing – 1" & 2" Copper tubing shall be seamless and shall conform to ANSI/AWWA C800 and ASTM B88, Type K, containing not less than 99.90% copper and not more than 0.04% phosphorus,

suitable for use with a working pressure of 150 psi. No 1.5", 2.5", or 3" will be allowed.

D. All plastic and copper tubing 2" and smaller shall be copper tube size (cts).

1.02 JOINTS:

A. Flanged Joints - Shall conform to ANSI/AWWA C115/A21.15 latest revision. Bolts shall conform to ANSI B18.2.1 and nuts shall conform to ANSI B18.2.2. Gaskets shall be rubber, either ring or full face, and shall be 1/8-inch thick. Gaskets shall conform to the dimensions recommended by ANSI/AWWA C115/A21.15 latest revision. Flanged joints shall not be used for buried installations.

B. Mechanical Joints - In ductile iron pipe shall conform to ANSI/AWWA C111/A21.11 latest revision.

C. Push-On Joints - In ductile iron pipe shall conform to ANSI/AWWA C111/A21.11 latest revision.

D. Plastic Pipe - Joints in plastic pipe 4-inches and larger shall meet all requirements of ANSI/AWWA C900 latest revision. Joints in 1" and 2" plastic tubing shall conform to ASTM D3139 latest revision. Solvent joints shall not be used. Butt-fused or compression type only for plastic tubing.

E. Restrained Joints - Restrained joints for pipe, valves and fittings shall be mechanical joints with ductile iron retainer glands equivalent to "Megalug" or push-on type joints equivalent to "Lock-Ring," "TR Flex", or "Super Lock" and shall have a minimum rated working pressure of 250 psi. Mechanical joint retainer glands shall comply with the manufacturer's specifications for the pipe material (ductile iron vs. PVC).The joints shall be in accordance with the applicable portions of ANSI/AWWA C111/A21.11. The manufacturer of the joints shall furnish certification, witnessed by an independent laboratory, that the joints furnished have been tested at a pressure of 500 psi without signs of leakage or failure. All wedge assemblies and related parts of restraint devices shall be processed through an iron-phosphate spray, rinse and drying operation in preparation for coating application. The coating shall consist of a minimum of two coats of liquid Xylan® fluoropolymer coating with heat cure to follow each coat. All casting bodies of restrained joints shall be surface pre-treated with an iron-phosphate spray, rinse and sealer before drying. The coating shall be electrostatically applied and heat cured. The coating shall be a polyester based powder to provide corrosion, impact and UV resistance. The coating system shall be Mega-Bond™ by EBAA Iron, or approved equal. Restrained joints shall be capable of being deflected after assembly. Restrained joints shall have a preset deflection of no more than 5 degrees and shall be able to take up 3 degrees of deflection after burial.

F. Fluorinated Hydrocarbon Gaskets - Fluorinated hydrocarbon gaskets shall conform to the requirements of ANSI/AWWA C111/A21.11-90 (Trade

names may include, but are not limited to "Fluoral" or "Viton") and shall be required where petroleum exposure may occur.

1.03 FITTINGS:

A. Fittings for Ductile Iron or Plastic Pipe - Shall be compact ductile iron, manufactured in accordance with ANSI/AWWA C153/A21.53 latest revision. They shall be cement lined in accordance with ANSI/AWWA C104/A21.4 latest revision. An asphaltic coating with a thickness of 1 mil shall be applied to all fittings. Fittings shall be designed to accommodate the type of pipe used.

B. Fittings for Flanged Pipe - Shall be manufactured in accordance with ANSI/AWWA C110/A21.10, latest revision and pressure rated at 150 psi.

C. Fittings for Tubing - Shall be brass or bronze, compression type.

1.04 POLYETHYLENE ENCASEMENT:

Polyethylene encasement shall be used on all ductile iron pipe, and shall be in tube form conforming to the requirements of ANSI/AWWA C105/A21.5 latest revision. The polyethylene film shall have the following characteristics:

Tensile Strength:	1,200 psi minimum
Elongation:	300 percent minimum
Dielectric Strength:	800V/mil thickness minimum
Thickness:	Nominal thickness of .008 in. (8 mil)

1.05 CAUTION TAPE:

Caution tape shall consist of a minimum 4.0 mil thickness inert polyethylene plastic that is resistant to alkalis, acids and other destructive elements found in the soil. The tape shall have a minimum 3" width and a minimum tensile strength of 2,800 psi. A continuous warning message repeated every 16" to 36" shall be imprinted on the tape surface. The tape shall contain an opaque color concentrate designating the color code appropriate to the line being buried (Water Systems - Safety Precaution Blue with "Caution - Buried Water Line Below" imprinted in black). Caution tape shall be installed 24" above the pipe on all water mains.

1.06 TRACING WIRE:

Tracing wire shall be #12 gauge insulated single strand copper wire, and shall be installed on all water mains and service laterals from the main to the meter, and provide continuous electrized conductivity. Area markers shall be at least every 500' with tracer wire attached, unless a manhole, fire hydrant and air release are available. Manhole shall provide a 6' lead attached to the inside of lid and ring. On laterals, the tracing wire shall terminate inside the meter box.

1.07 STEEL CASING:

Casing pipe shall be steel conforming to ASTM A139, yield point of 35,000 psi, of the diameter and thickness shown on the contract drawings for each crossing. All pipe within casing shall be restrained joint ductile iron.

1.08 CASING SPACERS:

Casing Spacers shall be bolt on style with a shell made in two (2) sections of Heavy T-304 Stainless Steel. Connecting flanges shall be ribbed for extra strength. The shell shall be lined with a PVC liner. All nuts and bolts shall be 18-8 Stainless Steel. Runners shall be made of Ultra High Molecular Weight Polymer with inherently high abrasion resistance and a low coefficient of friction. Runners shall be supported by risers made of Heavy T-304 Stainless Steel. The combined height of the supports and runners shall keep the carrier pipe a minimum of 0.75" from the casing pipe at all times. Casing Spacers shall be as manufactured by Cascade Waterworks Manufacturing Company, or approved equal.

1.09 GATE VALVES:

A. Four (4) Inches and Larger Valves - Shall be cast iron or ductile iron body, bronze mounted, resilient wedge design, with non-rising stems, conforming to ANSI/AWWA C509. They shall have ends to match the pipe to which they are attached. Attachment to plastic pipe shall be made by special adapters. Valves shall have a minimum working pressure of 200 psi and be tested at 400 psi. Valves shall open counter-clockwise.

   Valves shall be furnished with "O" ring packing. One (1) "O" ring shall be located above the thrust collar and one (1) below. The thrust collar shall be permanently lubricated and have an anti-friction washer on top of the thrust collar.

B. Two (2) Inch - Shall be all brass ball valve type. The pressure rating shall be 175 psi. See Part 1.14 for specifications. No 2" gate valves shall be allowed.

C. Valve Boxes - Underground 2" valves and fire hydrant valves shall be installed in accepted valve boxes. The valve boxes shall be embedded in No. 57 stone wrapped with filter fabric, with shaft extension sections to cover and protect the valve and permit easy access and operation. The cover shall be cast iron and shall be marked "WATER". The box and any extensions needed shall be cast iron having a crushing strength of 1,500 psi. Valve boxes shall conform to the detail shown. The top section shall be the slip type, adjustable for elevation.

D. Valve Manhole - Gate valves 4" and larger shall be installed in a manhole. Manholes shall be precast concrete, unless authorized by the Water Department. Brick manholes will not be allowed and shall conform to the details. Valves 10-inch and larger shall be in 6-foot diameter manholes or

vaults.

1. Brick manholes shall be new whole brick of good quality laid in cement mortar. The bottom of the manhole shall be concrete. Brick manholes shall only be allowed where precast manholes cannot be used.

   a. Concrete - Concrete shall have a compressive strength of 3,000 psi in 28-days. Concrete shall be ready-mixed conforming to ASTM C904. Reinforcing steel shall conform to ASTM C615, Grade 60. Mesh reinforcing shall conform to ASTM A185. Concrete covering deposited directly against the ground shall have a minimum thickness of 3-inches between the reinforcing and the ground.

   b. Mortar - Mortar shall be composed of one part by volume of Portland cement and two parts of sand. The Portland cement shall conform to ASTM C160, Type I. The sand shall conform to AASHTO Standard A45 and shall be of an acceptable gradation. The quantity of water in the mixture shall be sufficient to produce a workable mortar, but in no case exceed 7 gallons of water per sack of cement. Water for mixing shall be potable water, clean and free of harmful acids, alkalies and organic impurities. The mortar shall be used within 30 minutes from the time the ingredients are mixed with water.

   c. Brick Masonry - Brick shall conform to ASTM C62, Grade SW or C-55, Grade P-I or P-II. The joints shall be completely filled with mortar and shall be smooth and free from surplus mortar on the inside of the structure. Brick structures shall be plastered with ½-inch of mortar over the entire outside surface of the walls. For square or rectangular structures, brick shall be laid in stretcher courses with a header course every sixth course, and for round structures, brick shall be laid radially with every sixth course a stretcher course.

2. Precast Concrete manholes shall have a minimum wall thickness of five inches. Manholes shall be manufactured with 4,000 P.S.I. concrete, type II cement. Wall reinforcement shall meet ASTM-478 and also have a No. 4 rebar hoop around each pipe opening. Bottom slabs shall be five inches thick and be reinforced with No. 4 rebar at 9" O.C.E.W. All items shall be wet cast. Dry casting or low slump concrete will not be allowed. All bases will have proper lifting hooks in the bottom slabs (min. of 3) and there shall be no penetrating lifting holes on any structures. No holes will be allowed within six inches of any joint on structures. All manholes shall have a coating as per Section 02555.

   This shall be the minimum requirements for wall and slab thickness/

rebar. It shall be the responsibility of the Contractor to insure that the manhole(s) are designed properly for the loading conditions as indicated on the plans. Should the loading conditions require greater structural integrity than the minimum, as herein specified, it shall be the responsibility of the Contractor to utilize the maximum design.

Gaskets shall be O-Ring or Type A or B "Tylox," or equivalent, conforming to ASTM C-443; Mastic shall be "Ram-nek," or equivalent, with primer. The primer shall be applied to all contact surfaces of the manhole joint at the factory in accordance with the manufacturer's instructions.

3. Frames and Covers – Manhole frame and covers shall be out of gray cast iron per ASTM A48, Class 30 without perforations and suitable for addition of cast iron or steel rings for upward adjustment of top. The word "WATER" shall be cast into the face of the cover in 1-1/2 to 2 inch letters raised flush with the top of the cover. Frames and covers shall have machine ground seats, a coating of coal tar pitch varnish, and be an approved equal to U.S. Foundry and Manufacturing Corp. 170-D. All manhole rings and covers shall be made water tight by means of dovetail grooves and gaskets in the cover. No stacking lugs shall be allowed.

4. Tops of manholes outside of roads, streets, and highways shall be built to grades 1-inch above the existing ground surface unless otherwise shown on the plans. Manholes in roads, streets, or highways shall be built to the pavement grade, the grade designated on the plans, or as directed by the Engineer.

1.10 BUTTERFLY VALVES:

All butterfly valves shall be of the tight-closing, rubber seated type, with rubber seat positively locking in place sealing against flow from either direction. No metal-to-metal seating surfaces will be permitted. Valves shall be bubble-tight at rated pressures with flow in either direction. Butterfly valves shall conform to ANSI / AWWA C504, Class 150B. Butterfly valves shall not be used on pipe smaller than 14" unless, otherwise specified.

1. Valve body end connections for buried valves shall be installed using restrained joints.

2. Valve shafts shall be stainless steel and may consist of a one-piece unit or may be the "Stub Shaft" type. A stub shaft comprises two separate shafts inserted into the valve disc hubs. Each stub shaft shall be inserted into the valve disc hubs for a distance of at least 1½ shaft diameters.

3. Valve discs shall be solid ductile iron with an epoxy coating making it corrosion resistant. The thickness of the discs shall not exceed

2¼ times the shaft diameter.

4. Valve seats shall be natural or synthetic rubber providing 360 degrees uninterrupted seating. The resilient seat shall be adjustable or replaceable in the field without burning or grinding. The seat shall be molded over a stainless steel ring for support and secured to the disc by corrosion resistant, self locking stainless steel screws.

5. All internal ferrous metal surfaces in the waterway shall be factory coated with a non-toxic, two-component, holiday-free, thermo-setting epoxy to a nominal thickness of 4 mils.

6. All butterfly valves shall be manually operated. Operators shall be of the traveling nut, self-locking type and shall be designed to hold the valve in any intermediate position without creeping or fluttering. Operators shall be furnished with externally adjustable mechanical stop limiting devices. Valves shall have a 2-inch square operating nut and shall be installed with extension stems to extend the operating nut in accordance with the project details. The operator shall be integrally mounted on the valve mounting flange and shall have all gearing totally enclosed for buried service. Maximum force for operating nut shall be 40 pounds.

1.11 TAPPING VALVES:

All tapping valves shall be provided with a standard flange on one end for bolting to the tapping sleeve. The outlet end shall be mechanical joint, flanged for bolting to a standard tapping machine. All tapping valves shall be resilient seat. No double disc shall be permitted. In all other respects, tapping valves shall comply with the requirements for gate valves. Tapping valves and tapping sleeves 12" diameter and smaller shall be compatible with the Mueller tapping machine.

1.12 TAPPING SLEEVES:

Tapping Sleeves shall be compact ductile iron mechanical joint type conforming to ANSI/AWWA C153/A21.53 for fittings 4" - 16" or ANSI/AWWA C110/A21.10 for fittings larger than 16", latest revision. They shall be sized to fit the intercepted pipe and be equivalent to Mueller H-615/715. All tapping sleeves and valves shall be pressure tested prior to tapping. The tapping sleeve shall include the necessary pressure test port.

1.13 AIR RELEASE VALVE:

Air Release Valve shall be 1-inch screwed inlet equivalent to Crispin Model No. PL10. The air release valve shall be designed to permit automatic escape of large quantities of air from the pipeline when the line is being filled and must also allow accumulating air to escape while the line is in operation and under pressure. All internal trim parts shall be

stainless steel. No plastic parts will be permitted. The floats shall be stainless steel.

The body and cover shall be cast iron conforming to ASTM A48, Class 35 and shall be able to operate at pressures up to 300 psi.

The valve shall be provided with a cast iron cowl. This cowl covers the discharge opening of the valve to prevent dirt and other debris from falling into the seated area, but allows free discharge of air or water which may blow by.

1. Corporation stops for combination air/vacuum valves shall be 1" Brass or Bronze with 1" inlet and 1" outlet outside iron pipe threads equivalent to Mueller Model #H-10013.

2. Tapping saddles for combination air/vacuum valves shall be equivalent to Smith-Blair No. 313-015.

All air release valves shall be installed in precast concrete manholes in accordance with Part 1.09.D.2 and shall include flat tops.

1.14 SMALL BALL VALVE:

Ball Valve 2-inch and smaller shall be designed for a working pressure of not less than 175 PSI. End connection shall be threaded. The body and all parts shall be made of 85-5-5-5 red brass in accordance with AWWA C800 and ASTM B62 latest revision. The ball shall be fluorocarbon coated red brass with molded Nitrile (BUNA-N) seats sealed in place. All internal parts shall be permanently assembled by way of a metal to metal body joints with sealed threads. Operator shall have two (2) Nitrile (BUNA-N) "O"-Rings and a bronze lock ring. Ball valve shall be Ford B11-777, Ford B81-777W or approved equal.

1.15 POST HYDRANTS:

Shall be equivalent to Mueller 2-1/8" Post Type Hydrant, have one way main valve opening and one 2½" hose nozzle. All internal and external parts shall conform to Section 2.15 Fire Hydrants.

1.16 FIRE HYDRANTS:

A. General - Hydrants shall be manufacturer's current model design and construction. All units to be complete including joint assemblies. Physical characteristics and compositions of various metal used in the hydrant components shall meet the requirements as specified in ANSI/AWWA C502 latest revision. Hydrant shall be suitable for working pressure of 150 psi and shall be hydrostatically factory tested to 300 psi.

B. Bonnet - Bonnet shall be of the dry reservoir type. Bonnet must have a lubricating fitting for ease of lubrication. All parts shall be removable through top of hydrant without removing entire barrel section from safety

flange.

C. Nozzles and Caps - The hydrant shall have two (2) 2¼-inch connection and one (1) 4½" steamer connection, National standard threads. Nozzles shall be bronze and have interlocking lugs to prevent blowout. Nozzle caps shall not be equipped with chains.

D. Seat Ring - Seat ring shall be bronze to bronze. The bronze shall be Grade A, B, D, or E.

E. Drain Valves and Openings - Positive operating drain valves shall be provided to assure drainage of fire hydrant when the main valve is closed. Drain openings shall have bronze bushings.

F. Main Valve - Valve shall be designed to close with the pressure and remain closed. Valve shall be bronze Grade A, B, D, or E, that will resist rocks or other foreign matter. Valve shall have a full 4½-inch opening.

G. Barrel and Safety Flanges - Hydrant shall have a safety-type vertical barrel with a minimum 3½-foot bury and be designed with safety flange and/or bolts to protect the barrel and stem from damage and to eliminate flooding when hydrant is struck. Bury depth shall be cast on barrel of hydrant. All risers necessary for deeper bury applications shall be provided by the hydrant manufacturer. A maximum riser height of 1' shall be allowed.

H. Operating Stop and Nut - Hydrant shall have a positive stop feature to permit opening of hydrant without over travel of stem. The operating stop shall be located at the bottom of the hydrant by means of a capnut or stop nut at the end of the main valve stem. Operating nut shall be bronze, 1¼", point to flat, pentagon.

I. Bolts and Nuts - Bolting materials shall develop the physical strength requirements of ASTM A307. Bolts, studs, washers and nuts shall be made from a corrosion-resistant material such as low zinc bronze, monel, stainless steel or low alloy steel conforming to ASTM A242.

J. Inlet - Bottom inlet of hydrant shall be provided with mechanical joint connection as specified and shall be 6-inch nominal diameter.

K. Direction of Opening - Hydrants shall be designed to close "right" or clockwise and open "left" or counter-clockwise.

L. Coatings - All inside portions of the hydrant shall be coated in accordance with ANSI/AWWA C550 latest revision. The exterior portion of hydrant above ground level shall be painted with two (2) coats of red primer paint equivalent to Hydrant Hide Red Setter #9050 as manufactured by Pennsbury Coatings Corporation. After the hydrant has been accepted

and placed in service, the exterior, above-ground portion of the hydrant shall be painted with two (2) coats of yellow hydrant enamel equivalent to Hydrant Hide Old Yeller #9032 as manufactured by Pennsbury Coatings Corporation.

M. Joint Assemblies - Mechanical joint assemblies shall conform to ANSI/AWWA C111/A21.11 latest revision.

N. Inspection and Affidavit - Hydrants furnished under this specification shall be subject to inspection and acceptance by City personnel, and, if required, shall have full access to manufacturer's facilities for inspection and observation of tests. Manufacturer is also required to furnish the City with an affidavit of compliance with specifications covering all materials and test procedures relating to construction of the hydrants.

1.17 CORPORATION STOPS:

Corporations stops shall be red brass of 85-5-5-5 composition and shall be manufactured in conformance with ANSI/AWWA C800 and ASTM B62. The key and body seating surfaces shall be accurately machined and fit to a taper of 1¾-inches per foot. The stem and retaining nut shall be so designed that failure from over-tightening of the retaining nut results in thread stripping rather than stem fracture. Corporation stops shall be equivalent to Mueller H-15008 or Ford F-1000.

1.18 CURB STOPS:

Curb stops shall be a 1-inch brass ball valve with a ball valve lock provided for each valve manufactured in conformance with ANSI/AWWA C800. The curb stop shall be closed bottom design and sealed against external leakage at the top by means of a non-adjustable resilient pressure actuated seal, and shall be provided with a secondary resilient seal disposed above the pressure seal for added protection of the bearing surfaces against ground water infiltration. Shut off shall be effected by a resilient pressure actuated seal so disposed in the key as to completely enclose the inlet body port in the closed position. All ball valves shall be ¼ turn valves and the full open and closed position shall be controlled by check lugs which are integral parts of the key and body. The pressure rating shall be 175 psi. The ball valves shall be equivalent to Ford Ball Valve No. B41-343W. Valves shall be full part, packed joint with 1" diameter compression connection on the inlet side and 1" diameter female iron pipe thread connection on the meter side.

1.19 TAPPING SADDLES

Tapping saddles shall be equivalent to Smith-Blair 313-015 with a 1-inch AWWA tapped connection. Tapping saddles shall be used on 2" and 4" pipes. All 1", 2" and 4" taps on water lines smaller than six (6) inches will require a tapping saddle, regardless of the water main size. Brass saddle shall be Ford 202B Brass Saddle. No service taps shall be allowed on transmission mains larger than 12" unless approved by the City.

1.20 PERMANENT SAMPLING STATION:

Sampling Stations shall be 36" minimum bury, with a 3/4" FIP Inlet and a 3/4" unthreaded nozzle. The station shall be enclosed in a lockable, non-removable, aluminum-cast housing. When opened, the station shall require no key for operation, and the water shall flow in an all-brass waterway. All working parts shall be made of brass and shall be removable from above ground without digging. A copper vent tube shall allow the station to be pumped free of standing water. The vent tube shall be opened or closed via an easily accessible pet cock. Exterior pipings hall be galvanized. The sampling station shall be Kupferle "Eclipse No. 88", or approved equal.

1.21 STANDARD METER BOX:

A. Meter Box shall be manufactured of high grade super flexion, or equal. The physical properties shall be in accordance with the following standards latest revision:

Property	Standard
1. Tensile Strength	ASTM D-638
2. Flexural Modulus	ASTM D-790
3. Notched Izod Impact-Strength	ASTM D-256
4. Deflection Temperature	ASTM D-648

B. The Meter Box shall have a minimum body weight of six (6) pounds. Wall thickness at the top of the box shall be no less than 3/4". The box shall have a minimum of four (4) reinforcing ribs on the long sides for crush strength. The Meter Box shall be Brooks Series 1419, or approved equal.

C. Standard Lid - The Meter Box Lid shall be constructed of high grade cast iron with a non-skid surface. The lid shall have a weight of twelve (12) to seventeen (17) pounds and shall have a lip of 1 3/4" and shall fit firmly into the box without shifting or vibrating under normal pedestrian or traffic loading. Lid shall be flush with the side of the box and shall not overhang.

D. Lid Flange - The Lid Flange shall be no less than 4" in width and shall be constructed of high grade cast iron and shall be sized to fit on the standard Meter Box and shall be compatible with the standard lid. All mounting hardware shall be stainless steel.

1.22 COUPLINGS

All couplings shall be mechanical joint solid sleeves. All Couplings shall be compact Class 350 ductile iron, manufactured in accordance with ANSI / AWWA A21.53 / C153, latest revision. Mechanical joints shall be manufactured in accordance with ANSI / AWWA A21.11/C111/ All

couplings shall be cement lined in accordance with ANSI/AWWA A21.4/C104. Mechanical joint nuts and bolds shall be Corten or ductile iron, high strength, low alloy steel per ANSI/AWWA A21.11/C111. An asphaltic coating with a thickness of 1 mil shall be applied to all couplings. Couplings shall be designed to accommodate the type of pipe used. Couplings or fittings in accordance with Part 1.03 shall be used at all transitions from ductile iron to PVC pipe.

1.23 BLOW-OFF HYDRANTS

All blow-off hydrants shall be manufactured to fit in a standard 5¼" valve box and shall include a 2" coupling riser and a self draining valve with a 2" FIP inlet connection. The operating screw shall fit a standard ¾" bolt socket or a 7/8" pentagon. All working parts shall be brass, and shall be removable without excavation. All blow-off hydrants shall be equal to the MainGuard™ Model No. 79 Valve Box Blow-off Hydrant by The Kupferle Foundry Company of St. Louis, Missouri.

1.24 BACKFLOW PREVENTION DEVICES

All service laterals shall include backflow prevention devices in accordance with the City of Savannah, Cross Connection Control Policy.

PART 2 – EXECUTION

2.01 INSTALLATION:

Ductile iron pipe shall be laid in accordance with ANSI/AWWA C600; Plastic pipe shall be laid in accordance with AWWA M23, ASTM D2774, UNI-Bell UNI-B-3 and the pipe manufacturer's recommendations.

A. Alignment and Grade - The water mains shall be laid and maintained to lines and grades established by the plans and specifications, with fittings, valves, and hydrants at the required locations unless otherwise accepted by the owner. Valve-operating stems shall be oriented in a manner to allow proper operation. Hydrants shall be installed plumb.

1. Prior Investigation - Prior to excavation, investigation shall be made to the extent necessary to determine the location of existing underground structures and conflicts. Care shall be exercised by the contractor during excavation to avoid damage to existing structures. The pipe manufacturer's recommendations shall be used when the watermain being installed is adjacent to a facility that is cathodically protected.

2. Unforeseen obstructions - When obstructions that are not shown on the plans are encountered during the progress of work and interfere

so that an alteration of the plans is required, the owner will alter the plans, or order a deviation in line and grade, or arrange for removal, relocation, or reconstruction of the obstructions.

3. Clearance - When crossing existing pipelines or other structures, alignment and grade shall be adjusted as necessary, with the acceptance of the owner, to provide clearance as required by federal, state, and local regulations or as deemed necessary by the owner to prevent future damage or contamination of either structure.

4. Depth of Pipe - The Contractor shall perform excavation of whatever substances are encountered to a depth that will provide a minimum cover over the top of the pipe of 36-inches from the existing or proposed finished grade, for pipe 12-inches and smaller. Pipe larger than 12-inches in diameter shall have 48-inches of cover from the finished grade. A maximum cover of 60" (inches) from finished grade shall be used unless approved by the City to avoid a conflict. If the cover will be less than 36", duct iron pipe shall be used.

5. Fluorinated Hydrocarbon Gaskets - Fluorinated hydrocarbon gaskets are intended for use in soils where a possibility of petroleum contamination is present. Fluorinated hydrocarbon gaskets shall only be used where specifically called for on the drawings.

B. Trench Construction - The trench shall be excavated to the alignment, depth, and width specified or shown on the plans and shall be in conformance with all federal, state, and local regulations for the protection of the workers.

1. Trench Preparation - Trench preparation shall proceed in advance of pipe installation only as far as stated in the specifications or as directed by the owner. Discharge from any trench-dewatering pumps shall be conducted to natural drainage channels, storm sewers, or as directed by applicable regulatory agencies. Excavated material shall be placed in a manner that will not obstruct the work nor endanger the workers or the public, or obstruct sidewalks, driveways, roadways, or other structures. Placement of excavated material shall be done in compliance with federal, state, and local regulations.

2. Pavement Removal - Removal of pavement and road surfaces shall be a part of the trench excavation. The amount removed shall depend on the width of trench required for installation of the pipe and the dimensions of the area into which valves, hydrants, manholes, or other structures will be installed. The dimensions of pavement removed shall not exceed the dimensions of the opening required for installation of pipe, valves, hydrants, specials, manholes, and other structures by more than 6 inches in any

direction, unless otherwise required or accepted by the owner. Methods such as sawing, drilling, or chipping shall be used to ensure the breakage of pavement along straight lines. Pavement removal shall occur in accordance with the City of Savannah standard details.

3. Width - The width of the trench at the top of the pipe shall be the same as that afforded by the single-pass capabilities of normally available excavating equipment, and shall be ample to permit the pipe to be laid and joined properly and to allow the backfill to be placed as specified. Trenches shall be of such extra width, when required, to permit the placement of timber supports, sheeting, bracing, and appurtenances as required by the safety requirements of the agency having jurisdiction.

4. Bell holes - Holes for the bells shall be provided at each joint, but shall be no larger than necessary to allow joint assembly and to ensure that the pipe barrel will lie flat on the trench bottom. Push-on type joints require only minimum depressions for bell holes. Other than noted previously, the trench bottom shall be true and even to provide support for the full length of the pipe barrel, except that a slight depression may be provided to allow withdrawal of pipe slings or other lifting tackle without damaging coating or polyethylene encasement.

5. Clearances and bedding procedures shall be observed for pieces of concrete or masonry and other debris or subterranean structures, such as masonry walls, piers, or foundations, that may be encountered during excavation. When encountered, all structures shall be removed to provide a clearance below and on each side of all pipe, valves, and fittings of at least 18 inches for pipe sizes 24 inches or smaller and 24 inches for pipe sizes 30 inches or larger. When excavation is completed, a layer of appropriate backfill material shall be placed on the bottom of the trench to the previously mentioned depths, leveled, and tamped.

6. Previous excavations - Should the trench pass over a sewer or other previous excavation, the trench bottom shall be sufficiently compacted to provide support equal to that of the native soil or to conform to other regulatory requirements in a manner that will prevent damage to the existing installation.

7. Protection of Property - Trees, shrubs, fences, and all other property and surface structures shall be protected during construction, unless their removal is shown in the plans and specifications or directed by the owner. Any cutting of tree roots or branches shall be done only as directed by the City of Savannah Engineering Department. Temporary support, adequate protection, and maintenance of all underground and surface structures, drains, sewers, and other obstructions encountered in the progress of the work shall be provided in accordance with specifications or

applicable regulations. All properties that have been disturbed shall be restored as nearly as practical to their original condition.

8. Unsuitable subgrade material - When the subgrade is found to include ashes, cinders, refuse, organic material, or other unsuitable material, such material shall be removed to a minimum of at least 6 inches below the bottom of the pipe or to the depth ordered by the engineer. The removed material shall be replaced, under the direction of the engineer, with clean, stable backfill material. The bedding shall be consolidated and leveled so that the pipe may be installed.

9. Safety - Appropriate traffic-control devices shall be provided in accordance with federal, state, and local regulations to regulate, warn, and guide traffic at the work site.

C. Pipe Installation - Proper implements, tools, and facilities shall be provided and used for the safe and convenient performance of the work. All pipe, fittings, valves, and hydrants shall be lowered carefully into the trench by means of a derrick, ropes, or other suitable tools or equipment, in such a manner as to prevent damage to water main materials and protective coatings and linings. Under no circumstances shall water main materials be dropped or dumped into the trench. Where necessary, the trench shall be dewatered prior to installation of the pipe. Chains shall not be allowed to transport of lower pipe into the trench.

1. Examination of material - All pipe, fittings, valves, hydrants, and other appurtenances shall be examined carefully for damage and other defects immediately before installation.

2. Pipe ends - All lumps, blisters, and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and be free from dirt, sand, grit, or any foreign materials before the pipe is laid.

3. Pipe cleanliness - Foreign material shall be prevented from entering the pipe while it is being placed in the trench. No debris, tools, clothing, or other materials shall be placed in the pipe at any time. Excessive flush water required to clean the pipe after installation may be charged to the contractor.

4. Pipe placement - As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with acceptable backfill material.

5. Direction of bells - It is common practice to lay pipe with the bells

facing the direction in which work is progressing; however, it is not mandatory. For example, when the main is being laid on a slope, the pipe is frequently laid with the bells facing uphill for ease of installation. The direction of the bells is not functionally related to the direction of flow within the main.

6. Pipe plugs - At times when pipe-laying is not in progress, the open ends of pipe shall be closed by a temporary watertight plug approved by the owner. The plug shall be fitted with a means for venting. When practical, the temporary plug shall remain in place until the trench is pumped completely dry. Care must be taken to prevent pipe flotation, should the trench fill with water. Prior to removal of a permanent plug for extending the line or for any other reason, air and/or water pressure in the line shall be released.

7. Joint deflection - When it is necessary to deflect pipe from a straight line in either the horizontal or vertical plane, the amount of joint deflection shall not exceed that shown in Tables 1 or 2. The deflections listed are maximum deflections and should not be exceeded.

8. Pipe cutting - Cutting pipe for insertion of valves, fittings, or closure pieces shall be done in conformance with all safety recommendations of the manufacturer of the cutting equipment. Cutting shall be done in a safe, workmanlike manner without creating damage to the pipe or cement-mortar lining.

9. Cut ends and rough edges shall be ground smooth, and for push-on joint connections the cut end shall be beveled by methods recommended by the manufacturer and accepted by the owner.

TABLE 1
MAXIMUM JOINT DEFLECTION*
FULL-LENGTH PIPE PUSH-ON TYPE JOINT DUCTILE IRON PIPE

		Maximum Offset - S (in)		Approx. Radius of Curve R Produced by Succession of Joints (ft)	
Nom. Pipe Size (in)	Deflection Angle - (Deg)	L=18' ft	L=20' ft	L=18' ft	L-20' ft
4	5	19	21	205	230
6	5	19	21	205	230
8	5	19	21	205	230
10	5	19	21	205	230
12	5	19	21	205	230
14	3*	11	12	340	380
16	3*	11	12	340	380
18	3*	11	12	240	380
20	3*	11	12	240	380
24	3*	11	12	240	380
30	3*	11	12	340	380
36	3*	11	12	340	380
42	2*	7.5	8	510	570
48	2*	7.5	8	510	570

* For 14-inch and larger push-on joint, maximum deflection angle may be larger than shown above. Consult the manufacturer.

TABLE 2
MAXIMUM JOINT DEFLECTION
FULL-LENGTH PIPE-MECHANICAL-JOINT PIPE

		Maximum Offset - S (in)		Approx. Radius of Curve R Produced by Succession of Joints (ft)	
Nom. Pipe Size (in)	Deflection Angle - (Deg)	L=18' ft	L=20' ft	L=18' ft	L-20' ft
4	8-18	31	35	125	140
6	7-07	27	30	145	160
8	5-21	20	22	195	220
10	5-21	20	22	195	220
12	5-21	20	22	195	220
14	3-35	13.5	15	285	320
16	3-35	13.5	15	285	320
18	3-00	11	12	340	380
20	3-00	11	12	340	380
24	2-23	9	10	450	500
30	2-23	9	10	450	500
36	2-05	8	9	500	550
42	2-00	7.5	8	510	570
48	2-00	7.5	8	510	570

D. Valve and Fitting Installation

1. Examination of material - Prior to installation, valves shall be checked for direction of opening, number of turns to open, freedom of operation, tightness of bonnet bolts and test plugs, cleanliness of valve ports and especially seating surfaces, handling damage, and cracks. Valves shall be closed before being installed.

2. Placement - Valves, fittings, plugs, and caps shall be set and joined to the pipe in the manner specified in Sec. C for cleaning, laying and joining pipe, except that 12-inch and larger valves should be provided with special support, such as crushed stone, concrete pads, or a sufficiently tamped trench bottom so that the pipe will not be required to support the weight of the valve. Valves shall be installed in the closed position.

3. Valve location - Valves in water mains shall, where practical, be located within or immediately adjacent to the street property lines unless shown otherwise on the plans.

4. Mains shall be drained through drainage branches or blow-offs. Drainage branches, blow-offs, air vents, and appurtenances shall be provided with control valves and shall be located and installed as shown on the plans. Drainage branches or blow-offs shall not be directly connected to any storm or sanitary sewer, submerged in any stream, or be installed in any other manner that will permit back siphonage into the distribution system.

5. In no case shall valves be used to bring misaligned pipe into alignment during installation. Pipe shall be supported in such a manner as to prevent stress on the valve.

6. Plugs and caps - All dead ends on new mains shall be closed with plugs or caps that are suitably restrained to prevent blowing off under test pressure. If a blow-off valve precedes the plug or cap, it too shall be restrained against blowing off. All dead ends shall be equipped with suitable blow-off facilities.

E. Hydrants - Hydrants shall be set at such elevations that the connecting pipe and tee will have the same depth of cover as the distribution mains. Hydrants and valves shall have the interiors cleaned of all foreign matter before installation. Not less than 1 cubic foot of crushed stone shall be placed around the base of the hydrant. See Detail on the Drawings.

Where hydrants are to be moved, the lateral shall be extended with 6-inch pipe, and the hydrant reinstalled at the end of the lateral. Minimum clearance under steamer cap on fire hydrants shall be 18" from final grade.

Existing hydrants that are relocated, and therefore, temporarily out of service, shall be placed in service within a period of 24 hours. All preliminary connection requirements shall be completed as promptly as

possible to insure that the hydrant is operational within the above time frame. The contractor shall be responsible for insuring that valves on the hydrant laterals are accessible and remain in an open position. Payment for relocated hydrants will not be made until the hydrant has been checked and is operational. In the event that the 24 hour time schedule cannot be met, due to conditions beyond the control of the contractor, then the contractor shall so notify the City Water Distribution Administrator. It shall then be the responsibility of the latter to notify the City Fire Department and identify the location of the inactive hydrant. Once the hydrant is in service, it shall be the responsibility of the Contractor to so advise the City Water Distribution Administrator.

The time frame and procedures outlined in the above paragraph shall also apply for old hydrants replaced with new hydrants. Old hydrants shall be removed as soon as new hydrants are placed in service and shall be delivered to the City Lot.

Anchorage for hydrants shall be provided using Megalug joint restraints or equal.

F. Backfill and Compaction - All trenches and excavation shall be backfilled immediately after the pipes are laid therein, unless other protection of the pipe line is directed. The backfilling material shall be selected and deposited with special reference to the future safety of the pipes. The material shall be completely void of rocks, stones, bricks, roots, sticks or any other debris that might cause damage to the pipe and tubing or that might prevent proper compaction of the backfill. Except where special methods of bedding and tamping are provided for, clean earth or sand shall be solidly tamped about the pipe up to a level at least 2' above the top of the pipes, and shall be carefully deposited to uniform layers, each layer solidly tamped or rammed with proper tools so as not to injure or disturb the pipeline. The remainder of the backfilling of the trench shall be carried on simultaneously on both sides of the pipe in such a manner that injurious side pressure does not occur. The material used shall be selected from excavated material anywhere on the work if any of the material is suitable. For purpose of definition the sand used should contain less than 10% by weight of loam and clay that passes a 3/4" sieve with no more than 5% remaining on a No. 4 sieve.

Under traffic areas, the top 12-inches of backfill material shall be compacted to a density of not less than 100% as determined by ASTM D-1556 or D-2922. Below the 12-inch line to, and including the area around the pipe, the density shall not be less than 95% at optimum moisture. In areas other than traffic areas, the backfill shall be compacted to 95% density, at optimum moisture. Laboratory test shall conform to ASTM-D-698.

Whenever the trenches have not been properly filled, or if settlement occurs, they shall be refilled, smoothed off and finally made to conform to the surface of the ground. Backfilling shall be carefully performed, and the original surface restored to the full satisfaction of the Engineer immediately after installation.

Where PVC pipe is installed, the Contractor shall take precautions, in accordance with ASTM D2321, during the backfill operations so as not to create excessive side pressures, or horizontal or vertical deflection of the pipe, nor impair flow capacity.

G. Joint Restraint - All bends, plugs, valves, caps and tees on 2" pipe and larger, shall be provided with joint restraints equivalent to Mega-Lugs. Additional restraint shall be as indicated on the drawings.

H. New Service Connections - The Contractor shall tap the main and install a service connection to each vacant lot or as directed by the Engineer in accordance with the detail shown on the plans for Water Service Connections. Plastic or copper tubing for service lines shall be installed in a manner that will prevent abrupt changes or bends in any direction. Tracing wire in accordance with Part 1.06 shall be installed on all service laterals extending from the main to the curb stop. The Contractor shall exercise extreme caution to prevent crimping of the tubing during handling, storage and installation. The tubing shall have an absolute positive connection to the water main to prevent leakage. Taps shall be made perpendicular to the main. A water service connection shall be marked on the curb with a "W". The mark shall be made with a branding iron on the vertical face of the curb and shall be a minimum of ¼-inch in depth. All laterals shall be locked during construction, testing and disinfection. The Contractor may unlock the laterals only when water is being blown off to prepare for testing. When the water system is accepted by the City, all laterals shall be completed by removing the locks and placing the curb stop in a Standard Meter Box as shown on the Detail. Copper tubing is intended for use in soils where a possibility of petroleum contamination is present and shall only be used where specifically called for on the drawings.

I. Connect Existing House Service - The Contractor shall tap the main and install a house service connection to each existing water meter. Taps shall be made perpendicular to the main and opposite the existing meter. Plastic tubing for house service lines shall be installed in a manner that will prevent abrupt changes or bends in any direction. The Contractor shall exercise extreme caution to prevent crimping of the tubing during handling, storage, and installation. The tubing shall have an absolute positive connection to the water main to prevent leakage. The Contractor shall locate and excavate the existing lateral connections, cut and plug the existing lateral at the main, remove the existing curb stop, and connect the new lateral to the meter. The new work shall be tested, cleaned and disinfected prior to connecting to the existing meter. All laterals shall be locked during construction, testing and disinfection. The contractor may unlock the laterals only when water is being blown off to prepare for testing or when the laterals are being connected to the existing meters.

J. Jacking and Boring - Steel casing of the diameter shown on the plans shall be jacked or bored in the location indicated. Joints between sections of the steel casing shall be of a continuous weld made by a certified welder. Boring or jacking shall be in accordance with the provisions of

Section 615 of the Georgia DOT Standard Specifications. Carrier pipe shall be installed as shown on the Detail. After the carrier pipe has been installed, the ends of the casing shall be sealed with Class "C" concrete after being checked by the Engineer.

Where the work involves a highway, the Resident Engineer of the State Department of Transportation shall be notified three (3) days before the crossing is started. Where the work involves a railroad, the work shall conform to the requirements of AREA specifications and the Division Superintendent of the Railroad shall be notified three (3) days prior to beginning the work. Before commencing work within the rights-of-way of the railroads or highways, the Contractor shall verify that the Owner has obtained the required permits.

K. Detection Tape - Detection tape will be used over all pipe and tubing 2" or larger. The tape shall be laid 24" above existing main.

Tracing wire shall be securely fastened to fire hydrants, valves, and valve covers according to the specification. Locate wire for laterals shall extend 1' (foot) beyond the curb stop.

L. Tracing Wire - Tracing wire will be installed on all water mains and water service laterals directly on top of the water line. Tracing wire shall be securely fastened to fire hydrants, valves, and valve covers according to the specification. Locate wire for laterals shall extend 1' (foot) beyond the curb stop. The wire shall be secured to the pipe with tape or other acceptable methods at spacings of no more than 36" apart. Where water service laterals connect to water mains, the wire insulation shall be stripped so that the bare wires can and shall be joined securely together and wrapped with a rubberized insulation tape. The insulation tape shall completely cover all areas of the exposed wire. The insulated wire must maintain electrical continuity. This tracing wire system shall be checked and tested by the contractor, in the presence of City personnel, prior to acceptance of the water main installation. All equipment, meters, detectors, etc., needed for testing shall be furnished by the Contractor.

M. Polyethylene Encasement - Polyethylene encasement shall be used on all ductile iron piping, fittings, valves and appurtenances and installed according to the requirements of ANSI/AWWA C105/A21.5, Sec. 5.4, Method A.

N. Air Relief Valves - Tapping saddles shall be used when installing air relief valves on non-metallic pipe less than 6" in diameter. A direct tap shall be made on all pipe 6" in diameter and larger.

2.02 LOWERING WATER MAINS:

A. The existing water lines shall be lowered to the control elevations shown on the plans or as specified by the Engineer. The water mains that are to be lowered shall be completely uncovered to the bottom of the main. At all changes in grade or line, the pipe shall be firmly wedged against the vertical face of the trench to prevent a joint from blowing off. The main

shall be lowered to its new elevations by removing the earth from under the main and along-side the pipe uniformly. Deflections in the joints of the main, while lowering or when its final lowered position shall not exceed three (3) degrees for an 18 foot length of pipe. All joints shall be reworked with Megalugs so that they do not leak. The joint work shall be done in such a manner as to secure tight joints without over straining the bell. The lowered pipe shall be true to line and grade.

B. Trench Excavation - Trenches shall be of necessary width for the proper lowering of the pipe. The bottom of the trenches shall be accurately graded to provide uniform bearing and support for each section of the pipe on undisturbed soil at every point along its entire length, except for the portions of the pipe sections where it is necessary to excavate for bell holes and for the proper sealing of pipe joints. Bell holes and depressions for joints shall be dug after the trench bottom has been graded. In order that the pipe rests upon the prepared bottom for as nearly its full length as practicable, the depressions shall be only of such length, depth, and width as required for properly making the particular type of joint. Care shall be taken not to excavate below the depths indicated. Unauthorized over excavation shall be backfilled with accepted backfill material and compacted per Section 2.01, Paragraph F, at no cost to the owner. Unstable soil that is not capable of properly supporting the pipe shall be removed to a minimum of at least 6 inches below the bottom of the pipe or to the depth ordered by the owner. The removed material shall be replaced with accepted backfill material and compacted per Section 2.01, Paragraph F.

2.03 OFFSET EXISTING WATER MAINS:

A. Where water mains must be offset to avoid interference with new structure or pipe the contractor shall notify the Engineer for instructions and methods for said work. Prior to any work on existing mains, the contractor shall notify the Water Distribution Administrator a minimum of four (4) days in advance of required shut-off.

2.04 SEPARATION BETWEEN WATER AND SEWER:

A. Water mains and/or laterals shall not be laid closer than 10 feet horizontally to a sanitary or storm sewer without written instruction from the engineer. Some deviation may be allowed on a case by case basis if approved by the City for installation of the water main closer to a sewer, provided that the water main is laid in a separate trench, such that the bottom of the water main is at least 18 inches above the top of the sewer. In no case, shall the water and sewer lines be closer than 5' horizontally edge to edge. Water mains crossing sewers should be laid to provide a minimum vertical distance of 18 inches between the invert of the water main and the top of the sewer line. The water and sewer lines must be <u>ductile iron</u> when laid in violation of the separation requirements. One full length of water pipe shall be located so both joints will be as far from the sewer as possible.

2.05 PROCEDURES FOR CONNECTIONS OF WATER MAINS:

A. Purpose - To insure that there is a physical disconnection of any new untested water main from existing water mains owned and operated by the City of Savannah.

B. Procedure - Any physical connection of untested water mains with existing City of Savannah water mains is prohibited except when acceptable backflow prevention devices have been installed, tested and checked by City personnel.

1. Any new water main to be tested must be capped and restrained with retaining glands or thrust blocks to prevent blow out or leakage during the pressure testing.

2. Water for filling and flushing the new water main will be obtained from only approved and specified fire hydrant or special wet tap of the existing City main. This physical connection for obtaining water for the new untested main shall be protected by a RPZ backflow preventor. Appropriate taps of sufficient size must be made at the end of the new system to allow air to escape during the filling sequence.

3. This physical tie-in with the existing City System must be physically disconnected after sufficient water for hydrostatic testing and disinfection has been obtained.

4. Once the new water system has demonstrated adequate hydrostatic testing and has been chlorinated in accordance with paragraph 2.06, the new system must be flushed using the filling method in Step Two (2). The system or main will then be subjected to bacteriological testing. After bacteriological test the system must be open flushed and connected to existing system within 72 hours.

5. The permanent connection to the new system must be made with clean materials. The connection will be made with solid ductile iron sleeves. Any connection with stainless steel or similar metal full circle clamps is prohibited. Once the connection has been made, the new system must be flushed using water from the existing system to insure adequate flow and velocity into the new water system.

6. If a wet tap is required, the contractor will be responsible for preparing the site. This preparation includes the excavation and installation of the tapping sleeve. The contractor will make available a lifting device for the tapping machine and at least a 100 CFM Air Compressor to power the tapping machine.

   The City will provide the tapping machine and one man to operate the unit.

   All taps of 12" and smaller diameter will be made by the City Water

Distribution Department unless authority has been granted in writing by the Water Distribution Superintendent for a private firm to perform the wet tap for a particular new main.

C. Water for Construction - Metering Requirements -

1. All water used for construction shall be metered. Water meters, either temporary or permanent, shall be the responsibility of the contractor to purchase from the City.

2. Fire hydrant meters obtained from the City of Savannah shall be obtained by making an application with the Water Revenue Department and making a deposit of $ 1,000.00 to cover the cost of any damage or theft of meters.

3. Fire hydrant meters shall be picked up at the Water Operations Department by presenting receipt that the $ 1,000.00 deposit has been paid.

    a. Fire hydrant meters shall be brought to the Water Distribution Department for inspection and testing at least once a year.

4. A double check valve will be installed on the fire hydrant meter prior to installation. The double check assembly shall be the responsibility of the contractor. No fire hydrant meter shall be used without a double check valve assembly. The fire hydrant meter and double check assembly shall be supported on the fire hydrant to relieve weight on the fire hydrant 2½" outlet.

5. The contractor shall be responsible to notify the Water Revenue Office of the location of the fire hydrant meter on a bi-monthly basis for the purpose of billing. Water Revenue will inform the contractor of the required date for the call-in during the initial meter application process. Failure to call in on the required date shall result in immediate confiscation of the meter and return of the deposit minus the cost of the water used and/or damages to the meter.

6. It shall be the responsibility of the contractor to estimate the volume of water required during construction and include the cost in the installation price of the water main.

7. When fire hydrant meters are returned to the Water Distribution Department, an inspection and test will be made on the meter. Any damage to the meter shall be deducted from the deposit made by the Contractor.

D. All permanent or temporary meters installed shall be equipped with double check valves or RPZ which will be the responsibility of the contractor to install in accordance to the specifications. Construction meters shall be obtained through the normal meter application process. Construction meters shall be used during all phases of the construction project. Upon

completion of the project, the meter must be disconnected and returned to the Water Distribution Department for final processing and return of the deposit for the meter. All laterals to the meter shall be removed from the tap at the main to the meter location.

2.06 TESTING, FLUSHING, AND DISINFECTION OF NEW WATER MAINS

A. Filling and Hydrostatic Testing of New Mains

Upon complete installation and prior to connection to the City's existing water mains, all new water mains shall be hydrostatically tested in accordance with Section 02550, Part 3.01 of these specifications. Where any portion of the line fails to meet the hydrostatic requirements of Section 02550, Part 3.01, repairs shall be made and the entire new main shall be retested. All filling and hydrostatic testing of new mains shall be coordinated with and witnessed by the City's inspector.

Temporary connections to the City's existing water system for the purpose of filling and/or flushing of new mains shall be approved by the City's inspector prior to installation of said connections. A City of Savannah approved backflow prevention device shall be used for all such temporary connections. A test certification shall be required on all backflow prevention devices not supplied by the City of Savannah prior to their use. The test certification shall indicate that the backflow prevention device has been tested and approved within the previous 12 months, by an individual holding a valid State of Georgia Backflow Prevention Assembly Tester license.

The rate at which new mains are filled shall be controlled to allow air to escape the mains during the filling process and to prevent sudden increases in system pressure due to water hammer at such time as the line becomes full. The rate of filling may also be limited by system operation requirements as determined by the City's Water Supply and Treatment Department.

Under NO circumstance, other than a life threatening emergency, shall the contractor, his employees, and/or representatives operate any valve which will allow flow into or out of the City's existing water system. In the event of a non-life threatening emergency condition, the Contractor shall contact the City's inspector or the City's Water Supply and Treatment Department (351-3434) for approval prior to valve operation.

B. Flushing Of New Mains

Upon successful completion of hydrostatic testing, all new mains shall be flushed to remove all foreign material from within the mains. Flushing shall generally be accomplished at the highest practical flow rate. However, limitations of existing water system operational demand and pressure, as well as drainage areas receiving flush water may exist. Such flow rate limitations shall not relieve the contractor from providing a clean water main and all requirements of chlorination and bacteriologic sampling shall remain in full force (see Section 02550, Parts 2.06 C and 2.06 E).

Not less than 48 hours (2 working days) prior to the desired commencement of flushing, the Contractor shall contact the City's inspector for the purpose of coordinating the flushing effort.

Prior to flushing, the Contractor shall identify the area(s) into which flushed water will be drained. Such drainage area shall be approved by the City's inspector prior to flushing. The Contractor shall provide sufficient supervision to monitor the designated drainage area and to insure that flooding and/or erosion of private property does not occur. Where public roadways are to be used, the Contractor shall monitor water volumes and traffic to insure flushing does not create a hazard to traffic. The Contractor may request that an effected street be closed to traffic during the flushing period. However, such closings shall be subject to the requirements and approval of the City's Traffic Engineering Department.

Under NO circumstance, other than a life threatening emergency is the contractor, his employees, and/or representatives to operate any valve which will allow flow into or out of the City's existing water system. In the event of a non-life threatening emergency condition, the Contractor shall contact the City's inspector or the City's Water Supply and Treatment Department (351-3434) for approval prior to valve operation.

Water Mains 10" and Smaller

For water mains with a nominal diameter up to and including 10 inches, a double detector check valve shall be used between the City's water main and the new main to be flushed. The double detector check valve shall be not less than 6 inches in diameter. A test certification shall be required on all backflow prevention devices not supplied by the City of Savannah prior to their use. The test certification shall indicate that the backflow prevention device has been tested and approved within the previous 12 months, by an individual holding a valid State of Georgia Backflow Prevention Assembly Tester license.

Flushing shall continue until the water is clear to the eye and no foreign material is observed. Examination for sediments of a sample collected in a clear container and allowed to stand for approximately 5 minutes will provide an indication of the necessity to continue flushing. Termination of flushing based on such an indication shall not relieve the contractor from providing a clean water main and all requirements of chlorination and bacteriologic sampling shall remain in full force (see Section 02550, Parts 2.06 C and 2.06 E).

Water Mains 12" and larger

For water mains with a nominal diameter of 12 inches and larger, a double detector check valve shall be used between the City's water main and the new main to be flushed. The double detector check valve shall be not less than 10 inches in diameter. A test certification shall be required on all backflow prevention devices not supplied by the City of Savannah prior to their use. The test certification shall indicate that the backflow prevention

device has been tested and approved within the previous 12 months, by an individual holding a valid State of Georgia backflow prevention license.

For new water mains 12 inches in diameter and larger, the Contractor shall collect a sample from the flushed main that is apparently clear and shall deliver same to the Water Supply and Treatment laboratory located at the I&D Water Plant for examination and determination of apparent successful flushing. Review of the sample by the laboratory is only an indication of apparent successful flushing and shall in no way imply that disinfection will be successful or that satisfactory bacteriological tests will be obtained. Termination of flushing based on such an indication shall not relieve the contractor from providing a clean water main and all requirements of chlorination and bacteriologic sampling shall remain in full force (see Section 02550, Parts 2.06 C and 2.06 E).

C. Disinfection of New Mains

All new water mains shall be disinfected
in accordance with these specifications prior to being connected to the City's existing water system.

1. Chemicals to be used in the disinfection of new water mains shall be as follows:

   a. Liquid (gas) Chlorine – conforming to ANSI/AWWA B301 containing 100% available chlorine and packaged in steel containers. Liquid chlorine shall be used only 1) in combination with appropriate gas-flow chlorinators and ejectors to provide a controlled high-concentration solution feed to the water be chlorinated; 2) under the direct supervision of someone familiar with the physiological, chemical, and physical properties of liquid chlorine and who is trained and equipped to handle any emergency that may arise; and 3) when appropriate safety practices are observed to protect working personnel and the public.

   b. Sodium hypochlorite – conforming to ANSI/AWWA B300. However, sodium hypochlorite shall NOT be used in granular or tablet form. The use of sodium hypochlorite shall require that all granules or tablets shall be completely dissolved in an appropriate amount of water to obtain the desired chlorine concentration. The sodium hypochlorite solution may then be pumped into the new mains to achieve required levels of free chlorine for disinfection.

   c. Calcium hypochlorite – conforming to ANSI/AWWA B300. However, calcium hypochlorite shall NOT be used in granular or tablet form. The use of calcium hypochlorite shall require that all granules or tablets shall be completely dissolved in an appropriate amount of water to obtain the desired chlorine concentration. The calcium hypochlorite solution may then be pumped into the new mains to achieve required levels of free chlorine for disinfection.

2. Method of Chlorination

a. Tablet Method – Shall NOT be used.

b. Continuous Feed Method – Prior to chlorination, the main(s) and all stub outs, fire hydrants and other appurtenances to the main(s) shall be filled with water and all air shall have be removed. Chlorine shall be fed into the new main(s) on a continuous basis such that the available free chlorine shall be not less than 50 mg/l throughout the entire length of the main(s). Minimum chlorine residual shall be confirmed by sampling at each end of the main(s) plus one sample for every 1200 ft. of pipe length. Upon successful introduction of chlorine to the minimum concentration, all valves shall be closed such that no water may enter or exit the main(s) being disinfected. Said chlorinated water shall be allowed to sit undisturbed within the main(s) for a period of not less than 24 hours. During the aforementioned 24 hour period no additional disinfectant (i.e. chlorine) shall be added to the main(s) at any point. After not less than 24 hours, samples shall be collected from each of the initial sampling points and each sample shall be checked for free chlorine residual. The residual free chlorine in each of the "24-hour" samples shall be not less than 25 mg/l.

In the event that the residual free chlorine in any one or more of the "24-hour" samples is less than 25 mg/l, the entire main(s), including stub outs, fire hydrants and appurtenances shall be flushed and dechlorinated in accordance with Section 02550, Part 2.06.D.3. Upon completion of the required flushing, the entire main(s), including stub outs, fire hydrants and appurtenances shall be rechlorinated in accordance with Section 02550, Part 2.06 (C).

c. Slug Method - This method shall NOT be used for the disinfection of any new water main having a total volume of less than 500,000 gallons. Where the total volume of the new main to be disinfected is greater than 500,000 gallons and the slug method is to be used for disinfection, all stub outs, laterals and other appurtenances to the main(s) shall be filled with water and all air shall be removed prior to the commencement of chlorine injection. Chlorine shall be fed into the new main(s) on a continuous basis such that a continuous slug of heavily chlorinated water shall be developed. The available free chlorine residual shall be not less than 100 mg/l throughout the length of the slug. The length of the chlorinated slug shall be not less than twenty (20) percent of the entire length of the main to be disinfected. After the heavily chlorinated slug has been developed, water from the existing water system shall be introduced into the new main to move the slug throughout the entire length of the new main as well as into all stub outs, laterals, and appurtenances. The rate of movement of the slug shall be such that all portions of the new main, including stub outs, laterals and appurtenances shall be in contact with the slug for a period of

not less than three (3) hours. As the slug is moved through the main, sampling shall occur at each end of the slug and at intervals of not more than 1000 feet through out the length of the slug. All sample locations, sample times, and sample results shall be recorded and verification of the minimum three (3) hour contact time shall be provided in a sampling report.

d. If at any time during the disinfection process the free chlorine residual of the slug falls below 75 mg/l, the flow shall be stopped and chlorination equipment shall be moved to the head of the slug. Flow shall resume and additional chlorine shall applied to restore the free chlorine within the slug to not less than 100 mg/l.

D. Removal of Heavily Chlorinated Water

Upon successful chlorination as described in Section 02550, Part 2.06 C, the contractor shall thoroughly flush the new main(s) so as to reduce free chlorine residuals to water system background levels. Flushing of the heavily chlorinated water shall require dechlorination. Hydrogen Peroxide (H_2O_2) shall be used for all dechlorination processes. Sulfur Dioxide (SO_2), Sodium Bisulfite ($NaHSO_3$), Sodium Sulfite (Na_2SO_3), and/or Sodium Thiosulfate ($Na_2S_2O_3 \cdot 5H20$) shall **not** be used.

Note: Hydrogen Peroxide (H_2O_2) dechlorination, requires approximately 0.5 lbs of 100% Hydrogen Peroxide solution to neutralize 1.0 lbs of 100% Chlorine. Appropriate adjustments must be made for actual solution concentration of Hydrogen Peroxide to be used and residual Chlorine to be neutralized to obtain necessary Hydrogen Peroxide feed rates. The following can be used as a guide for determining necessary feed rates:

$$H_2O_2 \text{ (gal/hr)} = \frac{Cl_2 \text{ X gpm X } 0.003}{\%\text{Conc}}$$

Where:

Cl_2 – Free chlorine residual (mg/l) of water to be neutralized.
gpm – Flow rate of water to be neutralized into which H_2O_2 is being injected.
%Conc – Percent concentration of H_2O_2 being used.
(i.e. 10% solution is 10 NOT 0.1)

Gallons of Hydrogen Peroxide (H_2O_2) required to neutralize various residual chlorine concentrations in 100,000 gallons of water.

Mg /l	H_2O_2 Concentration		
	10 %	**15 %**	**20 %**
1	0.5	0.33	0.25
2	1.0	0.67	0.5
10	5.0	3.4	2.5
50	25	17	12.5

E. Bacteriological Sampling

All bacteriological samples shall be collected by the City's inspector. All bacteriological testing shall be performed by the City of Savannah Water Supply and Treatment Laboratory. Bacteriological testing by any other entity shall not be acceptable. Results of the bacteriological testing shall be faxed to the City's inspector as soon as they are available. Results of bacteriological testing shall not be given by the lab directly to the contractor.

Bacteriological tests shall be failed as follows:

1. Where bacteriological tests indicate that too much trash exists within the sample.

2. Where more than ten (10) non-coliform bacteria are found on any tested sample.

3. Where any coliform bacteria or e-coli bacteria are found on any tested sample.

4. Any other reason, as deemed by the lab, that may yield suspicion that the samples and/or test results are not of sufficient quality to warrant acceptance.

Upon successful completion of proper chlorination/dechlorination in accordance with Section 02550, Parts 2.06 C and 2.06 D, the new main(s) shall be sampled for bacteriological contamination in two stages as follows:

Stage 1 Sampling

At a minimum, bacteriological samples shall be collected at each end of the new main(s) for mains not greater than 500 feet in length. Where new main(s) exceed 500 feet in length, intermediate samples shall be taken at intervals of not more than 1200 feet along the entire length of the new main(s). Intermediate samples shall be evenly distributed through the main(s) to the

extent possible.

In the event that Stage 1 bacteriological testing is failed, the contractor may **(ONE TIME ONLY)** re-flush the main(s) in accordance with Section 02550, Part 2.06 B and repeat the required Stage 1 bacteriological sampling, without re-chlorination and in accordance with this specification.

Stage 2 Sampling

There shall be NO flushing between Stage 1 and Stage 2 sampling.

Not less than 24 hours following the collection of the Stage 1 bacteriological samples, a second set (Stage 2) of bacteriological samples shall be collected from the same sampling points.

All bacteriological samples for both Stage 1 and Stage 2 must be acceptable to the lab prior to connecting the new main(s) to the existing water system and/or to any portion of the new water main(s) which has previously passed bacteriological testing.

F. Disinfection and Bacteriological Phasing of New Mains

The new main(s) to be sampled shall be considered as a single unit such that failure of a single bacteriological sample shall constitute a failure of the entire new main(s). Where new mains are being chlorinated and tested in phases, each phase shall be considered as a single unit and the failure of one phase shall not impact the acceptance or failure of any other phase. However, phasing of a system of new mains, or phasing of a single long main shall be established prior to the commencement of disinfection and shall proceed in geometric order beginning at the existing water system, such that water from an untested or failed phase shall not pass through a phase which has been accepted.

2.07 DISPOSAL AND TREATMENT OF HEAVILY CHLORINATED WATER

A. The waters and/or environment into which the chlorinated water is to be discharged shall be inspected and analyzed. If there are any possibilities that the chlorinated discharge will cause damage to the environment, the chlorinated water may be discharged by either of the following two (2) methods:

1. Should a City of Savannah Sanitary Sewer manhole be in the vicinity and after confirmation and approval of the City of Savannah Water Quality Department, the chlorinated water may be discharged into the manhole.

2. A neutralizing chemical shall be added to the discharge water to neutralize thoroughly or decrease the chlorine residual to less than 0.5 mg/l (or amount permitted to be discharged.)

The neutralizing chemicals required to neutralize various chlorine residual concentrations in 100,000 gallons, are listed in the following table:

Table 2.07* Amounts of Chemicals Required to Neutralize Various Residual Chlorine Concentrations in 100,000 gal (378.5m3) of Water

Chemical Required		
Residual	H202 @ 50%	
Chlorine Concentration (Na2S203.5H20)		
mg/L	lb	(kg)
1	0.3	(0.14)
2	0.6	(0.28)
10	6.7	(3.05)
50	33.5	(15.23)

*AWWA Specification C651-92, Page 15

B. Containers

Depending on the chemical used for dechlorination, the storage containers will vary from gas cylinders, liquid in 50 gallon (190 L) drums, or dry compounds. Dilution tanks and mixing tanks will be required when using dry compounds and may be necessary when using liquid compounds to deliver the proper dosage. Solution containers should be covered to prevent evaporation and spills.

C. Feed Equipment, Mixing, and Contact Requirements Equipment

In general, the same type of feeding equipment used for chlorine gas may be used with minor modifications for gas. However, the manufacturer should be contacted for specific equipment recommendations. No equipment should be alternately used for the two gases. The common type of dechlorination feed equipment utilizing sulfur compounds includes vacuum solution feed of sulfur dioxide gas and a positive displacement pump for aqueous solutions of sulfite or bisulfite.

The selection of the type of feed equipment utilizing sulfur compounds shall include consideration of the operator safety and overall public safety relative to the work area. The selection and design of sulfur dioxide feeding equipment shall take into account that the gas reliquifies quite easily. Special precautions must be taken when using ton (909 kg) containers to prevent reliquefaction.

Where necessary to meet the operating ranges, multiple units shall be provided for adequate peak capacity and to provide a sufficiently low feed rate on turn down to avoid depletion of the dissolved oxygen concentrations in the receiving waters.
Mixing Requirements

The dechlorination reaction with free or combined chlorine will generally occur within 15-20 seconds. Mechanical mixers are required unless the mixing facility will provide the required hydraulic turbulence to assure thorough and complete mixing. The high solubility of S02 prevents it from escaping during turbulence.

Contact Time
A minimum of 30 seconds for mixing and contact time shall be provided at the design peak hourly flow or maximum rate of pumpage. A suitable sampling point shall be provided downstream of the contact zone. Consideration shall be given to a means of re-aeration to assure maintenance of an acceptable dissolved oxygen concentration in the stream following sulfonation if required.

Protective and Respiratory Gear

The respiratory air-pac protection equipment is the same as for chlorine. (Refer to The Compressed Gas Association Publication CGA G-3-1988, "Sulfur Dioxide").

D. Sampling and Control

City personnel will be responsible for the collection of water samples from new water lines or systems.

A minimum of 48 hours prior to chlorination/dechlorination (where required) shall be required for the contractor to contact the City Water Supply & Treatment at 351-3434, so Water/Sewer may schedule the collection of the required sample(s). For Private Development projects, contractors shall contact the City Engineer's office at 651-6510.

Facilities shall be included for sampling the dechlorinated effluent for residual chlorine. Provisions shall be made to monitor for dissolved oxygen concentration after suffonation when required by the regulatory agency.

E. Testing and Control

Provisions shall be made for manual or automatic control of sulfonator feed rates based on chlorine residual measurement or flow, when needed.

2.08 EXISTING SYSTEM

The existing water distribution system in service shall be kept in service until the new system has been constructed, sterilized, and accepted by the City of Savannah Water and Sewer Bureau.

2.09 GRASSING:

All disturbed areas shall be grassed in accordance with Section 02485 "GRASSING" unless otherwise indicated.

PART 3 - TESTING

3.01 HYDROSTATIC AND LEAKAGE TESTS:

A. The new main(s), including stub outs, laterals, fire hydrants, and appurtenances shall be hydrostatically tested to a minimum of 150 psi at the highest point of the main(s) for a period of not less than 2 hours in accordance with ANSI/AWWA C600. In the event that a pressure gauge cannot be placed at the highest point of the new main(s) the test pressure at the gauge shall be increased by 1 psi for every 2.31 feet of rise between the elevation of the gauge and the elevation of the highest point of the new main(s).

B. A maximum loss of 3 psi will be allowed during static testing. A leakage recovery test will not be acceptable. The contractor shall notify the City inspector not less than 48 hours (2 working days) prior to applying pressure for testing. Pressure tests shall be witnessed by the City's inspector.

3.02 COMPACTION TESTING:

Laboratory tests of the soil shall be made in accordance with ASTM D-698. In-place density tests shall be made in accordance with ASTM D-1556 or D-2922. Results of the tests shall be furnished to the Engineer by the testing laboratory.

The minimum number of tests required for backfill over sewer in traffic area shall be 1 per 100 lf for each 4 feet of depth or portion thereof.

The minimum number of tests required for backfill over sewer in non-traffic areas shall be 1 per 200 lf for each 6 feet of depth or portion thereof.

END OF SECTION

INDEX TO

SECTION 02554 - WASTEWATER COLLECTION SYSTEM

SECTION 02554
WASTEWATER COLLECTION SYSTEM

PART 1 - PRODUCTS

Materials used in the work shall be those named in the Bid Proposal. In multiple type bids, the selection of the type of material will be at the option of the Owner. Material and equipment used in the work shall conform to one of the following:

1.01 SEWER PIPE:

A. Gravity Sewer

Unless specified otherwise the type of pipe shall be:

Depth	Type
Less Than 4'	Ductile Iron
4' and Greater	PVC-SDR 26

(Note: The max. allowable depth shall be 20' (feet) from proposed grade).

1. PVC Pipe - Shall be SDR 26 polyvinyl chloride plastic and shall meet all requirements of ASTM D-3034, latest revision. PVC pipe shall be installed in accordance with ASTM D-2321, latest revision. All pipe shall be suitable for use as a gravity sewer conduit and shall be ~~green~~ in color. Provisions must be made for contraction and expansion at each joint with a rubber ring. Pipe sizes and dimensions shall be as shown in the table below. Standard laying lengths shall be 13'(feet)(± 1-inch) for all sizes. Fittings shall meet the same specification requirements as the pipe.

Nom. Size	Outside Diameter Average	Min. Wall Thickness
4"	4.215"	0.162"
6"	6.275"	0.241"
8"	8.400"	0.323"
10"	10.500"	0.404"
12"	12.500"	0.481"

Tests on PVC Pipe - Shall be designed to pass all tests at 73° F. (± 3° F.)

2. Ductile Iron - Shall conform to ANSI A 21.50 (AWWA C 150) latest revision, ANSI A 21.51 (AWWA C 151) latest revision and ASTM A-746 latest revision. All pipe shall be thickness Class 50 or greater unless otherwise noted. All ductile iron pipes and fittings shall be bituminous coated approximately 1 mil. thick on the outside and lined with Protecto 401 Ceramic Epoxy on the inside. Fittings shall meet the same specification requirements as the pipe.

a. Coating on the outside shall be a bituminous coating approximately 1 mil thick. The finished coating shall be continuous, smooth, neither brittle when cold or sticky when exposed to the sun, and shall be strongly adherent to the iron.

b. Protecto 401 Ceramic Epoxy interior lining shall conform to ASTM E-96, ASTM B-117, ASTM G-95, ASTM D-714.

The interior of the pipe shall receive 40 mils nominal dry film thickness of Protecto 401 Ceramic Epoxy. Interior lining shall not be applied below 40 degree F. Only less than 4.0 mils loss of interior coating is acceptable after one million cycles on a +/- 22.5^{o} sliding aggregate slurry abrasion tester using a sharp natural siliceous gravel with a particle size between 2mm and 10mm. Lining application, inspection, certification, handling and surface preparation of the area to receive the protective coating shall be in accordance with the Protecto 401 manufacturer specification and requirements. Lining shall not be used on the face of the flange.

B. Force Main Pipe

1. PVC Pipe - Plastic pipe shall be PVC DR18, C-900 for 12"(inch) and smaller and DR18, C-905 for 14" (inch) and larger. All pipe shall conform to ASTM D-2241 and be installed in accordance with ASTM D-2321.

Pipe shall bear the National Sanitation Foundation seal of approval and shall comply with the requirements of Type I, Grade I (PVC 1120) of the ASTM resin specification D-1784. Certificates of conformance with the foregoing specifications shall be furnished with each lot of pipe supplied.

PVC pipe for force mains shall be ~~green~~ in color, and shall be furnished in nominal 18' to 20' (foot) laying lengths unless otherwise noted.

2. Ductile Iron Pipe - Shall conform to AWWA C-150, AWWA C-151 and ASTM A-746 latest revisions. All pipes shall be thickness Class 50 unless otherwise noted.

Coatings and Linings: All ductile iron pipes and fittings shall be bituminous coated approximately 1 mil thick on the outside and lined with 40 mils of Protecto 401 Ceramic Epoxy in the inside.

a. Coating on the outside shall be a bituminous coating approximately 1 mil thick. The finished coating shall be continuous, smooth, neither brittle when cold or sticky when exposed to the sun, and shall be strongly adherent to the iron.

b. Protecto 401 Ceramic Epoxy interior lining shall conform to Permeability rating ASTM E-96-669366, Salt Spray ASTM B-117-85, Cathodic Disbondment ASTM G6-95, and Immersion Testing ASTM D-714-87.

The interior of the pipe shall receive 40 mils nominal dry film thickness of Protecto 401 ceramic epoxy. Interior lining shall not be applied below 40°F.

Lining application, inspection, certification, handling and surface preparation of the area to receive the protective coating shall be in accordance with the Protecto 401 manufacturer specification and requirements. Lining shall not be used on the face of the flange.

1.02 SEWER PIPE JOINTS:

A. Gravity Sewer Pipe

1. Joints for PVC Pipe - Shall be integral wall bell and spigot with a rubber ring gasket. The joints shall conform to ASTM D-3212 latest revision and the gaskets shall conform to ASTM F-477 latest revision.

2. Joints for Ductile Iron Pipe - Shall comply with the requirements of 1.02 Subpart B.2.

B. Force Main Pipe

Joints shall be in accordance with ASTM D-3036. Saddle type fittings shall not be used.

1. Plastic pipe shall be jointed by means of a rubber ring bell joint which shall be an integral part of the barrel or solvent welded at the factory. The joints shall have a space to provide expansion and contraction of the pipe without leaking. Fittings for plastic pipes shall be PVC with ring tightened rubber joints; or ductile iron with adapters to PVC pipe. Pipe shall be manufactured to ductile iron pipe equivalent outside diameter.

   The bell shall consist of an integral wall section with a bonded-in solid cross section electrometric ring which meets the requirements of ASTM F-477 and ASTM D-3139. The bell section shall be designed to be at least as hydrostatically strong as the pipe wall and meet the requirements of UNI-BELL-B-11.

   Each standard and random length of pipe shall be tested to two times the rated pressure of the pipe for a minimum of 5 seconds. The integral bell shall be tested with the pipe.

2. Ductile Iron Joints – For various applications should meet the below criteria:

   a. Flanged Joints: Shall conform to ANSI Specification 21.2(AWWAC–150). Flanges shall be Class 125. Gaskets for flanged pipe and fittings shall be 1/16"(inch) ring gasket of red sheet rubber. Bolts

and bolt studs shall conform to ANSI Specification B 16.1 (AWWA C-153).

b. Mechanical Joints: In cast and ductile iron pipe shall conform to ANSI Specification A 21.11 (AWWA C-111). All glands shall be made of ductile iron only.

c. Push-On Joints: Shall have a rubber gasket that fits into a retainer recess in the bell and produces a watertight joint when the spigot is pushed home.

d. Restrained Joints - Restrained joints for pipe, valves and fittings shall be mechanical joints with ductile iron retainer glands equivalent to "Megalug" or push-on type joints equivalent to "Lock-Ring," "TR Flex", or "Super Lock" and shall have a minimum rated working pressure of 250 psi. Mechanical joint retainer glands shall comply with the manufacturer's specifications for the pipe material (ductile iron vs. PVC).The joints shall be in accordance with the applicable portions of ANSI/AWWA C111/A21.11. The manufacturer of the joints shall furnish certification, witnessed by an independent laboratory, that the joints furnished have been tested at a pressure of 500 psi without signs of leakage or failure. All wedge assemblies and related parts of restraint devices shall be processed through an iron-phosphate spray, rinse and drying operation in preparation for coating application. The coating shall consist of a minimum of two coats of liquid Xylan® fluoropolymer coating with heat cure to follow each coat. All casting bodies of restrained joints shall be surface pre-treated with an iron-phosphate spray, rinse and sealer before drying. The coating shall be electrostatically applied and heat cured. The coating shall be a polyester based powder to provide corrosion, impact and UV resistance. The coating system shall be Mega-Bond™ by EBAA Iron, or approved equal. Restrained joints shall be capable of being deflected after assembly. Restrained joints shall have a preset deflection of no more than 5 degrees and shall be able to take up 3 degrees of deflection after burial.

e. Couplings - All connections of new sewer pipe to existing sewer pipe shall be done using rigid couplings. Flexible (e.g. Fernco) couplings shall not be allowed. Couplings shall be PVC double bell type, ductile iron mechanical joint solid sleeve type or ductile iron straight and transition type (e.g., Dresser Couplings) depending on the application.

C. Ductile Iron Fittings

Fittings shall consist of bends, tees, crosses, caps and plugs, reducers, tapped tees, sleeves, etc. All fittings furnished shall be cast and machined at one foundry location to assure quality control and provide satisfactory test data. Fittings shall have cast on

them the pressure rating, nominal diameter of openings, manufacturer's name, foundry location, plant code, and degrees of fraction of the circle. Cast letters and figures shall be on the outside body of the fitting. Ductile iron welded on outlets is not acceptable.

a. Fittings for Push-On and Mechanical Joint Pipe shall be ductile iron, manufactured in accordance with ANSI A21.10 (AWWA C-110) or ANSI A21.53 (AWWA C-153) standards. Fittings shall be designed to accommodate the type of pipe used.

b. Fittings for Flanged Pipe: Shall be manufactured in accordance with ASNI B16.1, Class 125 flanges. Bolt circles and bolt holes shall also meet ANSI B16.1.

1.03 MANHOLES:

A. Pre-cast Concrete – Pre-cast manholes shall have a minimum wall thickness of five inches. Cone sections shall have a minimum wall thickness of 8" (inch) at their top. Manholes shall be manufactured with 4,000 P.S.I. concrete, type II cement that meet ASTM C-150 and absorption shall not exceed 6%. Wall reinforcement shall meet ASTM C-478 and also have a No. 4 rebar hoop around each pipe opening. The flat top slab sections shall handle HS-20 traffic loadings. Bottom slabs shall be five inches thick and be reinforced with No. 4 rebar at 9"(inch) O.C.E.W. All items shall be wet cast. Dry casting or low slump concrete will not be allowed. All bases will have proper lifting hooks in the bottom slabs (min. of 3) and there shall be no penetrating lifting holes on any structures. No holes will be allowed within 6" (six) inches of any joint on structures. All manholes shall have a coating as per Section 02555.

This shall be the minimum requirements for wall and slab thickness/rebar. It shall be the responsibility of the Contractor to insure that the manhole(s) are designed properly for the loading conditions as indicated on the plans. Should the loading conditions require greater structural integrity than the minimum, as herein specified, it shall be the responsibility of the Contractor to utilize the maximum design.

Manhole sections shall be free from large honeycomb, cracks, spalls, large chips, exposed reinforcing, and broken bells and spigots. Edges of bells and spigots shall be even and straight. Mastic shall be "Ram-nek," or equivalent, with primer. The primer shall be applied to all contact surfaces of the manhole joint at the factory in accordance with the manufacturer's instructions.

B. Frames and Covers - Manhole frame and covers shall be out of gray cast iron per ASTM A48, Class 35 without perforations and suitable for addition of cast iron or steel rings for upward adjustment of top. The word "SANITARY" shall be cast into the face of the cover in 1.5"(inches) to 2"(inch) letters raised flush with the top of the cover. Frames and covers shall have machine ground seats, a coating of coal tar pitch varnish, and be an approved equal to U.S. Foundry and Manufacturing Corp. No. USF 195-ORS. All manhole rings and covers shall be made water-tight by

means of dovetail grooves and gaskets in the cover. Provide circular cover with two (2) pulls for removing manhole cover spaced at 180 degrees and weighing not less than 120 pounds.

Proof Load Testing: Traffic service castings shall have a first article proof load test conducted and the results of that proof load test shall be made available to the City upon request. The proof load test shall be conducted in accordance with the methods and procedures outlined in AASHTO M306-04, Section 5, Proof Load Testing. The casting shall be tested on a suitable and calibrated load testing machine and the casting shall hold a 40,000 pound proof load for one minute without experiencing any cracks or detrimental permanent deformation.

C. Pipe Connections - Pipe/manhole connector shall be one piece rubber boot secured to pipe with stainless steel clamp band and to the manhole with stainless steel expansion ring. Kor-N-Seal Boot, A-lock or equal. Space between Kor-N-Seal boot and pipe OD shall be filled with non-shrink grout.

D. Steps – Steps in manholes shall be 3/8" (inch) steel rods coated with polypropylene material.

1.04 CASING:

A. Casing Pipe: Casing pipe shall be steel conforming to ASTM A-139, minimum yield strength point of 35,000 psi of the diameter shown on the drawings at each crossing. The minimum wall thickness shall be 0.25" (inches) for 24" (inch) diameter and smaller, and 0.375"(inch) for larger diameters.

The pipe ends shall be tapered where welding is required. Full pipe lengths shall be provided. No pipe casing lengths less than 8'(feet) shall be allowed unless approved by the Owner. All casing welds shall be continuous and made by a certified welder. All pipe within casings shall be restrained joint ductile iron.

B. Casing Spacers: Casing Spacers shall be bolt on style with a shell made in two (2) sections of Heavy T-304 Stainless Steel. Connecting flanges shall be ribbed for extra strength. The shell shall be lined with a PVC liner. All nuts and bolts shall be 18-8 Stainless Steel. Runners shall be made of Ultra High Molecular Weight Polymer with inherently high abrasion resistance and a low coefficient of friction. Runners shall be supported by risers made of Heavy T-304 Stainless Steel. The combined height of the supports and runners shall keep the carrier pipe a minimum of 0.75"(inch) from the casing pipe at all times. Casing Spacers shall be as manufactured by Cascade Waterworks Manufacturing Company, or approved equal.

1.05 SERVICE CONNECTIONS:

A. Tee-wyes shall be a minimum of 4"(inches)and shall be the same diameter as the run of the pipe. They shall be of the same material as the sewer main. Tee-wyes shall be used for all service connections to new sewer main.

B. Service Saddles: Service Saddles shall be flexible sewer saddles with double stainless steel straps or PVC Inserta Tees™. Service Saddles shall only be allowed for new service connections to existing sewer mains.

1.06 LATERALS:

Laterals under traffic loads shall be ductile iron conforming to Paragraph 1.01.A, with push-on joints. Laterals under non-traffic loads can be Polyvinyl Chloride with bells and natural rubber rings for jointing, conforming to Paragraph 1.01.A. All PVC sewer laterals shall be constructed with SDR 26 pipe.

A saw cut "S" shall be cut in the top of the curb directly over the lateral location. Tracing wire shall be adhered to the lateral from the main and up to the cleanout.

1.07 METAL DETECTOR TAPE:

Detector tape shall be installed over all nonmetallic gravity sewer. The tape will be equivalent to Terra-Tape by Griffolyn co., Inc. of Houston, Texas. The tape shall be at least 2"(inches)wide and "green" with the "black" words "Caution Buried Force Main Below" or "Caution Buried Sewer Line Below" noted on the tape. The tape shall have a tensile strength of not less than 4,000 psi, a dart impact strength of not less than 120 grams per 1.5 mils, be not less than 0.0055" (inches) thick, and include sufficient metal to allow easy detection from above ground. The detector tape shall be designed to last as long as the pipe it is installed over, even in adverse soils.

1.08 TRACING WIRE:

All force mains and sanitary sewer laterals below grade shall have a #12 gauge 30 mil insulated single strand copper wire installed directly on top of the pipe line. The wire shall be secured to the pipe with tape or other accepted methods at spacing of no more than 36" (inch) apart. Where appurtenances connect to the force main, the wire insulation shall be stripped so that the bare wires can and shall be joined securely wrapped with 3M Direct Bury Splice or equivalent. The insulation tape shall completely cover all areas of the exposed wire. The insulated wire must maintain electrical continuity. In addition, tracing wire shall locate laterals by connecting cleanouts to gravity sewers. All these tracing wire systems shall be checked and tested by the contractor, in the presence of the engineer or project representative, prior to acceptance of the force main installation. All equipment, meters, detectors, etc. needed for testing shall be furnished by the Contractor.

Plastic Tracing Wire Stations equal to Rhino TriView FlexTM shall be installed every 500' (feet) along the force main. Tracing wire shall be connected to the station and shall be marked as "Sanitary Sewer Force Main."

1.09 FORCE MAIN SUBSURFACE MARKERS:

Omni-balls or equal shall be installed above force main pipe at all bends, and at least every 500' (feet) along straight pipe runs.

1.10 AIR RELEASE VALVES:

Air Release Valve - Shall be designed for sewage service. The valve shall be constructed of a cast iron body, stainless steel or bronze trim, and stainless steel float. The inlet shall be 2" (inches), 5/16" (inch) orifice and have a venting capacity of 35 c.f.f.a.m, however, at 10 pounds. working pressure it should not vent less than 25 cfm of free air. The working pressure shall be as specified in the contract. Sewage air release valves shall be Crispin UX20 or equal. Piping, nipples, and plugs shall be Schedule 40, type 316 stainless steel. Air release valves shall be installed at all high points in the force main and/or as designated by the engineer. It shall conform to the detail shown. A copy of the O&M manual shall be given to the City prior to acceptance. Provide 3" (inch) diameter or larger clean out port.

The manhole and installation of the valve shall be in accordance with the City of Savannah Standard Construction Detail, S-11. Prior to deciding on the location of any air release valve, the Contractor shall provide the Engineer with an accurate profile of the installed force main so that high points in the system can be determined. The locations of the air release valves shall be field adjusted based on the locations of the high points.

1.11 POLYETHYLENE ENCASEMENT:

Polyethylene encasement shall be used on all ductile iron pipe, and shall be in tube form conforming to the requirements of ANSI/AWWA C105/A21.5 latest revision. The polyethylene film shall have the following characteristics:

Tensile Strength:	1,200 psi minimum
Elongation:	300 percent minimum
Dielectric Strength:	300V/mil thickness minimum
Thickness:	Nominal thickness of .008 in. (8 mil)

1.12 STONE BEDDING:

Shall be graded crushed granite with the following gradation:

Square Opening Size	Percent Passing
1"	100%
3/4"	90 to 100%
3/8"	0 to 65%
No. 4	0 to 25%

1.13 BORROW:

Where it is determined that sufficient suitable material is not available from the site to satisfactorily backfill the pipe to at least 2' (feet) above the top of the pipe, the Contractor shall furnish suitable sandy borrow material to accomplish the

requirements. The material shall have not more than 60% passing the No. 100 sieve, nor more than 20% passing the No. 200 sieve

1.14 PRODUCT REVIEW:

A. The Contractor shall provide the Engineer with a complete description of all products before ordering. The Engineer shall review and approve all products before they are ordered.

PART 2 - EXECUTION

2.01 CONSTRUCTION OBSERVATION:

The line, grade, deflection and infiltration of sewers shall be tested by the Contractor under the direction of the Engineer. The Engineer will have the right to require that any portion of the work be done in his presence and if the work is covered up after such instruction, it shall be exposed by the Contractor for observation. However, if the Contractor notifies the Engineer that such work is scheduled and the Engineer fails to appear within 48 hours, the Contractor may proceed without him. All work done and materials furnished shall be subject to review by the Engineer or project representative. Improper work shall be reconstructed. All materials which do not conform to the requirements of the specifications shall be removed from the work upon notice being received from the Engineer for the rejection of such materials. The Engineer shall have the right to mark rejected materials so as to distinguish them as such. The Contractor shall give the Project Engineer or Project Representative a minimum of 48 hours notice for all required observations or tests.

2.02 LOCATION AND GRADE:

The line and grade of the sewers and the position of all manholes and other structures are shown on the drawings. The grade line as given on the profile or mentioned in these specifications means the invert or bottom of the inside of the pipe, and the price for trenching shall include the trench for the depth below this line necessary to lay the sewer to this grade, but measurements for payment will be made only to the grade line. Master control lines and bench marks have been provided by the Engineer. The Contractor shall be responsible for the proper locations and grade of the sewers.

2.03 EXCAVATION:

The Contractor shall perform all excavations of every description and of whatever substance encountered to the depth shown on the plans or specified for all sewers, manholes and other appurtenances. All trenches shall be properly dewatered before laying pipe, by the use of well points, pumping or other methods accepted by the Engineer. The top portion of trenches may be excavated with sloping or vertical sides, except that the width of trench to a height of 2'(feet) above the top of the pipe shall not exceed 2'(feet) greater than the diameter of the pipe. A minimum of 6" (inches) of stone bedding shall be required for all sewers and force mains. The

bedding shall extend to one-half of the pipe diameter.

Where the character of the soil is such that the Engineer determines it unsuitable for pipe bedding, an additional foot of excavation will be authorized and the trench backfilled with stone. Excavation in excess of the depths and widths required for sewers, manholes and other structures shall be corrected by backfilling with stone to the proper grade.

The limit of excavation shall be such to allow for placing and removing forms, installing sheeting, shoring, bracing, etc. The Contractor shall pile excavated material in a manner that will not endanger the work and will avoid obstructing sidewalks, driveways, power poles, etc. Drainage shall be kept clear.

2.04 BRACING AND SHEETING:

The sides of all trenches shall be securely held by trench boxes, stay bracing, or by skeleton or solid sheeting and bracing, as required by the soil conditions encountered, to protect the adjoining property and for safety in accordance with OSHA requirements. Where shown on the drawings or where directed by the Engineer, the Contractor must install solid sheeting to protect adjacent property and utilities. The sheeting shall be steel or timber and the Contractor shall submit design data, including the section modules of the members and the arrangement for bracing at various depths, to the Engineer for review before installing the sheeting. Sheeting shall be removed in units when the backfilling has reached the elevation necessary to protect the pipe, adjoining property and utilities.

When sheeting or shoring above the elevation cannot be safely removed, it shall be left in place. Timber left in place shall be cut off at least 2' (feet) below the surface.

2.05 LAYING PIPE:

A. Gravity Sewer Installation:

All gravity sewer pipe shall be laid upgrade with spigots pointing downgrade. The pipe shall be laid in a trench prepared in accordance with Paragraph 2.03 "Excavation," so that after the sewer is complete, the interior surface shall conform on the bottom accurately to the grades and alignment fixed or given by the Engineer. All pipe shall be cleaned out and left clean. Every third joint shall be filled around immediately after being properly placed. The recommendations of the manufacturer of the particular pipe joint used shall be adhered to.

The sewer lines shall be straight and show a uniform grade between manholes. Any sags or bellies in the pipe sections shall not extend longer than 10' (feet) or hold water more than one-eighth of the pipe's inside diameter.

B. Force Main Installation

Depth of Pipe – The Contractor shall perform excavation of whatever substances are encountered to a depth that will provide a minimum cover over the top of the pipe of 36" (inches) from the proposed finished grade, for pipe 12" (inches) and smaller. Pipe larger than 12" (inches) in diameter shall have 48" (inches) of cover from the finished grade. A maximum cover of 60" (inches) from finished grade shall be used unless approved by the City to avoid a conflict. If the cover will be less than 36" (inches), ductile pipe shall be used.

The force main shall be laid in a ditch prepared in accordance with Paragraph 2.03 "Excavation", so that after the force main is complete, the interior surface shall conform on the bottom accurately to the grades and alignment fixed or given by the Engineer. Special care should be taken to provide a firm bedding in good material, select borrow, stone backfill or Class "A" concrete, as authorized, for the length of each joint and one-half of the circumference. Install stone bedding to a depth of 6" (inches) beneath the FM pipe and up to the spring line of the pipe. Holes shall be provided to relieve bells from bedding strain, but not so large as to allow separation of the bell from the barrel by settlement after backfilling. All pipes shall be cleaned out and left clean. Every third joint shall be filled around immediately after being properly placed. The recommendations of the manufacturer of the particular pipe joint used shall be adhered to.

2.06 METAL DETECTOR TAPE:

As a part of the installation of gravity or force main sewer, the Contractor shall place metallic detector tape, suitably coded, over the installed pipes at a depth not to exceed 18" (inches) below the finished surface.

2.07 SEPARATION BETWEEN WATER & SANITARY SEWERS:

Water mains and/or laterals shall not be laid closer than 10 feet horizontally to a sanitary or storm sewer without written instruction from the engineer. Some deviation may be allowed on a case by case basis if approved by the City for installation of the water main closer to a sewer, provided that the water main is laid in a separate trench, such that the bottom of the water main is at least 18 inches above the top of the sewer. In no case, shall the water and sewer lines be closer than 5' (feet) horizontally edge to edge. Water mains crossing sewers should be laid to provide a minimum vertical distance of 18" (inches) between the invert of the water main and the top of the sewer line. The water and sewer lines must be ductile iron when laid in violation of the separation requirements. One full length of water pipe shall be located so both joints will be as far from the sewer as possible.

2.08 STONE BEDDING:

Stone bedding shall be installed 6" (inches) below all sewer pipes and to one-half of the pipe diameter. Stone shall be placed 6" (inches) deep and 2' (feet) wider than the pipe at the barrel, and up to the spring line of the sewer pipe. The pipe shall be carefully bedded in the stone as specified on City of Savannah Detail S-26, or in accordance with the manufacturer's recommendations.

2.09 CONNECTIONS TO EXISTING SEWER MAINS:

Connections to existing sewer mains may be performed with the use of two difference connections devices:

A. A saddle matching the existing main line pipe diameter with either 4" or 6" (inch) lateral connections may be used. The existing lines must be cut with a round cutter so that the opening will allow the hub of the saddle to fit inside the opening. Square holes cut with a pipe saw will not be acceptable. The saddles must be gasketed. Stainless steel straps must be used to attach the saddle to the existing sewer main. The sewer main must be protected from existing debris around the pipe from entering the line during the attachment of the saddle. The area around the existing sewer pipe must be compacted to 100% density. All saddles must be attached to the sewer main at either the 2:00 or 10:00 position. No laterals will be attached to the sewer main at the 12:00 position.

B. The other alternative to attaching sewer laterals to an existing main is by using an Inserta Tee. This device can be connected to the main by drilling an appropriate size round hole for the 4" or 6" (inch) lateral. The proper Inserta Tee for the existing sewer line pipe material must then be installed by inserting the rubber boot inside the sewer main. A PVC insert, lubricated properly, is then inserted inside the boot, then a stainless steel strap ties the boot to the insert. The insert then accepts PVC pipe of the appropriate size. The site must then be 100% compacted around the lateral. All connections to existing sewer mains must be inspected by the City prior to backfilling.

2.10 BACKFILLING:

A. All trenches and excavation shall be backfilled immediately after the pipes are laid therein, unless other protection of the pipe line is directed. The backfilling material shall be selected and deposited with special reference to the future safety of the pipes. Except where special methods of bedding and tamping are provided for, select backfill or sandy borrow shall be solidly tamped about the pipe up to a level at least 2' (feet) above the top of the pipes and shall be carefully deposited to uniform layers, each layer solidly tamped or rammed with proper tools so as not to injure or disturb the pipeline. The remainder of the backfilling of the trench shall be carried on simultaneously on both sides of the pipe in 8" - 12" (inch) layers in such a manner that injurious side pressure does not occur. The material used shall be selected from excavated material anywhere on the work site if any of this material is suitable.

Under the traffic areas the top 12" (inches) of backfill material shall be compacted to a density of not less than 100% at optimum moisture. Below the 12" (inch) line and to and including the area around the pipe the density shall not be less than 95% at optimum moisture. In areas other than traffic areas, the backfill material shall be compacted to 95% density at optimum moisture. Compaction tests shall be conducted in accordance with ASTM D-1556 or D-2922 by an independent testing laboratory. The tests are to be taken at the direction of the Engineer to average not

more than 100' (foot) intervals. Laboratory Tests shall conform to ASTM D-698.

Whenever the trenches have not been properly filled, or if settlement occurs, they shall be refilled, smoothed off and finally made to conform to the surface elevation of the ground. Backfilling shall be carefully performed and the original surface restored to the full satisfaction of the Engineer immediately after the installation.

Where thermoplastic (P.V.C.) pipe is installed, the Contractor shall take precautions in accordance with ASTM D-2321, during the backfill operations so as not to create excessive side pressures, or vertical or horizontal deflection of the pipe so as not to impair flow capacity.

2.11 JACKING AND BORING:

Steel casing of the diameter shown on the plans shall be jacked and bored in the locations indicated. Joints between sections of the steel casing shall be welded by a certified welder. Boring and jacking shall be in accordance with the provisions of Section 65 of the Georgia Department of Transportation Standard Specifications. After the carrier pipe has been installed, the ends of the casing shall be sealed with Class "C" concrete after observation by the Engineer.

Where the work involves a State highway, the Resident Engineer of the State Department of Transportation shall be notified by the Contractor three (3) working days before the crossing is started. Where the work involves a railroad, the work shall conform to the requirements of American Railway Engineering Association specifications and the Division Superintendent of the Railroad shall be notified three (3) working days prior to beginning the work. Before commencing work within the rights-of-way of the railroads or highways, the Contractor shall verify that the Owner has obtained the required permits.

2.12 MANHOLES:

Manholes shall be constructed on compacted bedding material so structure is plumb and pipe inverts are at the proper extension where shown on the drawings or where directed by the Engineer. Manholes shall be installed at the end of each line, at all changes in grade, size, or alignment, at all intersections, and at distances not greater than 400' feet). The channel in the bottom of the manholes shall be smooth and properly rounded and the invert channel shall be same size as installed sewer line. Special care must be exercised in laying the channel and adjacent pipes to grade. Invert piping shall not extend inside manhole any further than 2" (inches). The slope of the invert benches shall provide a minimum of 2" higher than the crown of the pipe. The tops of manholes outside of roads shall be built to the ground surface unless otherwise shown on the plans. Manholes in roads shall be built to grades designated by the Engineer. Manhole sections with either honeycomb defects; exposed reinforcing; broken/fractured bell or spigot or cracked walls will be subject to rejection by the Engineers for use on the project. When mastic sealant is used, improperly applied primer will also be cause for rejection.

No leaks in any manhole will be acceptable. All repairs made from inside the manhole shall be made with non-shrink grout.

A 0.1' (feet) minimum drop shall be required through all manholes where the horizontal alignment change is less than 45 degrees. A 0.2' (foot) minimum drop shall be required through all manholes where the horizontal alignment change is 45 degrees to 90 degrees. Horizontal alignment changes greater than 90 degrees at a single manhole shall not be allowed. A wide sweep invert shall be required for all manholes where the horizontal alignment change is 90 degrees.

2.13 PROTECTION OF EXISTING SANITARY SEWER SYSTEMS:

During the construction of new Sanitary Sewer Systems, the existing sanitary sewer shall be protected at the point of connection with use of a pneumatic or mechanical plug. This isolation shall remain in place until the new system is fully accepted. Provisions must be in place to prevent sediment and excess water from entering the City's existing Sanitary Sewer System.

The isolation of the new system must be performed at the Contractor's expense. Any breach of this isolation shall be resolved by the Contractor to meet City expectations and standards. The Contractor may also be liable and responsible for remediation costs due to this breach.

2.14 CLEANING:

Prior to mandrel tests, televising, and before acceptance of the gravity sewer systems, all sewer lines shall be cleaned to the satisfaction of the Engineer. Where any obstruction occurs, the contractor will be required to clean the sewers by flushing and by means of rod and swabs or other instruments. Cleaning of new sewers is to be completed without impacting the existing sewer system.

2.15 TESTING AND INSPECTION

A. LEAKAGE TESTING: GRAVITY SEWER MAINS AND LATERALS

All new public and private gravity sewers and laterals shall be pressure tested a minimum of 30 days following final backfill in accordance with the Time-Pressure Drop Method specified in ASTM F1417 - Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air, latest revision. The procedure is summarized as follows:

1. Isolate the section of the sewer line to be tested using inflatable plugs or stoppers.

2. Cap all laterals and stubs using glued caps. All caps and plugs shall be

securely braced to prevent blow-out.

3. One of the plugs or caps shall have an inlet tap or other provision for connecting a hose to a portable air control source.

4. Connect the air hose to the inlet tap and portable air control source. The air source equipment shall include necessary valves and pressure gages to pressurize an oil-free air source at a controlled rate into the test section.

5. Add air slowly to the test section until the pressure inside the pipe reaches 4 psi greater than the average backpressure of any groundwater submerging the pipe. (NOTE: All test pressures are measured as gage pressure, which is any pressure greater than atmospheric pressure. Since water produces a pressure of 0.43 psi per foot of depth, air test pressures must be increased to offset the depth of groundwater over the sewer line. If the groundwater is 2' (feet) or more above the top of the pipe at the upstream end, or if the required test pressure exceeds 9 psi, this test should not be used.)

6. Disconnect the air supply and allow a minimum of two minutes for pressure stabilization.

7. Measure the pressure drop over the following time period, depending on the diameter of the sewer pipe being tested (based on a maximum test section length of 400' (feet) between manholes):

8 inch:	6 minutes
10 inch:	8 minutes
12 inch:	12 minutes
15 inch:	18 minutes
18 inch:	26 minutes

8. Acceptable pressure drop over time period: Not more than 0.5 psi.

The testing shall be performed by the Contractor, and a representative of the City shall be present to observe the test. The Contractor shall be responsible for all costs associated with performing the leakage testing, locating leaks, repairing leaks, and conducting additional leakage testing as necessary until the system passes the pressure test. No gravity sewers or laterals will he accepted by the City without a passing pressure test.

B. LEAKAGE TESTING: FORCE MAINS

The Contractor shall furnish equipment and plugs and subject the force mains to hydrostatic tests at 100 psi for a period of 2 hours. Any leaks shall be located and repaired. Each section tested shall be slowly filled with water, care being taken to expel all air from the pipes. No pipe installation will be accepted until the leakage during the pressure test is less than the number of gallons listed for each 1,000 feet of pipe tested:

6" & less	- 0.9 gallons	12" - 1.8 gallons
8"	- 1.2 gallons	14" - 2.1 gallons
10"	- 1.5 gallons	16" - 2.4 gallons

C. DEFLECTION – GRAVITY SEWER MAINS

It is the responsibility of the Contractor to assure that backfill is sufficient to limit deflection for all PVC pipe, 8" (inch) diameter and larger, to no more than 5% of the internal diameter of the pipe which shall be tested by a mandrel permitting no greater than maximum 5% deflection. All pipe shall be tested no sooner than 30 days after installation. All pipe not passing the 5% deflection limitation test shall be repaired or removed and replaced.

The mandrel shall be pulled through the pipe (SDR-26) with the following diameter:

Nominal Pipe Size	AV I.D.	Mandrel Diameter
8"	7.754"	7.37"
10"	9.692"	9.20"
12"	11.538"	10.96"

D. DEFLECTION-LATERALS:

It is the responsibility of the Contractor to assure that installation and backfill is sufficient to limit obstructions and deflections in the laterals. Laterals shall be tested by dropping a tennis ball in the upstream end of the pipe. The tennis ball must show up at the next downstream manhole. If not, the lateral must be repaired or removed and replaced. The tennis ball may be followed by water to help with its travel to the next downstream manhole.

E. TELEVISING:

After the completion of successful mandrel tests and cleaning, all newly constructed sewer lines must be televised by the City prior to acceptance. Accordingly, all sewer lines, 8" (inch) in diameter and larger, that are installed within accepted public right-of-ways and easements will be televised, including those lines on private property that are connected to the public lines. Contractors will be charged a fee, currently $0.85/linear feet for all size sewers, by the City, and will be responsible for preparing the lines to insure that they are cleaned and free of debris prior to televising. Contractor shall be responsible for providing access for the televising equipment. Contractor shall notify the Inspector on his progress prior to the televising request. Details and procedures of this program are included in the Televising Procedures Manual developed by the City's Water Quality Control Department who will be providing the television services. Contractors will be responsible for becoming familiar with this manual. This Manual is available on the City's Website.

F. COMPACTION:

Laboratory tests of the soil shall be made in accordance with ASTM D-698. In-place density tests shall be made in accordance with ASTM D-1556 or D-2922. Results of the tests shall be furnished to the Engineer by the testing laboratory. The minimum number of tests required shall be:

Backfill over sewer in traffic areas ..... 1 per 100 linear feet or less for each 4' (feet) of depth or portion thereof.

Backfill over sewer in non-traffic areas ..... 1 per 200 linear feet or less for each 6' (feet) of depth or portion thereof.

2.16 CLOSING PIPE:

When the work or pipe laying is suspended, either for night or at other times, the end of the gravity sewer or force main pipe must be closed with a water tight cover. The Contractor will be held responsible for keeping the gravity sewer or force main free from obstruction. Plugs shall remain in pipe ends until all water is removed from the trench.

2.17 GRASSING:

Grassing of areas disturbed during construction shall be in accordance with Section 02485 - Grassing.

2.18 ACCEPTANCE OF PORTIONS OF THE WORK:

The Owner reserves the right to accept and use any portion of the work whenever it is considered to the City's interest to do so. The Engineer shall have power to direct on what line the Contractor shall work and the order thereof.

2.19 RECORD DATA:

As required under Section 1500, Paragraph 54, of the General Conditions, the Contractor is required during construction to keep accurate, legible records of the location of all new sewers, force mains, tees and laterals. This record data will include survey coordinates of all bends and fittings on the force main. These records will be made available to the Engineer before his final review for incorporation into the consulting Engineer's Record Drawings. Final payment to the Contractor will be withheld until all such information is received and accepted.

END OF SECTION

INDEX TO

SECTION 02600 - PAVEMENT

SECTION 02600

PAVEMENT

PART 1 - PRODUCTS

1.01 BASE COURSE:

The following base course alternates will be allowed as directed by the plans:

Compacted Thickness	Type
3"	Hot Mix Asphaltic Concrete (Collector & Arterial Streets)
8"	Graded Aggregate

A. Hot Mix Asphaltic Concrete - Shall consist of fine and coarse aggregate and mineral filler uniformly mixed with hot asphaltic cement in a central mixing plant. The gradations, asphalt content and stabilities shall be the following:

Square Sieve	% Passing by Weight
1"	100
3/4"	85 - 100
3/8"	55 - 75
No. 8	38 - 44
No. 200	4 - 7
Asphalt Cement	5 - 7%
Minimum Marshall Stability @ 50 Blows	1,500 lbs.

B. Graded Aggregate Base Course - The aggregate shall consist of processed and blended crushed granite stone. Aggregates shall be free from lumps and balls of clay, organic matter, objectionable coatings and other foreign material and shall be durable and sound. Aggregate shall meet the applicable requirements of Section 800, Coarse Aggregate, of the Georgia Highway Department Specifications. The material shall meet the following gradation and other requirements:

Sieve Size	% Passing by Weight
2"	100
1-1/2"	95 - 100
1"	70 - 100
½"	50 - 80
No. 4	30 - 55
No. 30	12 - 31
No. 200	6 - 15

	Percent
Clay	0 to 10
Volume Change	0 to 15
Liquid Limit	0 to 25
Plasticity Index	0 to 6

1.02 PRIME AND TACK COATS:

A. Prime Coat - The prime coat shall consist of spraying the base course with low viscosity liquid asphalt, such as RC-30 or RC-70, on the prepared surface of the base and allowing the asphalt to penetrate as far as possible.

B. Tack Coat - The tack coat shall consist of spraying the base course with AC-20 or AC-30, Asphalt Cement. When the temperature in the shade is 70• F or above an emulsion, such as CRS-2h or CRS-3, may be used.

1.03 SURFACE COURSE:

A. The surface course shall consist of fine and coarse aggregate and mineral filler uniformly mixed with hot asphalt cement in a central mixing plant. An antistripping agent shall be added to the asphalt-cement in the preparation of the hot-mix asphalt concrete when "hydrophilic" aggregates are used. The gradations, asphalt content and stabilities for "E" Mix shall be the following:

Square Sieve	% Passing by Weight
3/4"	100
½"	85 - 100
3/8"	70 - 85
No. 8	44 - 48
No. 50	10 - 25
No. 200	4 - 7
Asphalt Cement	5 - 7%
Minimum Marshall Stability @ 50 blows	1,500 lbs.

The gradations, asphaltic content and stabilities for "F" Mix shall be the following:

Square Sieve	% Passing by Weight
½	100
1/4	90-100
No. 4	55- 75
No. 8	44- 50
No. 50	14- 25
No. 200	4- 7
Asphalt Cement	5.25-7.50%
Minimum Marshall @ 50 Blows	1,500 lbs.

1.04 PAVEMENT FABRIC:

A. Fabric used for underlayment shall be equivalent to Phillip's Petromat.

1.05 TRAFFIC LINE PAINT:

A. Traffic Line Paint - Shall conform to Section 870.03 of the Standard Specifications for Road and Bridge Construction, Department of Transportation, State of Georgia. The color shall be at the direction of the Owner or as specified in the plans.

PART 2 - EXECUTION & TESTING

2.01 TESTS:

The following tests will be made in accordance with the DOT Specifications or other specified methods. Compaction tests shall be made at the Owner's direction and expense. Failed tests shall be rescheduled at the Owner's direction and retesting shall be paid for by the Contractor.

A. Subgrade Compaction - One (1) test per 250 square yards. 100% Standard (ASTM Test D-698).

B. Base - One (1) test each per 250 square yards.

1. Field Determination of Compaction.

C. Asphaltic Concrete - One (1) test each for 250 tons of asphaltic concrete. These tests shall conform to the Georgia Department of Transportation's Standards for roads and bridges.

1. Asphalt extraction and aggregate test; one set for each 250 tons of asphaltic concrete.

2. Marshall Stability Tests; stability not less than 1,500 lbs. for surface course. One test for each 250 tons of asphaltic concrete.

D. All design mixes heretofore specified.

2.02 PAVEMENT SYSTEM'S LOCATION, GRADE, AND ALLOWABLE TOLERANCES:

A. The locations and grades of pavement are shown on the drawings. The grade as given on the drawings is the finished pavement grade and allowance will be made for the thickness of pavement when preparing the subgrade.

B. Surfaces - The finished surfaces of pavements shall conform to the lines, grades and cross sections shown. The finished surfaces of pavement shall not vary more than 1/8 inch above or below the planned grade lines or elevations established at the job site. The finished surfaces of new abutting pavements shall coincide at their juncture. Where a new pavement abuts an existing pavement, a transition pavement strip shall be installed to the juncture of the new and existing pavement. The finished surface of pavements shall have no abrupt change of 1/8-inch or more and shall not deviate from the testing edge of an accepted 10-foot straightedge more than 1/8-inch.

C. Thickness -

1. Permissible Deviation - For asphaltic concrete wearing surfaces, will be up to 1/8-inch of the required thickness. Deviation in base courses will be up to 3/8-inch.

2. Pavements Deficient in Thickness - When measurement of any core indicates that the pavement is deficient in thickness, additional cores will be drilled at 25-foot intervals along the centerline of the lane on each side of the original deficient core until the cores indicate that the deficiency in thickness is less than 1/8-inch. Pavement areas deficient in thickness shall be removed and replaced with pavement of the indicated thickness. If the Contractor believes that the cores and measurements taken are not sufficient to indicate fairly the actual thickness of the pavement, additional cores and measurements will be taken, provided the Contractor will bear the extra cost of drilling the cores and filling the holes in the pavement as directed.

2.03 FIELD QUALITY CONTROL:

A. Equipment - All equipment, tools and machines, used in the performance of the work required by this section of the specifications shall be subject to the acceptance of the Owner and shall be maintained in satisfactory working condition at all times.

1. Bituminous Distributor - The distributor shall have pneumatic tires of such width and number that the load produced on the base surface shall not exceed 650 pounds per inch of tire width. It shall be so designed and equipped as to distribute the bituminous material uniformly at even heat in variable widths of surface at readily determined and controlled rates ranging from 0.05 to 2.0 gallons per square yard, with a pressure range of from 25 to 75 pounds per square inch and with

an allowable variation from any specified rate not exceeding ten percent (10%). Distributor equipment shall include an independently operated bitumen pump, tachometer, pressure gauges, volume measuring devices, a thermometer for reading the temperature of tank contents and a hose attachment suitable for applying bituminous material to spots missed by the distributor. The distributor shall be equipped for circulation and agitation of the bituminous material during the heating process.

2. Power Brooms and Power Blowers - Blowers and brooms shall be of the power type and shall be suitable for cleaning the surfaces to which the prime or tack coat is to be applied.

B. Weather Limitations - The prime or tack coat shall be applied only when the base course or pavement is dry or contains moisture not in excess of the amount that will permit uniform distribution and the desired penetration and when the temperature has not been below 35 degrees F. for 12 hours immediately prior to application. The prime or tack coat shall only be applied when the atmospheric temperature in the shade is 55 degrees F. or above.

C. Preparation of Surface - Immediately before applying the pavement course, if the underlying surface is sufficiently bonded, all loose material, dirt, clay or other objectionable material, shall be removed from the surface to be treated with a power broom or blower supplemented with hand brooms, as directed by the Engineer. After the cleaning operation and prior to the application of the pavement course, an observation of the area to be treated will be made by the Engineer to determine its fitness to receive the bituminous coating. That portion of the surface prepared for immediate treatment shall be dry and in satisfactory condition.

2.04 SEQUENCE OF CONSTRUCTION:

A. Prior to the placement of the base material the roadbanks/esplanade shall be stabilized to the satisfaction of the Engineer.

B. Prior to the placement of the finish surface (asphalt) the base material must be approved by the Engineer and:

1. Graded Aggregate: Shall be allowed to set for a period of at least forty-eight hours and no longer than ten days before the finish surface is applied.

2.05 PROOF ROLLING:

A. Shall be required on the subgrade of all streets where designated by the Engineer. Proof rolling shall be done after water lines have been lowered, house services installed and sewers backfilled. The operation shall be in accordance with methods described in Section 221 of the DOT Specifications.

2.06 GRADED AGGREGATE BASE COURSE:

A. Aggregate shall be placed with an accepted spreader in accordance with Georgia Department of Transportation Standard Specifications. (The spreader shall contain a hopper, an adjustable screed and be so designed that there will be a uniform, steady flow of material from the hopper. The spreader shall be capable of laying material without segregation across the full width of the lane to a uniform density.) Spreaders are not required on curb and gutter road sections.

The base or subbase aggregate shall be thoroughly wetted to optimum moisture ($\pm$ 1-1/2%) content as determined by ASTM D-698.

B. Excavation - The existing subgrade shall be leveled to the lines and grades shown on the plans.

1. Subgrade Preparation - Prior to constructing the graded aggregate base course, the subgrade shall be cleaned of all foreign substances. At the time of construction of the base course, the subgrade shall contain no frozen material. The surface of the subgrade shall be checked by the Owner or his representative for adequate compaction and surface tolerances. Ruts or soft yielding spots that may appear in areas of the subgrade course having inadequate compaction and areas not smooth or which vary in elevation more than ½-inch above or below the required grade established on the plans shall be corrected to the satisfaction of the Owner or his designated representative.

C. Compaction - While at Optimum moisture ($\pm$ 1-1/2%), the aggregate base shall be rolled with rollers capable of obtaining the desired density. The rolling shall continue until the base is compacted to a maximum laboratory dry density of 100% of ASTM D-698.

In-place density of the compacted base will be determined in accordance with the Sand Cone Method, ASTM D-1556 or Nuclear Method, ASTM D-2922. At the option of the Contractor, vibratory, flatwheel and other rollers accepted by the Engineer may be used to obtain the required compaction.

D. Surface Finish Tolerances - The surface of the completed base shall not show any deviation in excess of 1/4-inch when tested with a 10 foot straight edge. Deviation in thickness of the base shall be up to, but not including, 3/8-inch of the required thickness.

E. Maintenance - The base shall be maintained in a condition that will meet all specification requirements until the work is accepted.

2.07 PAVEMENT FABRIC:

A. Fabric shall be placed on the base where directed by the Engineer and installed in accordance with the manufacturer's recommendations.

2.08 BITUMINOUS PRIME/TACK COATS:

A. Bituminous Prime Coat - Bituminous material for the prime coat shall be applied in quantities of not less than 0.15 gallons nor more than 0.30 gallons per square yard of base course. Any prescribed application shall be divided, if necessary, into two (2) applications to avoid flowing off the surface. All irregularities in the base surface shall be corrected prior to application of the prime coat.

The prime shall only be applied when the base course is only slightly damp and when the temperature of the air in the shade is 55°F or above.

B. Bituminous Tack Coat - Bituminous material for the tack coat shall be applied in quantities of not less than 0.08 gallons nor more than 0.15 gallons per square yard of base course. The entire surface to be paved shall be coated with the tack coat.

The tack coat shall only be applied when the base is dry and when the temperature has not been below 35°F. for 12 hours immediately prior to application. The tack coat shall only be applied when the temperature of the air in the shade is 55°F. or above.

Work shall be planned so that no more tack coat than is necessary for the day's operation is placed on the surface. All traffic not essential to the work should be kept off the tack coat.

In places where the distributor bars cannot reach, it will be necessary to apply the tack coat with a hand spray attached to the distributor by a hose. When hand spray methods are used, care should be taken to give the surface a very light application of the asphalt.

2.09 ASPHALTIC CONCRETE BASE AND SURFACE COURSES:

A. Mixing Plants - Asphaltic Concrete shall be mixed in central plants conforming to the applicable requirements of Section 400 of the Standard Specifications of the Georgia State Highway Department.

B. Equipment -

1. Bituminous-Materials Spreaders - Shall be self-propelled type equipped with hoppers, tamping or vibrating devises, distributing screws, adjustable screeds, equipment for heating the screeds and equalizing devices. The spreader shall be capable of spreading hot bituminous mixtures without tearing, shoving or gouging, while producing a smooth finished surface, confining the edges of the strips to true lines without the use of stationary side forms and placing the course to the required thickness. Spreaders shall be designed to operate forward at variable speeds and in reverse at traveling speeds of not less than 100 feet per minute. The use of a spreader that leaves indented areas or other objectionable irregularities in the fresh-laid mix during operation will not be permitted.

2. Steel-Wheel Rollers - Shall be the self-propelled, three-wheel and tandem types, weighing not less than 20,000 pounds each. The three-wheel rollers shall have a minimum weight of 300 pounds per inch of width in the rear wheel. The wheels shall be equipped with adjustable scrapers, water tanks and sprinkling apparatus that will be used for keeping the wheels wet to prevent the bituminous mixture from sticking to the wheels. The rollers shall be capable of reversing without backlash and shall be free from worn parts. The roller wheels shall have no flat or pitted areas and no projections that will leave marks in the pavement. Three-axle tandems will be permitted in lieu of two-axle tandems if accepted by the Engineer.

3. Heavy Pneumatic-Tired Rollers - Shall be self-propelled and shall consist of two axles on which are mounted multiple pneumatic-tired wheels in such a manner that the rear group of wheels will not follow in the tracks of the forward group but will be so spaced as to give essentially uniform coverage with each pass.

   The axles shall be mounted in a rigid frame provided with a loading platform or body suitable for ballast loading. The tires shall be smooth and shall be capable of being inflated to a minimum pressure of 90

pounds per square inch. Construction of the roller shall be such that each wheel can be loaded to a minimum of 4,500 pounds.

4. Light Pneumatic-Tired Rollers - Shall consist of two axles on which are mounted not less than nine pneumatic-tired wheels in such manner that the rear group of tires will not follow in the tracks of the forward group but will be so spaced as to give essentially uniform coverage with each pass. The axles shall be mounted in a rigid frame provided with a loading platform or body suitable for ballast loading. The tires shall be uniformly inflated. The rollers shall be weighted with not less than 4.5 tons of ballast. The tractor and other towing equipment shall also be equipped with pneumatic tires. The tires on both rollers and towing equipment shall be smooth and of a type that will not leave tire prints in the surface being rolled. The use of a self-propelled roller meeting the above requirements will be permitted.

5. Blowers and Brooms - Shall be of the power type and shall be suitable for cleaning the surface to be paved.

6. Small Tools - Shall consist of rakes, lutes, shovels, tampers, smoothing irons, pavement cutters, portable heater for heating small tools, wood sandals, stilt sandals of standard type and other small tools, as may be required. A sufficient number of small tools shall be available at all times for use in constructing the bituminous pavements efficiently. The lutes shall be constructed of metal and shall consist of a plate or sheet, 36" by 4", attached to a handle properly braced and with sufficient strength to adequately compact the free edge of the surface course. Hand tampers shall weigh not less than 25 pounds and shall have a tamping face not larger than 50 square inches.

C. Weather Limitations - Bituminous courses shall be constructed only when the base course, binder course or the existing pavement is dry and when the weather is not rainy. Unless otherwise directed, asphaltic courses shall not be constructed when the air temperature in the shade is below 40 degrees F.

D. Preparation of Base - The surface of the base course will be checked by the Engineer for adequate compaction and surface tolerances as specified in applicable base course or subbase course sections. Any ruts or soft yielding spots that may appear in the base course, any areas having inadequate compaction or any deviations of the surface from the

requirements specified for the base course shall be corrected by loosening the affected areas, removing unsatisfactory material and adding accepted material where required, then by reshaping and recompacting to line and grade to the specified density requirements, as directed.

E. Grade Control - The lines and grades shown on the contract drawings for each pavement category of the contract shall be established and maintained by means of line and grade stakes placed at the site of the work by the Contractor.

F. Transportation of Bituminous Mixture - Transportation of bituminous mixture shall be from the paving plant to the site in trucks having tight, clean, smooth beds that have been coated with a minimum amount of a concentrated solution of hydrated lime and water to prevent adhesion of the mixture to the truck bodies. Each load shall be covered with canvas or other accepted material of ample size to protect the mixture from the weather and to prevent loss of heat. Deliveries shall be made so that the spreading and rolling of all mixture prepared for one day's run can be completed during daylight, unless adequate accepted artificial lighting is provided. The mixture shall be delivered to the area to be paved in such manner that the temperature at the time of dumping into the spreader will not be less than 235 degrees F. Any loads that are below minimum temperature, that have crusts of cold unworkable material or that have been wet excessively by rain will be rejected. Hauling over freshly laid material will not be permitted.

G. Placing -

1. Surface Preparation of Underlying Course - Prior to the laying of the surface course, the underlying base shall be cleared of all foreign or objectionable matter with power blowers, power brooms or handbrooms, as directed.

2. Spraying of Contact Surfaces of Structures - Contact surfaces or previously constructed base shall be sprayed with a tack coat.

3. Number of Courses - The surface course shall be laid in one course.

4. General Requirements for Use of Mechanical Spreader - Asphalt mixtures having temperatures less than 235 degrees F. when dumped into the mechanical spreader will be rejected. The mechanical spreader shall be adjusted and the speed regulated so that the surface of the course will be smooth and continuous without tears and pulling, and of such depth that, when compacted, the surface will conform with the cross section, grade,

and contour indicated. Unless otherwise directed, the placing shall begin along the centerline of areas to be paved on a crowned section or on the high side of areas with a one way slope, and shall be in the direction of the major traffic flow. The mixture shall be placed in consecutive adjacent strips having a minimum width of 10 feet, except where the edge lanes require strips less than 10 feet to complete the area. Each strip laid before a succeeding strip shall be of such a length that sufficient heat will be retained to make the strip readily compatible so that a joint can be obtained that will conform to the requirements for texture, density and smoothness.

5. Shoveling, Raking and Tamping After Machine Spreading - A sufficient number of shovelers and rakers shall follow the spreading machine adding or removing hot mixture and raking the mixture as required to obtain a course that when completed will conform to all requirements specified herein. Broadcasting or fanning of mixture over areas being compacted will not be permitted. When segregation occurs in the mixture during placing, the spreading operation shall be suspended until the cause is determined and corrected. Any irregularities in alignment left by the mechanical spreader shall be corrected by trimming directly behind the machine. Immediately after trimming, the edges of the course shall be thoroughly compacted by tamping liberally with the metal lute specified herein. Distortion of the course during tamping will not be permitted.

6. Hand Spreading in Lieu of Machine Spreading - In areas where the use of machine spreading is impractical, the mixture shall be spread by hand. The mixture shall be dumped on accepted dump boards or at an adjacent accepted area outside the area to be paved and shall be distributed into place from the dump boards or from the accepted area by means of hot shovels. The mixture shall be spread with hot rakes in a uniformly loose layer of a thickness that, when compacted, will conform to the required grade and thickness. During hand spreading, each shovelful of mixture shall be carefully placed by turning the shovel over in a manner that will prevent segregation. <u>In no case</u> shall the mixture be placed by throwing or broadcasting from a shovel. The loads shall not be dumped any faster than can be properly handled by the shovelers and rakers. Rakers not equipped with stilt sandals shall not be permitted to stand in the hot mixture while raking the course.

H. Compaction of Mixture - Compaction of mixture shall be effected by the three-wheel rollers, the tandem rollers, the light pneumatic-tired rollers and the heavy self-propelled pneumatic-tired rollers, specified hereinbefore. Rolling of the mixture shall begin as soon after placing as the mixture will bear the roller without undue displacement. Delays in rolling freshly spread mixture will not be tolerated. The rolling shall continue until the surface mixture is compacted to a minimum 100% density of AASHTO T-230. Compaction rolling shall be compacted before the surface temperature drops below 185 degrees F. Field density will be determined by AASHTO T-191 or T-238.

I. Patching Deficient Areas - Any mixture that becomes contaminated with foreign material or is in any way defective shall be removed. Skin patching of a area that has been rolled will not be permitted. Holes of the full thickness of the course shall be cut so that the sides are perpendicular and parallel to the direction of traffic and so that the edges are vertical. Edges shall be sprayed with tack coat bituminous materials. Fresh paving mixture shall be placed in the holes in sufficient quantity so that the finished surface will conform to grade and smoothness requirements. The paving mixture shall be compacted to the density specified herein. The Contractor shall provide competent workmen capable of performing all work incidental to correction of deficiencies and defects.

J. Joints -

1. General - The joints (paper joints) between successive days' work or joints that have become cold because of any delay, shall be carefully made in such a manner as to insure a continuous bond between old and new sections of the course. All joints shall present the same texture, density and smoothness as other sections of the course. All contact surfaces of previously constructed pavements that have become coated by dust, sand or other objectionable material shall be cleaned by brushing or shall be cut back with an acceptable power saw, as directed. All the surfaces against which the new material is to be placed shall be sprayed with a thin, uniform coat of bituminous material. The material shall be applied far enough in advance of placement of the fresh mixture to insure adequate curing. Care shall be taken to prevent damage or contamination of the sprayed surface.

2. Transverse Joints - The roller shall pass over the unprotected end of a strip of freshly laid material only when the laying is to be discontinued or when delivery of mixture is interrupted to the extent that the material in place may become cold. In all cases, the edge of the previously laid pavement shall be cut back to expose an even vertical surface for the full thickness of the course. In continuing the placement of the strip, the mechanical spreader shall be positioned on the transverse joint so that sufficient hot mixture will be spread to obtain a joint after rolling that will conform to the required density and smoothness specified herein. When required, the fresh mixture shall be raked against the joints, thoroughly tamped with hot tampers, smoothed with hot smoothers and followed by rolling. In all cases, the transverse joints in adjacent lanes shall be offset a minimum of two feet (2').

3. Longitudinal Joints - When the edges of the previously placed strip have become cooled, cold, irregular, honey combed, poorly compacted, damaged or otherwise defective, all unsatisfactory sections of joints shall be cut back to expose a clean sound surface for the full thickness of the course, as directed. When required, fresh mixture shall be raked against the joint, thoroughly tamped with hot tampers, smoothed with hot smoothers and then rolled.

K. Protection of Pavement - After final rolling, no vehicular traffic of any kind shall be permitted on the pavement until the pavement has cooled and hardened. In no case shall the non usage be less than six hours.

2.10 STONE STABILIZATION FOR STREETS:

A. Earth streets disturbed by the Contractor's operations shall be stabilized where required by the Engineer. This work will consist of placing graded aggregate at the rate of 250 pounds per square yard on compacted subgrade, and uniformly spreading and compacting the aggregate to an approximate depth of 3-inches. Placement shall conform to Section 310 of the Standard DOT Specifications, except that harrow and blade mixing will be permitted. The aggregate shall conform to the following (percent by weight):

Passing 1-1/2" Sieve	100%
Passing 3/4" Sieve	60 - 90%
Passing #10 Sieve	25 - 45%
Passing #60 Sieve	10 - 30%
Passing # 200 Sieve	0 - 15%

2.11 ADJUST EXISTING VALVES, INLETS AND MANHOLES:

A. Existing inlets, manholes, or valve boxes shall be adjusted by the Contractor to the new grade lines and elevations. All adjustments to structures in areas proposed for pavement shall be accomplished prior to construction of the surface course.

The existing castings shall be removed and, if suitable, reinstalled after adjustments to the structures. Other materials necessary for this work, such as mortar, grout, concrete, brick, and other approved materials, shall meet the requirements of these specifications for materials in new structures of the same type.

The Contractor shall furnish all materials and labor and perform all excavation and backfilling and other work necessary to complete the item.

1. Adjust Existing Frames - Adjustment to grade of existing frames shall include raising or lowering the upper portion of the structure, including any necessary sleeve extensions, adjustable manhole rings, gaskets, mortar, masonry or other approved material, to bring the frame to the required grade.

2.12 REMOVE AND REPLACE PAVEMENT:

A. Pavement removed and replaced shall be done in accordance with the latest specifications of the State Department of Transportation. Traffic shall be maintained and controlled by means of flagmen.

The edges of the pavement shall be cut to a neat straight line with a masonry saw. The backfill shall be compacted to 100% density and a concrete base course of 5,000 psi placed on the fill. The concrete base shall be placed within 24 hours after the utility line is installed. A temporary wearing surface may be used provided it presents a smooth surface. The final wearing surface shall be 1-1/2-inch asphaltic concrete, Type "F".

2.13 STRIPING OF PAVEMENT MARKINGS

A. Striping shall consist of furnishing and applying traffic markings with paint or thermoplastic in accordance with the contract drawings and specifications, and the requirements of the current Federal and State "Manual On Uniform Traffic Control Devices."

B. SPECIFICATIONS FOR PAVEMENT MARKINGS MARKED WITH PAINT

1. Equipment - The traveling traffic stripe painter shall be adaptable to traveling at a uniform, predetermined rate of speed both uphill and downhill in order to produce a uniform application of paint. The paint machine shall be of the spray type, capable of satisfactorily applying the paint under pressure with a uniformity of feed through nozzles spraying directly upon the pavement. Each machine shall be capable of applying three separate stripes, either solid or skip, in any specified pattern by utilizing 3 adjacent spray nozzles at the same time. Each paint tank shall be equipped with a mechanical agitator. Each nozzle shall be equipped with satisfactory cutoff valves which will apply broken or skip lines automatically. Each nozzle shall have a mechanical bead dispenser that will operate simultaneously with the spray nozzle and distribute the beads in a uniform pattern at the rate specified. Each nozzle shall also be equipped with suitable line guides consisting of metallic shrouds or air blasts.

   Hand painting equipment shall consist of suitable brushes, templates and guides necessary to produce satisfactory results.

   Cleaning equipment shall consist of the necessary brushes, brooms, scrapers, grinders, high pressure water jets and air blasters required to satisfactorily remove all foreign matter from the surfaces to be painted without damage to the underlying pavement.

   The traveling traffic striper painter shall also be equipped with paint meters which will indicate the amount of paint dispensed from each tank. Small, portable applicators or other special equipment may also be required.

2. Cleaning of Surface - All surfaces to be painted shall be thoroughly cleaned of dust, dirt, grease, oil and all other foreign matter before application of the paint.

3. Alignment - Traffic stripes shall be of the length, width and placement specified. On sections where no previously applied markings are present, the Contractor shall establish control points satisfactory to the Owner, spaced at intervals that will insure accurate locations of the stripe.

4. Application - Traffic stripe paint shall be applied by machine except for special areas and markings that are not adaptable to machine application, in which case hand application will be permitted.

   No paints shall be applied to areas of pavement when:

   (1) Any moisture or foreign matter is present on the surface;

   (2) The air temperature in the shade is below 50° F; or

   (3) Wind conditions are such as might cause dust to be deposited on the prepared areas or to prevent satisfactory application of the paint and beads.

   Painting shall be done only during daylight hours and all painted areas shall be dry enough before sunset to permit crossing by traffic. All protective devices shall be removed not later than sunset to allow free movement of traffic at night.

   Traffic stripe paint shall be thoroughly mixed in the shipping container before placing in the machine tank. The paint machine tanks, connections and spray nozzles shall be thoroughly cleaned with thinner before starting each day's work.

   The minimum wet film thickness for all painted areas shall be 15 mils.

5. Protective Measures - When painting is done under traffic, the Contractor shall furnish and place all warning and directional signs necessary to direct, control, and protect the traffic during the striping operations. Warning signs shall be set up before the beginning of each operation and extra signs shall be kept well ahead of the painting equipment. When necessary, a pilot car shall be used to protect both the traffic and the painting operation. The freshly painted stripe shall be protected by cones or other satisfactory devices. All stripes damaged by traffic, or pavement marked by traffic crossing wet paint, shall be repaired or corrected as specified below.

6. Tolerance and Appearance - No stripe shall be less than the specified width. No stripe shall exceed the specified width by more than ½ inch. The alignment of the stripe shall not deviate from the intended alignment by more than one inch on tangents and on curves up to and including one degree. On curves

exceeding one degree, the alignment of the stripe shall not deviate from the intended alignment by more than 2 inches.

Continued deviation from stated dimensions will be cause for stopping the work and removing the nonconforming stripe(s).

All stripes and segments of stripes shall present a clean cut, uniform and workmanlike appearance. All markings which fail to have a uniform, satisfactory appearance, in either day or night hours, shall be corrected by the Contractor at their expense.

7. Corrective Measures - All traffic stripes which fail to meet the Specifications, permissible tolerances, and appearance requirements, or are marred or damaged by traffic or from other causes, shall be corrected at the Contractor's expense. All missed areas, drip and spattered paint shall be removed to the satisfaction of the Owner. In all instances, when it is necessary to remove paint, it shall be done by means satisfactory to the Owner, which do not damage the underlying surface of the pavement. When necessary to correct a deviation which exceeds the permissible tolerance in alignment, that portion of the stripe so affected shall be removed, plus an additional 25 feet in each direction, and a new stripe then painted in accordance with these specifications.

8. Acceptance - All sections of painted stripe, words, and symbols which have dried to the extent that the paint will not be picked up or marred by the tires of vehicles, and which have been placed in reasonably close conformity with the Plans and Specifications, will be accepted and the Contractor will be relieved of the responsibility of maintenance on such sections.

C. SPECIFICATIONS FOR PAVEMENT MARKINGS MARKED WITH THERMOPLASTIC

1. Thermoplastic Plastic Stripe shall consist of solid or broken (skip) lines, words and/or symbols of the type, color and the location shown on the plans. It is the intent of these specifications that short lines which are defined to be crosswalks, stop bars, arrow symbols and crosshatching shall be extruded. All other lines, unless otherwise specified, shall be sprayed.

2. Equipment: The material shall be applied to the pavement by an extrusion method wherein one side of the shaping die is the pavement and the other three sides are contained by or are part of suitable equipment for heating and controlling the flow of material, or it shall be applied by spray techniques. Either method shall be applied as to assure continuous uniformity in the dimension of the stripe. The type of application at each location shall be designated by the Engineer.

Each spray application machine must be equipped with an automatic counting mechanism capable of recording the number of linear feet of material applied to the roadway surface with an accuracy of 0.50%.

The equipment shall be constructed to provide continuous mixing and agitation of the material. Conveying parts of the equipment between the main material reservoir and the shaping die or gun shall be constructed such as to prevent accumulation and clogging. All parts of the equipment which come in contact with the material shall be so constructed as to be easily accessible and exposable for cleaning and maintenance. The equipment shall be constructed so that all mixing and conveying parts up to and including the shaping die or gun maintain the material at the plastic temperature with heat transfer oil or electrical element controlled heat. No external source of direct heat will be allowed.

The equipment shall be so constructed as to insure continuous uniformity in the dimensions of the stripe. The applicator shall provide means for cleanly cutting off stripe ends squarely and shall provide a method of applying "skip" lines. The use of pans, aprons, or similar appliances which the die overruns will not be permitted under this Specification. The equipment shall also be capable of producing varying widths of traffic markings.

Glass spheres applied to the surface of the completed stripe shall be applied by an automatic bead dispenser attached to the striping machine in such a manner that the beads are dispensed almost instanteously upon the installed line. The glass sphere dispenser cutoff shall be

synchonized with the automatic cutoff of the thermoplastic material.

Special kettle(s) shall be provided for melting and heating the thermoplastic material. The kettle(s) must be equipped with automatic thermostatic control devices so as to provide positive temperature control and prevent overheating of the material. The applicator and kettle(s) must be so equipped and arranged as to satisfy the requirements of the National Fire Underwriters.

Applicators shall be mobile and maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc.

The applicator equipment to be used on roadway installations shall consist of either hand equipment or truck mounted units depending on the type of marking required.

The hand equipment shall have sufficient capacity to hold 150# of molten material and shall be sufficiently maneuverable to install crosswalks, lane, edge, and center lines; arrows and legends. The truck-mounted unit for lane, edge, and center lines shall consist of a mobile self-contained unit carrying its own material capable of operating at a minimum speed of 5 miles per hour while installing striping.

3. Application

Thermoplastic Traffic Stripe shall not be applied when the pavement temperature in the shade is 40°F or below.

For all extruded thermoplastic, and where directed by the Engineer for sprayed thermoplastic on old asphaltic concrete pavements where the aggregates are exposed, and on all Portland Cement Concrete pavement as directed by the City Traffic Engineer, to insure optimum adhesion, the Contractor shall apply a binder-sealer material prior to the actual thermoplastic installation. The binder-sealer material will form when applied with conventional mobile spray painting equipment, a continuous film over the pavement surface which will dry rapidly and mechanically adhere to the pavement surface. The

binder-sealer shall be that product currently in use and recommended by the thermoplastic material manufacturer as shown in the Qualified Products List. To insure optimum adhesion, the thermoplastic material shall be installed in a melted state at a temperature consistent with the manufacturer's recommendations, but less than 375°F.

The material, when formed into traffic strips, must be readily renewable by placing an overlay of new material directly over an old line of compatible material. Such new material shall bond itself to the old line in such a manner that no splitting or separation takes place.

Longitudinal lines shall be off-set at least two inches from construction joints of Portland Cement Concrete pavements.

Crosswalks, stop bars, and symbols shall have a minimum thickness of 3/32" at the edges and a maximum thickness of 3/16" at the center.

Minimum average film thickness of .090" **for lane lines and .060" **for edge lines shall be maintained on all markings unless otherwise noted on the Plans. This is to be computed on the basis of the amount of material used each. The glass sphere top coating must be must be applied by means of a pressure type spray gun designed specifically for this purpose, and which embed the spheres into the line surface to at least one-half their diameter. The glass spheres shall be applied at the rate of 14 pounds of spheres to each 100 square feet of compound. It shall be the responsibility of the Contractor to supply all of the necessary auxiliary vehicles required for this operation.

*Minimum Average Film Thickness (Inches) for 4" Wide Strip - Lane Line

$$= \frac{\text{Pound Used}}{\text{Total Linear Feet}} \times 0.270$$

**Minimum Average Film Thickness (Inches) For Edge Lines

$$= \frac{\text{Pounds Used}}{\text{Total Linear Feet}} \times 0.135$$

4. Cleaning: All pavement areas to be striped shall be thoroughly cleaned. Cleaning may be accomplished by the use of hand brooms, rotary brooms, air blasts, scrapers or other approved methods which leave the paving surface thoroughly clean and undamaged. Particular care shall be taken to remove all vegetation and road film from the area to be striped.

5. Acceptance: Segments of the Thermoplastic Traffic Stripe Project which have been placed in conformance with the Plans and Specifications may be accepted, if satisfactory, thirty (30) days after completion of all work required in that segment and the Contractor will be relieved of any further maintenance on such segments.

6. Certification: The producers of the Thermoplastic compound and glass spheres shall furnish to the City 6 copies of certified test reports showing results of all tests specified herein, and shall further certify that the materials meet all requirements of this Section. Final acceptance, however, will be contingent upon satisfactory test results of samples obtained after delivery.

7. Warranty: The Contractor shall transfer to the City the warranty on Thermoplastic materials issued by the Manufacturer. The Contractor shall also furnish the City the normal warranty for application. These warranties shall specify the guaranteed retainage of material for a stated period beginning with the application date.

PART 3 - PERVIOUS PAVEMENT

3.01 SCOPE OF WORK:

The work to be completed under this section includes the furnishing of all labor, materials, and equipment necessary for construction of the pervious concrete pavement subjected to light traffic loading as recommended by the Georgia Concrete and Products Association and the Georgia Department of Transportation (GDOT) Standard Specifications for Construction of Roads and Bridges.

3.02 TEST PANELS:

Contractor is to place, joint and cure two test panels, each to be a minimum of 225 sq. ft., at the required project thickness to demonstrate to the Engineer's satisfaction that in-place unit weights can be achieved and a satisfactory pavement can be installed at the site location.

D. Test panels may be placed at any of the specified portland cement pervious locations. Test panels shall be tested for thickness in accordance with ASTM C 42; void structure in accordance with ASTM C 138; and for core unit weight in accordance with ASTM C 140, paragraph 6.3.

E. Satisfactory performance of the test panels will be determined by:

1. Compacted thickness no less than 1/4" of specified thickness
2. Void Structure: 15% minimum, 21% maximum
3. Unit weight plus or minus 5 pcf of the design unit weight

F. If measured void structure falls below 15% or if measured thickness is greater than 1/4" less than the specified thickness or if measured weight falls less than 5 pcf design unit weight, the test panel shall be removed at the contractor's expense and disposed of in an approved landfill.

G. If the test panel meets the above mentioned requirements, it can be left in-place and included in the completed work.

3.03 CONCRETE MIX DESIGN:

Contractor shall furnish a proposed mix design with proportions of materials to Owner prior to commencement of work. The data shall include unit weights determined in accordance with ASTM C 29 Paragraph 11, "Jigging Procedure."

3.04 MATERIALS:

A. **Cement:** Portland Cement Type I or II conforming to ASTM C 150 or Portland Cement Type 1P or IS conforming to ASTM C 595.

B. **Aggregate:** Use Georgia Department of Transportation (GDOT) No. 89 coarse aggregate (3/8 to No. 50) per ASTM D 448. If other gradation of aggregate is to be used, submit data on proposed material to owner for approval.

C. **Air Entraining Agent:** Shall comply with ASTM C 260.

E. **Admixtures:**

Type A Water Reducing Admixtures - ASTM C 494
Type B Retarding - ASTM C 494
Type D Water Reducing/Retarding - ASTM C 494

Also, a hydration stabilizer can be utilized and is recommended in the design and production of pervious concrete. This stabilizer suspends cement hydration by forming a protective barrier around the cementitious particles, which delays the particles from achieving initial set. The admixture's primary function should be as a hydration stabilizer, however, it must also meet the requirements of ASTM C 494 Type B Retarding or Type D Water Reducing/Retarding admixtures.

3.05 PROPORTIONS:

A. **Cement Content:** For pavements subjected to vehicular traffic loading, the total cementitious material shall not be less than 600 lbs. per cu. yd.

B. **Aggregate Content:** The volume of aggregate per cu. yd. shall be equal to 27 cu. ft. when calculated as a function of the unit weight determined in accordance with ASTM C 29 "Jigging Procedure." Fine aggregate, if used, should not exceed 3 cu. ft. and shall be included in the total aggregate volume.

C. **Admixtures:** Shall be used in accordance with the manufacturer's instructions and recommendations.

D. **Mix Water:** Mix water shall be such that the cement paste displays a wet metallic sheen without causing the paste to flow from the aggregate. (Mix water yielding a cement paste with a dull-dry appearance has sufficient water for hydration.)

3.06 SUBGRADE PREPARATION AND FORMWORK:

A. **Subgrade Material:** The top 6 inches shall be composed of granular or gravely soil that is predominantly sandy with no more than a moderate amount of silt or clay.

B. **Subgrade Permeability:** Prior to placement of Portland Cement Pervious Pavement, the subgrade shall be tested for rate of permeability by double ring infiltrometer, or other suitable test of subgrade soil permeability. The tested permeability must reasonably compare to the design permeability.

C. Subgrade Support: The subgrade shall be compacted by a mechanical vibratory compactor to a minimum density of 92% of a maximum dry density as established by ASTM D 1557 or AASHTO T 180. Subgrade stabilization shall not be permitted. If fill material (embankment) is required to bring the subgrade to final elevation, it shall be clean and free of deleterious materials. It shall be placed in 8 inch maximum layers, and compacted by a mechanical vibratory compactor to a minimum density of 92% of a maximum dry density as established by ASTM D 1557 or AASHTO T 180.

3.06.4 Subgrade Support: The subgrade shall be compacted by a mechanical vibratory compactor to a minimum density of 92% of a maximum dry density as established by ASTM D 1557 or AASHTO T 180. Subgrade stabilization shall not be permitted. If fill material (embankment) is required to bring the subgrade to final elevation, it shall be clean and free of deleterious materials. It shall be placed in 8 inch maximum layers, and compacted by a mechanical vibratory compactor to a minimum density of 92% of a maximum dry density as established by ASTM D 1557 or AASHTO T 180.

3.07 MIXING, HAULING AND PLACING:

A. **Mix Time:** Truck mixers shall be operated at the speed designated as mixing speed by the manufacturer for 75 to 100 revolutions of the drum.

B. **Transportation:** The portland cement aggregate mixture may be transported or mixed on site and should be used within one (1) hour of the introduction of mix water, unless otherwise approved by an engineer. This time can be increased to 90 minutes when utilizing the hydration stabilizer specified in Section 205.

C. **Discharge:** Each mixer truck will be inspected for appearance of concrete uniformity according to Section 304. Water may be added to obtain the required mix consistency. A minimum of 20 revolutions at the manufacturer's designated mixing speed shall be required following any addition of water to the mix. Discharge shall be a continuous operation and shall be completed as quickly as possible. Concrete shall be deposited as close to its final position as practicable and such that fresh concrete enters the mass of previously placed concrete. The practice of discharging onto subgrade and pulling or shoveling to final placement is not allowed.

D. **Placing and Finishing Equipment:** Unless otherwise approved by the Owner in writing, the contractor shall provide mechanical equipment of either slipform or form riding with a following compactive unit that will provide a minimum of 10 psi vertical force. The pervious concrete pavement will be placed to the required cross section and shall not deviate more than• 3/8 inch in 10 feet from profile grade. If placing equipment does not provide the minimum specified vertical force, a full width roller or other full width compaction device that provides sufficient compactive effort shall be used immediately following the strike-off operation. After mechanical or other approved strike-off and compaction operation, no other finishing operation will be allowed. If vibration, internal or surface applied, is used, it shall be shut off immediately when forward progress is halted for any reason. The contractor will be restricted to pavement placement widths of a maximum of fifteen (15')

feet unless the contractor can demonstrate competence to provide pavement placement widths greater than the maximum specified to the satisfaction of the Engineer.

E. **Curing:** Curing procedures shall begin within 20 minutes after the final placement operations. The pavement surface shall be covered with a minimum six (6) mil thick polyethylene sheet or other approved covering material. Prior to covering, a fog or light mist shall be sprayed above the surface when required due to ambient conditions (temperature, wind, and humidity). The cover shall overlap all exposed edges and shall be secured (without using dirt or stone) to prevent dislocation due to winds or adjacent traffic conditions.

Cure Time:

1. Portland Cement Type I, II or IS - 7 days minimum
2. Portland Cement Type I or Type 1P - 10 days minimum
3. No truck traffic shall allowed for 10 days (no passenger car/light trucks for 7 days).

F. **Jointing:** Transverse control (contraction) joints shall be installed at 20 foot intervals. They shall be installed at a depth of 1/4 the thickness of the pavement. Longitudinal control joints shall be installed at the mid-point if the constructed lane width exceeds 15 feet. These joints can be installed in the plastic concrete or saw cut. If saw cut, the procedure should begin as soon as the pavement has hardened sufficiently to prevent raveling and uncontrolled cracking (normally after curing). Transverse construction joints shall be installed whenever placing is suspended a sufficient length of time that concrete may begin to harden. In order to assure aggregate bond at construction joints, a bonding agent suitable for bonding fresh concrete to existing concrete shall be brushed, rolled, or sprayed on the existing pavement surface edge. Isolation (expansion) joints will not be used except when pavement is abutting slabs or other adjoining structures.

3.08 TESTING, INSPECTION AND ACCEPTANCE:

A. **Laboratory Testing:** The Owner will retain an independent testing laboratory. The testing laboratory shall conform to the applicable requirements of ASTM E 329, Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction, and ASTM C 1077, Standard Practice for Testing Concrete and Concrete Aggregates for Use in Construction, and Criteria for Laboratory Evaluation, and shall be inspected and accredited by the Concrete Advisory Board of Georgia, Inc. or by an equivalent recognized national authority.

The agent of the testing laboratory performing field sampling and testing for concrete shall be certified by the American Concrete Institute as a Concrete Field Testing Technician Grade I, or by a recognized state or national authority for an equivalent level of competence.

B. **Testing and Acceptance:** A minimum of one (1) gradation test of the subgrade is required every 5,000 square feet to determine percent passing the No. 200 sieve per ASTM C 117.

A minimum of one test for each day's placement of pervious concrete in accordance with ASTM C 172 and ASTM C 29 to verify unit weight shall be conducted. Delivered unit weights are to be determined in accordance with ASTM C 29 using a 0.25 cubic foot cylindrical metal measure. The measure is to be filled and compacted in accordance with ASTM C 29 Paragraph 11, "Jigging Procedure." The unit weight of the delivered concrete shall be • 5 pcf of the design unit weight.

Test panels shall have two cores taken from each panel in accordance with ASTM C 42 at a minimum of seven (7) days after placement of the pervious concrete. The cores shall be measured for thickness, void structure, and unit weight. Untrimmed, hardened core samples shall be used to determine placement thickness. The average of all production cores shall not be less than the specified thickness with no individual core being more than 1/4 inch less than the specified thickness. After thickness determination, the cores shall be trimmed and measured for unit weight in the saturated condition as described in Paragraph 6.3.1 "Saturation" of ASTM C 140, "Standard Methods of Sampling and Testing Concrete Masonry Units." The trimmed cores shall be immersed in water for 24 hours, allowed to drain for one (1) minute, surface water removed with a damp cloth, then weighed immediately. Range of satisfactory unit weight values are • 5 pcf of the design unit weight.

After a minimum of 7 days following each placement, three cores shall be taken in accordance with ASTM C 42. The cores shall be measured for thickness and unit weight determined as described above for test panels. Core holes shall be filled with concrete meeting the pervious mix design.

INDEX TO

SECTION 03300 - CAST-IN-PLACE CONCRETE

Section 03300 CAST-IN-PLACE CONCRETE

CHAPTER 1 - GENERAL

1.1-Scope

1.1.1-These specifications cover cast-in-place concrete for use in buildings, sidewalks, curb and gutters, foundations, and other related items.

1.1.2-The following subjects are considered outside of the scope of these specifications:

1. Recast concrete products.
2. Heavy duty paving concrete
3. Terrazzo
4. Insulating Concrete
5. Lightweight concrete

1.2-Americans with Disabilities Act

All concrete structures shall be designed and constructed to meet the requirements of the U.S. Department of Justice, Americans with Disabilities Act, Rev. July '97. This law requires that all new places of public accommodations and commercial facilities be designed for persons with disabilities. Required guidelines for curb ramps and other handicapped related structures shall be as specified in U.S. Department of Justice, ADA Design Guide.

1.3-Design of Concrete Structures shall be performed and stamped by a Professional Engineer registered in the State of Georgia.
In no instance shall a concrete sidewalk be less than 4" thick nor a driveway less than 6" thick. The Engineer shall refer to City of Savannah Standard Construction Details for minimum design requirements of various structures.

1.4-Construction Loads

Construction loads shall not exceed what the member is able to carry safely and without damage. The Contractor is responsible for providing all supplemental support necessary to protect the structure until the concrete has reached it's specified design strength.

1.5-Referenced Standards and Specifications

1.5.1-The most recent issue of each standard or specification shall be used. The following abbreviations may be used to reference the publishing organization:

ACI - American Concrete Institute, P.O. Box 19150, Detroit MI 48219-0150

ASTM - American Society for Testing and Materials, 1916 Race St. Philadelphia, PA 19103

AASHTO - American Association of State Highway and Transportation Officials 444 North Capital Street, N.W., Suite 225, Washington DC 20001

CRSI - Concrete Reinforcing Steel Institute, 933 North Plum Grove Road, Schaumburg, IL 60195

CHAPTER 2 - MATERIALS FOR CONCRETE

2.1-Cements

Portland cement shall conform to ASTM C 150. Portland blast furnace slag cement or portland pozzolan cement shall conform to ASTM C 595.

2.2-Admixtures

2.2.1-Admixtures to be used in concrete, when required or permitted, shall conform to the following appropriate specifications:

2.2.1.1-Air-entraining admixtures, ASTM C 260

2.2.1.2-Water-reducing, retarding, and accelerating admixtures, ASTM C494

2.2.1.3-Pozzolanic admixtures, ASTM C 618

2.2.1.4-Fiber reinforcement: fiber reinforcement shall be 1/2" or 3/4" collated, fibrillated polylpropylene fibers meeting the requirements of ASTM C 1116, para. 4.1.3, Type III.

2.2.1.5-Admixtures used in the work shall be of the same composition as those used in establishing the concrete proportions.

2.3- Water

Mixing water for concrete shall meet requirements of ASTM C 94.

2.4-Aggregates

2.4.1-Aggregates for normal weight concrete shall meet the requirements for ASTM C 33 unless otherwise specified.

2.4.2-Fine and coarse aggregates shall be regarded as separate ingredients. Each size of coarse aggregate, as well as the combination of sizes when two or more are used, shall meet the appropriate grading requirements of the applicable ASTM specifications.

CHAPTER 3 - PROPORTIONING

3.1- General

Concrete for all parts of the work shall be of the specified quality and capable of being placed without excessive segregation. When hardened, concrete shall develop all characteristics required by these specifications and the contract documents.

3.2-Strength
The specified compressive strength of the concrete **(f'c)** for each portion of sidewalks and curb and gutters shall be a minimum of 3000 psi unless a greater strength requirement is indicated on the contract drawings or herein. Driveway and road paving shall have a compressive strength of not less than 5000 psi. Strength requirements shall be based on 28-day compressive strength unless a different test age is specified. The compressive strength of the concrete shall be determined by ASTM C39.

3.3-Durability

3.3.1-Concrete shall be air entrained and shall conform to the air content limits of ACI 301 , Table 3.4.1.

3.3.2-The water-cement ratio shall not exceed 0.53 by weight.

3.3.3-For all concrete in which aluminum or galvanized metal is to be embedded, it shall be demonstrated by test that the mixing water of the concrete, including that contributed by the aggregates and any admixture used, will not contain a deleterious amount of chloride ion.

3.4-Slump
The concrete shall be proportioned and produced to have a slump of 4 inches or less. A tolerance of up to 1 inch above the maximum indicated shall be allowed for one batch in any five consecutive batches tested. The slump shall be determined by ASTM C 143.

3.5-Maximum size of coarse aggregate
The nominal size of the aggregate shall not be more than one-fifth of the narrowest dimension between sides of forms, one-third of the depth of slabs, nor three-fourths of the minimum clear spacing between reinforcing bars. See ASTM C 33 for tolerance on oversize for various nominal maximum size designations.

3.6- Admixtures

3.6.1-The amount of calcium chloride shall not exceed 2 percent by weight of cement. The amount of calcium chloride shall be determined by the method of described in AASHTO T260.

3.6.2-For all concrete which will remain in contact with aluminum or galvanized metal, the limitation of Section 3.3.3 shall apply unless protective measures acceptable to the Engineer are provided.

3.6.3-All admixtures shall be used in accordance with the manufacturer's instructions except as otherwise specified.

3.6.4-Where fiber reinforcement is called for, it shall be added to the concrete in the manner and rate recommended by the manufacturer. Unless otherwise prohibited by the manufacturer, the minimum rate of application shall be 1 lb. of polypropylene fibers per cubic yard of concrete.

3.6.5-In the Historic District, a color additive equal to Lambert #4685 shall be added to all concrete sidewalks at the rate of 2 ½ pounds per cubic yard in order to match the color of existing sidewalks.

3.7- Mix Design

The Contractor shall **submit** proposed concrete mix designs for each type of concrete in the project. Proposed concrete proportions shall be subject to acceptance by the Engineer based on demonstrated ability to produce concrete meeting all requirements of the specifications. Concrete proportions shall be established on the basis of previous field experience as specified in ACI 301, Section 3.9 with materials to be employed in the work; or by laboratory trial batches as specified in ACI 301, Section 3.10. Contractor is not authorized to batch any concrete for use in this project until mix design has been approved by the Engineer.

CHAPTER 4 - FORM WORK

4.1-Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete, and shall have sufficient rigidity to maintain specified tolerances. The design and engineering of the formwork, as well as its construction, shall be the responsibility of the **Contractor**.

4.2-Earth cuts shall not be used as forms for vertical surfaces unless specifically allowed by the Engineer. The Contractor is responsible for ensuring that all earth cuts meet OSHA trenching regulations.

4.3-Before placing the reinforcing steel or the concrete, the surfaces of the forms shall be covered with an acceptable coating material that will effectively prevent absorption of moisture, prevent bond with the concrete, and not stain the concrete surfaces.

4.4-Under no circumstances shall formwork be removed prior to 24 hours after placement of concrete.

4.5-Tolerances for formed surfaces shall be in compliance with ACI 301, Table 4.3.1.

4.6-Unless otherwise specified, formwork shall meet the requirements of ACI 301, Chapter 4.

CHAPTER 5 - REINFORCEMENT

5.1-Reinforcing Bars shall be deformed except spirals, which may be plain bars. Reinforcing bars shall be Grade 60 conforming to one of the following specifications: ASTM A 615, ASTM A 616(incl. supplementary reqmt. S1), ASTM A 617, ASTM A 706. If called for on plans, reinforcing bars shall be epoxy-coated in accordance with ASTM A775

5.2-Welded Wire Fabric shall be fabricated from smooth or deformed wire and shall conform to the wire size and wire spacing required or indicated on the contract drawings. Welded wire fabric shall conform to one of the following specifications:

- ASTM A 185, except welded intersections shall be spaced not farther apart than 12 inches in the direction of the principal reinforcement.

- ASTM A 497, except welded intersections shall be spaced not farther apart than 16 inches in the direction of the principal reinforcement.

5.3-Bar Supports

5.3.1-Wire bar supports shall be in accordance with Class 1, maximum protection, or Class 2, moderate protection in Chapter 3 of the CRSI Manual of Standard Practice.

5.3.2-Precast concrete brick bar supports may used to support rebar mats or welded wire mesh in slab-on-grade construction.

5.4-Welding of reinforcing bars or welded wire fabric is specifically **prohibited.**

5.5-Fabrication of reinforcing bars shall be in accordance with the standard fabricating tolerances in Fig. 4 and 5 of ACI 315.

5.6-Placing Reinforcement

5.6.1-Reinforcement shall be placed within the tolerances and guidelines specified in ACI 301,Chapter 5.6 and 5.7. Minimum concrete cover for reinforcement shall be as required in para. 5.7.1 of ACI 301.

5.6.2-Field bending of bars partially embedded in concrete shall not be permitted unless specifically accepted by the Engineer.

5.7-Sidewalks shall be reinforced by one of the following methods:

5.7.1-Welded wire mesh located 2" from the top surface of the concrete. Minimum size of mesh shall be 6"x6" - W2.9 x W2.9.

5.7.2-Concrete shall be fiber reinforced.

5.7.3-Deformed reinforcing bars providing no less than 0.25 square inches per foot (each way).

CHAPTER 6 - JOINTS AND EMBEDDED ITEMS

6.1-Construction Joints shall be located and detailed on the contract drawings. Unless otherwise indicated on the drawings, all reinforcement shall be continued across the joints.

6.2- Contraction Joints

6.2.1-Sawcut joints shall be located and detailed as indicated on the contract drawings. Cutting shall be timed properly with the set of concrete. Cutting shall be started as soon as the concrete has hardened sufficiently to prevent aggregates being dislodged by the saw. Cutting shall be completed before shrinkage stresses become sufficient to produce cracking.

6.2.2-Tooled Control Joints in sidewalks shall be provided at a spacing not greater than 10 feet on center or twice the width along it's length.

6.3-Expansion Joints

6.3.1-Expansion joints shall be located as shown on the contract drawings but shall be spaced no further apart than 80 feet along a sidewalk or curb and gutter.

6.3.2-Reinforcement or other embedded metal items bonded to the concrete (except dowels in floors bonded on only one side of joints) shall not be permitted to extend continuously through any expansion joint.

6.3.3-Premolded expansion joint filler shall conform to one of the following specification: ASTM D 994, ASTM D 1751, or ASTM D 1752.

6.4-Joint Sealant All expansion joints shall be sealed per detail on project drawings. Other joints to be sealed will be indicated on the project drawings. Joint sealant shall meet the requirements of ASTM C 920, Type S or M, Grade P, Class 25.

6.5-Curb and Gutter sections shall be constructed in sections of uniform length not to exceed 10 feet in length or be less than 5 feet in length. If slip-form or extruded construction is used, contraction joints shall be located at intervals no greater than 10 feet by sawing the hardened concrete at the proper time. The depth of the saw-cut shall be one-fourth of the thickness of the curb and gutter section. The maximum width of the cut shall be 1/4 inch and shall be sawed no later than 24 hours after the pour.

CHAPTER 7 - PRODUCTION OF CONCRETE

7.1-Ready-mixed concrete shall be batched, mixed and transported in accordance with ASTM C 94, except as otherwise provided in this chapter. Plant equipment and facilities shall conform to "Certification of Ready Mixed Concrete Production Facilities" of the National Ready Mixed Concrete Association.

7.2-Concrete produced by on-site volumetric batching and continuous mixing shall be batched and mixed in accordance with and shall conform to all requirements of ASTM C 685.

CHAPTER 8 - PLACING OF CONCRETE

8.1 Preparation

8.1.1-Form work shall be completed; snow, ice and water shall be removed; reinforcement shall be secured in place; expansion joint material, anchors, and other embedded items shall be positioned; and the entire preparation shall be accepted by the Engineer or his representative prior to placing concrete.

8.1.2-The subgrade shall be well drained and of adequate and uniform load bearing capacity. The minimum in-place density of the subgrade soils shall be as required in the specifications.
8.1.3-Concrete shall not be placed on frozen ground. The subgrade shall be free of frost before concrete placing begins. If the temperature inside a building where concrete is to be placed is below freezing it shall be raised and maintained above 50 F long enough to remove all frost from the subgrade.

8.1.4-Subgrades shall be moist at the time of concreting. If necessary, they shall be dampened with water in advance of concreting, but there shall be no standing water on the subgrade nor any muddy or soft spots when the concrete is placed.

8.2-Conveying and Placing

8.2.1-Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of ingredients and in a manner which will assure that the required quality of the concrete is maintained.

8.2.2-The loss of slump in pumping or pneumatic conveying equipment shall not exceed 2 inches. Concrete shall not be conveyed through pipe made of aluminum or aluminum alloy.

8.2.3-Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, construction joints shall be located as indicated on the contract documents or as permitted by the Engineer. Placing shall be carried on at such a rate that the concrete which is being integrated with fresh concrete is still plastic. Concrete which has partially hardened or has been contaminated by foreign materials shall not be deposited. Temporary spreaders in forms shall be removed which the concrete placing has reached an elevation rendering their service unnecessary. They may remain embedded in the concrete only if made of metal or concrete and if prior acceptance has been obtained by the Engineer.

8.2.4-Concrete shall be deposited as nearly as possible in its final position to avoid segregation due to rehandling or flowing. Concrete shall not be subjected to any procedure which will cause segregation.

8.2.5-All concrete shall be consolidated by vibration, spading, rodding or forking so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into corners of forms, eliminating all air or stone pockets which may cause honeycombing, pitting, or planes of weakness. Use of vibrators to transport concrete within forms shall not be allowed. A spare vibrator shall be kept on the job site during all concrete placing operations.

8.2.6-Unless adequate protection is provided and acceptance is obtained from the Engineer, concrete shall not be placed during rain, sleet, or snow.

8.2.7-The temperature of the plastic concrete, as placed, shall be no lower than 55 F and no higher than 90 F. The air temperature shall be **at least 35 degrees F** and rising when concrete is mixed and placed.

CHAPTER 9 - REPAIR AND REPLACEMENT

9.1-Repair of Surface Defects: All honeycombed and other defective concrete shall be removed down to sound concrete and patched. When chipping away loose or defective material, no featheredging will be permitted.

9.2-Tie holes shall be plugged with patching mortar unless stainless steel, noncorrosive, or acceptably coated ties are used.

9.3-Where a portion of an existing concrete driveway or sidewalk is removed, the existing section shall be cut to a minimum depth of 4-inches with a suitable saw prior to breaking out pavement.

CHAPTER 10 - SURFACE FINISHES

10.1-Formed Surfaces of concrete shall be given the finishes specified below unless the contract documents specify otherwise:

<u>Rough form finish</u> - For all concrete surfaces not exposed to public view

<u>Smooth form finish</u> - For all concrete surfaces exposed to public view.

10.1.1-Rough form finish - No selected form facing materials shall be specified for rough form finish surfaces. Tie holes and defects shall be patched. Fins exceeding 1/4 in. in height shall be chipped off or rubbed off. Otherwise, surfaces shall be left with texture imparted by the forms.

10.1.2-Smooth form finish - The form facing material shall produce a smooth, hard, uniform texture on the concrete. The arrangement of the facing material shall be orderly and symmetrical, with the number of seams kept to the practical minimum. It shall be supported by studs or other backing capable of preventing excessive deflection. Materials with raised grain, torn surfaces, worn edges, patches, dents, or other defects which will impair the texture of the concrete surface shall not-

be used. All fins shall be completely removed. No later than the day following form removal, the concrete surfaces shall be wetted and rubbed with carborundum brick or other abrasive until uniform color and texture are produced.

10.1.3-Tops of walls or buttresses, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces shall be struck smooth after concrete is placed and shall be floated to a texture reasonably consistent with that of the formed surfaces. Final treatment on formed surfaces shall continue uniformly across the unformed surfaces.

10.2-Slab Finishes

Unless otherwise specified on the contract documents, the following finishes shall be used as applicable:

Broom or belt finish - For sidewalks and garage floors and ramps.

Floated Finish - For surfaces intended to receive roofing, waterproofing membranes, or sand bed terrazzo.

Troweled finish - For floor intended as walking surfaces or for reception of floor coverings.

Nonslip finish - For exterior platforms, steps, and landings; and for exterior and interior pedestrian ramps.

10.2.1-Floated Finish: After the concrete has been placed, consolidated, struck off, and leveled, the concrete shall not be worked further until ready for floating. Floating with a hand float or with a bladed power trowel equipped with float shoes, or with a powered disc float shall begin when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation. All high spots shall be cut down and all low spots filled during this procedure. The slab shall then be refloated immediately to a uniform sandy texture.

10.2.2-Troweled finish: The surface shall first be float-finished as specified in Section 10.2.1. It shall next be power troweled, and finally hand troweled. The first troweling after power floating shall produce a smooth surface which is relatively free of defects but which may still show some trowel marks. Additional trowelings shall be done by hand after the surface has hardened sufficiently. The final troweling shall be done when a ringing sound is produced as the trowel is moved over the surface. The surface shall be thoroughly consolidated by the hand troweling operations. The finished surface shall be essentially free of trowel marks, uniform in texture and appearance and shall be plane to required tolerances.

10.2.3-Broom or belt finish: Immediately after the concrete has received a float finish as specified in Section 10.2.1, it shall be given a coarse transverse scored texture by drawing a broom or burlap belt across the surface.

10.2.4-Nonslip finish: Crushed ceramically bonded aluminum oxide or other specified selected abrasive particles shall be blended with portland cement in the proportions recommended by the manufacturer of the aggregate. The surface shall be given a float finish in accordance with Section 10.2.1. Approximately two-thirds of the blended material for required coverage shall be applied to the surface by method that insures even coverage without segregation. Floating shall begin immediately after application of the first "dry shake". After this material has been embedded by floating, the remainder the blended material shall be applied to the surface at right angles to the previous application. A second floating shall follow immediately. The rate of application of such material shall be not less than 25 lb. per 100 square feet.

10.2.5-Slab finishing tolerances: Unless otherwise called out in the contract documents, finishes shall be true planes within 1/4 inch in 10 feet as determined by a 10-ft. straightedge placed anywhere on the slab in any direction. The maximum variation in elevation for a level slab shall not exceed 3/4 inches over the entire slab.

CHAPTER 11 - CURING AND PROTECTION

11.1-General:

Beginning immediately after placement, concrete shall be protected from premature drying, excessively hot or cold temperatures, and mechanical injury, and shall be maintained with minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete.

11.2-Preservation of Moisture

11.2.1-For concrete surfaces not in contact with forms, one of the following procedures shall be applied immediately after completion of placement and finishing:

11.2.1.1-Ponding or continuous sprinkling.

11.2.1.2-Application of absorptive mats of fabric kept continuously wet.

11.2.1.3-Application of waterproof sheet materials, conforming to ASTM C 171.

11.2.1.4-Application of a curing compound conforming to ASTM C309 in accordance with manufacturers recommendation. It shall not be used on any surface against which additional concrete or other material is to be bonded unless it is proven that the curing compound will not prevent bond.

11.2.2-Moisture loss from surfaces placed against wooden forms or metal forms exposed to heating by the sun shall be minimized by keeping the forms wet until they can be safely removed. After form removal the concrete shall be cured until the end of the time prescribed in Section 11.2.3 by one of the above methods.

11.2.3-Curing in accordance with the above requirements shall be continued for at least 7 days in the case of all concrete except high-early strength concrete for which the period shall be at least 3 days.

11.3-Temperature Control

When the mean daily outdoor temperature is less than 40 F, the temperature of the concrete shall be maintained between 50 and 70 F for the required curing period of Section 11.2.3. Combustion heaters shall not be used during the first 24 hours unless precautions are taken to prevent exposure of the concrete to exhaust gases which contain carbon dioxide.

CHAPTER 12 - TESTING

12.1-Field sampling and testing shall be performed by an independent testing lab hired and payed for by the Owner. Samples of concrete shall be taken at random locations and at such times to represent the quality of the materials and work throughout the project. The laboratory shall provide the necessary labor, materials, equipment, and facilities for sampling the concrete and for casting, handling and storing the concrete samples at the site of work. Sampling of plastic concrete will be in accordance with ASTM C172. Samples for pumped concrete shall be taken at the hose discharge point. Samples for other concrete shall be taken at the hopper of concreting equipment or transit mix truck.

12.2

The Contractor shall pay for the following services when required:

12.2.1-All testing, test results, or certifications required to verify that a proposed material item or mix design meets the requirements of the specifications.

12.2.2-Additional testing and inspection required because of changes in materials or proportions requested by the Contractor.

12.2.3-Additional testing of materials or concrete occasioned by their failure by test or inspection to meet specification requirements. For example, if compressive test results indicate concrete in place may not meet structural requirements, tests shall be made to determine if the structure or portion thereof is structurally sound. Tests may include, but not be limited to, cores in accordance with ASTM C 42 and any other load tests acceptable to the Engineer. Costs of such tests will be borne by the Contractor.

12.3
To facilitate testing and inspection, the Contractor shall advise the Owner and the designated testing agency sufficiently in advance of operations to allow for the assignment of personnel and for the completion of quality tests and inspection of forms.

12.4-STRENGTH TESTS

12.4.1-General: The strength of the concrete will be verified by the testing laboratory during placement of the concrete. Verification shall be accomplished by testing standard cylinders of concrete samples taken at the job site.

12.4.2-Frequency: As a minimum, one set of four standard cylinders shall be cast of each class of concrete based on the most stringent of the following requirements as applicable:

- for each 50 cubic yards or less
- for each 100 feet of sidewalk
- for each 200 feet of curb and gutter
- for each 4000 square feet of surface area
- for each day a pour is made

12.4.3-Lab testing: Testing of specimens for compressive strength shall be in accordance with ASTM C39. Tests shall be made at 7 and 28 days from time of casting. Two test cylinders from each group of four shall be tested at the end of 7 days and two shall be tested at the end of 28 days. Each strength test result shall be the average of the strengths of two test cylinders (cast from material taken from a single load of concrete) at 28 days.

12.4.4-Acceptance of Concrete Strength: The strength level of the concrete will be considered satisfactory so long as the average of all sets of three consecutive strength results equal or exceed the specified strength **f'c** and not more than 10% of the strength test results shall have values less then this value. No individual strength test shall be less than the specified strength **f'c** by more than 500 psi.

12.5-Slump Tests: The slump shall be as specified when measured in accordance with ASTM C 143. Samples for slump determination shall be taken from the concrete during placing. Tests shall be made at the beginning of concrete placing operations and at subsequent intervals to insure that the specification requirements are met. When concrete is pumped, slump tests shall be taken from concrete at the discharge end of the pump hose. Slump tests shall also be performed whenever standard cylinders are cast.

12.6-Temperature and Air Content Tests: Temperature tests shall be made at frequent intervals during hot or cold weather conditions until satisfactory temperature control is established. Whenever standard cylinders are cast, temperature tests shall be performed.
Air content tests shall be in accordance with ASTM C 231 and shall be measured whenever standard cylinders are cast.

CHAPTER 13 - FLOWABLE FILL

The mixture of dry material per cubic yard shall be 50 pounds cement, 600 pounds fly-ash, and 2,500 pounds sand. Depending on the slump requested for the specific job, water added shall be 65 gallons (541 pounds) for a 6-inch slump, to 55 gallons (458 pounds) for a 3-inch slump. One cubic yard of 6-inch slump will contain more than 27 cubic feet due to the additional water. Unconfined compressive strength will be 80 psi at 7 days and 150 psi at 28 days.

ATTACHMENT A

DRUG - FREE WORKPLACE CERTIFICATION

THE UNDERSIGNED CERTIFIES THAT THE PROVISIONS OF CODE SECTIONS 50-24-1 THROUGH 50-24-6 OF THE OFFICIAL CODE TO GEORGIA ANNOTATED, RELATED TO THE **DRUG-FREE WORKPLACE**, HAVE BEEN COMPLIED WITH IN FULL. THE UNDERSIGNED FURTHER CERTIFIES THAT:

1. A Drug-Free Workplace will be provided for the employees during the performance of the contract; and
2. Each sub-contractor under the direction of the Contractor shall secure the following written certification:

_____ (CONTRACTOR) certifies to Chatham County that a Drug-Free

Workplace will be provided for the employees during the performance of this contract known as **Chatham County Fleet Operations - Site Work.**
(PROJECT)

pursuant to paragraph (7) of subsection (B) of Code Section 50-24-3. Also, the undersigned further certifies that he/she will not engage in the unlawful manufacture, sale, distribution, possession, or use of a controlled substance or marijuana during the performance of the contract.

_____ _____
CONTRACTOR DATE

_____ _____
NOTARY DATE

ATTACHMENT B

PROMISE OF NON-DISCRIMINATION STATEMENT

Know All Men By These Presence, that I (We), _____
, Name
_____, _____ (herein after
"Company"),
Title Name of Bidder
in consideration of the privilege to bid/or propose on the following Chatham **County project procurement** **Chantham County Fleet Operations - Site Work.** hereby consent, covenant and agree as follows:

(1) No person shall be excluded from participation in, denied the benefit of or otherwise discriminated against on the basis of race, color, national origin or gender in connection with the bid submitted to Chatham County or the performance of the contract resulting therefrom;

(2) That it is and shall be the policy of this Company to provide equal opportunity to all business persons seeking to contract or otherwise interested with the Company, including those companies owned and controlled by racial minorities, and women;

(3) In connection herewith, I (We) acknowledge and warrant that this Company has been made aware of, understands and agrees to take affirmative action to provide minority and women owned companies with the maximum practicable opportunities to do business with this Company on this contract;

(4) That the promises of non-discrimination as made and set forth herein shall be continuing throughout the duration of this contract with Chatham County;

(5) That the promises of non-discrimination as made and set forth herein shall be and are hereby deemed to be made a part of and incorporated by reference in the contract which this Company may be awarded;

(6) That the failure of this Company to satisfactorily discharge any of the promises of non-discrimination as made and set forth above may constitute a material breach of contract entitling the County to declare the contract in default and to exercise appropriate remedies including but not limited to termination of the contract.

_____ _____

Signature Date

Attachment C

DISCLOSURE OF RESPONSIBILITY STATEMENT

Failure to complete and return this information will result in your bid/offer/proposal being disqualified from further competition as non-responsive.

1. List any convictions of any person, subsidiary, or affiliate of the company, arising out of obtaining, or attempting to obtain a public or private contract or subcontract, or in the performance of such contract or subcontract.

_____

2. List any indictments or convictions of any person, subsidiary, or affiliate of this company for offenses such as embezzlement, theft, fraudulent schemes, etc. or any other offenses indicating a lack of business integrity or business honesty which affects the responsibility of the contractor.

_____

3. List any convictions or civil judgments under states or federal antitrust statutes.

_____

4. List any violations of contract provisions such as knowingly (without good cause) to perform, or unsatisfactory performance, in accordance with the specifications of a contract.

_____

5. List any prior suspensions or debarments by any governmental agency.

_____

6. List any contracts not completed on time.

_____

7 List any penalties imposed for time delays and/or quality of materials and workmanship.

_____

8. List any documented violations of federal or any state labor laws, regulations, or standards, occupational safety and health rules.

_____

I,_____, as _____
Name of individual Title & Authority

of _____, declare under oath that

Company Name _____

the above statements, including any supplemental responses attached hereto, are true.

_____
Signature

State of _____

County of _____

Subscribed and sworn to before me on this _____ day of _____

2008 by _____ representing him/herself to be

_____ of the company named herein.

_____
Notary Public

My Commission expires:

_____

Resident State:_____

DPC Form #45

Attachment D

CONTRACTOR AFFIDAVIT AND AGREEMENT

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. 13-10-91, stating affirmatively that the individual, firm, or corporation which is contracting with (name of public employer) has registered with and is participating in a federal work authorization program* [any of the electronic verification of work authorization programs operated by the United States Department of Homeland Security or any equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603], in accordance with the applicability provisions and deadlines established in O.C.G.A. 13-10-91.

The undersigned further agrees that, should it employ or contract with any subcontractor(s) in connection with the physical performance of services pursuant to this contract with (name of public employer), contractor will secure from such subcontractor(s) similar verification of compliance with O.C.G.A. 13-10-91 on the Subcontractor Affidavit provided in Rule 300-10-01-.08 or a substantially similar form. Contractor further agrees to maintain records of such compliance and provide a copy of each such verification to the (name of the public employer) at the time the subcontractor(s) is retained to perform such service.

_____

EEV / Basic Pilot Program* User Identification Number

_____ _____

BY: Authorized Officer or Agent
(Contractor Name)

Date

_____

Title of Authorized Officer or Agent of Contractor

_____

Printed Name of Authorized Officer or Agent

SUBSCRIBED AND SWORN
BEFORE ME ON THIS THE
_____ DAY OF _____, 200_

_____

Notary Public
My Commission Expires:

_____

* As of the effective date of O.C.G.A. 13-10-91, the applicable federal work authorization program is the "EEV / Basic Pilot Program" operated by the U. S. Citizenship and Immigration Services Bureau of the U.S. Department of Homeland Security, in conjunction with the Social Security Administration (SSA).

SUBCONTRACTOR AFFIDAVIT

By executing this affidavit, the undersigned subcontractor verifies its compliance with O.C.G.A. 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract with (name of contractor) on behalf of (name of public employer) has registered with and is participating in a federal work authorization program* [any of the electronic verification of work authorization programs operated by the United States Department of Homeland Security or any equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603], in accordance with the applicability provisions and deadlines established in O.C.G.A. 13-10-91.

_____
EEV / Basic Pilot Program* User Identification Number

_____ _____
BY: Authorized Officer or Agent Date
(Subcontractor Name)

_____
Title of Authorized Officer or Agent of Subcontractor

_____
Printed Name of Authorized Officer or Agent

SUBSCRIBED AND SWORN
BEFORE ME ON THIS THE
_____ DAY OF _____, 200_

_____
Notary Public
My Commission Expires:

* As of the effective date of O.C.G.A. 13-10-91, the applicable federal work authorization program is the "EEV / Basic Pilot
Program" operated by the U. S. Citizenship and Immigration Services Bureau of the U.S. Department of Homeland Security, in conjunction with the Social Security Administration (SSA).

ATTACHMENT E

CHATHAM COUNTY, GEORGIA

BIDDER'S CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

The undersigned certifies, by submission of this proposal or acceptance of this contract, that neither Contractor nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntary excluded from participation in this transaction by any Federal department or agency, State of Georgia, City of Savannah, Board of Education of local municipality. Bidder agrees that by submitting this proposal that Bidder will include this clause without modification in all lower tier transactions, solicitations, proposals, contracts, and subcontracts. Where the Bidder or any lower tier participant is unable to certify to this statement, that participant shall attach an explanation to this document.

Bidder must verify Sub-Tier Contractors and Suppliers are not debarred, suspended, ineligible, pending County litigation or pending actions from any of the above government entities.

Certification – the above information is true and complete to the best of my knowledge and belief.

_____

(Printed or typed Name of Signatory)

_____

(Signature)

_____

(Date)

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001

END OF DOCUMENT Mod. CC P & C 6/2005

Attachment F

Construction Apprentice Program Documentation
(must be submitted to Arneja Riley County MWBE Coordinator with 1st Pay Request)

Contractor _____

Name of Project _____

Contract No. _____

1) Contractor has contacted CAP office to determine availability of specific labor classes which may be utilized for the project:

Date of Inquiry # of Available Participants

_____ _____

2) Anticipated number of CAP students that will be hired and related trade category:

#_____ Trade Category_____
#_____ Trade Category_____
#_____ Trade Category_____

3) If CAP students are not anticipated to be hired for this project, the contractor must briefly explain.

_____

_____

_____

_____

_____

Any questions regarding the Construction Apprentice Program and available participant labor should be directed to Tara Sinclair at (912) 604-9574.

Attachment G

Chatham County
Minority and Women Business Enterprise Program
Proposed MWBE Participation Report

Name of Bidder:_____

Name of Project:_____ Bid No:_____

M/WBE Firm	Type of Work	Contact Person/ Phone #	City, State	%	MBE or WBE

MBE Total_____% WBE Total_____% MWBE Combined_____%

The undersigned must enter into a formal agreement with M/WBE Contractor identified herein for work listed in this schedule conditioned upon execution of contract with the Chatham County Board of Commissioners.

Signature_____ Print_____

Phone (____)_____ Fax (____)_____

Attachment H

Systematic Alien Verification for Entitlements (SAVE)
Affidavit Verifying Status for Chatham County Benefit Application

By executing this affidavit under oath, as an applicant for a Chatham County, Georgia Business License or Occupation Tax Certificate, Alcohol License, Taxi Permit, Contract or other public benefit as reference in O.C.G.A. Section 50-36-1, I am stating the following with respect to my bid for a City of Savannah contract for _____. [Name of natural person applying on behalf of individual, business, corporation, partnership, or other private entity]

1.) _____ I am a citizen of the United States.

OR

2.) _____ I am a legal permanent resident 18 years of age or older.

OR

3.) _____ I am an otherwise qualified alien (8 § USC 1641) or non-immigrant under the Federal Immigration and Nationality Act (8 USC 1101 *et seq.*) 18 years of age or older and lawfully present in the United States.*

In making the above representation under oath, I understand that any person who knowingly and willfully makes a false, fictitious, or fraudulent statement or representation in an affidavit shall be guilty of a violation of Code Section 16-10-20 of the Official Code of Georgia.

Signature of Applicant: Date

_____ _____

Printed Name:

_____

SUBSCRIBED AND SWORN ***_____**

BEFORE ME ON THIS THE **Alien Registration number for non-citizens.**

_____DAY OF _____, 20___

Notary Public
My Commission Expires:

1

REFERENCE FORM

REFERENCES - $499,999 or less: On July 25, 2003 the Board of Commissioners directed that all construction projects with a bid of $499,999 or less, for bidders to be responsive each must provide information on the most recent three (3) projects with similar scope of work as well as other information to determine experience and qualifications as follows. If the contractor has performed any work for the Chatham County Board of Commissioners within the last five (5) years, at least one (1) of the three (3) owner references must be from the appropriate party within the Chatham County Government

a. Project Name:_____
   Location:_____
   Owner:_____
   Address:_____
   City and State:_____
   Contact:_____
   Phone & Fax:_____

   *Architect or Engineer:_____
   Contact:_____
   Phone & Fax:_____
   Email:_____

b. The awarded bid amount and project start date. _____
c. Final cost of project and completion date. _____
d. Number of change orders. _____
e. Contracted project completion in days. _____
f. Project completed on time. Yes____ No____ Days exceeded_____.
g. List previous contracts your company performed for Chatham County by Project Title, date and awarded/final cost.
h. Has contractor ever failed to complete a project?_____ If so, provide explanation.
i. Have any projects ever performed by contractor been the subject of a claim or lawsuit by or against the contractor? _____ If yes, please identify the nature of such claim or lawsuit, the court in which the case was filed and the details of its resolution.

2

REFERENCE FORM

REFERENCES - $499,999 or less: On July 25, 2003 the Board of Commissioners directed that all construction projects with a bid of $499,999 or less, for bidders to be responsive each must provide information on the most recent three (3) projects with similar scope of work as well as other information to determine experience and qualifications as follows. If the contractor has performed any work for the Chatham County Board of Commissioners within the last five (5) years, at least one (1) of the three (3) owner references must be from the appropriate party within the Chatham County Government

a. Project Name:_____
Location:_____
Owner:_____
Address:_____
City and State:_____
Contact:_____
Phone & Fax:_____

*Architect or Engineer:_____
Contact:_____
Phone & Fax:_____
Email:_____

b. The awarded bid amount and project start date. _____
c. Final cost of project and completion date. _____
d. Number of change orders. _____
e. Contracted project completion in days. _____
f. Project completed on time. Yes____ No____ Days exceeded_____.
g. List previous contracts your company performed for Chatham County by Project Title, date and awarded/final cost.
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3

REFERENCE FORM

REFERENCES - $499,999 or less: On July 25, 2003 the Board of Commissioners directed that all construction projects with a bid of $499,999 or less, for bidders to be responsive each must provide information on the most recent three (3) projects with similar scope of work as well as other information to determine experience and qualifications as follows. If the contractor has performed any work for the Chatham County Board of Commissioners within the last five (5) years, at least one (1) of the three (3) owner references must be from the appropriate party within the Chatham County Government

a. Project Name:_____
Location:_____
Owner:_____
Address:_____
City and State:_____
Contact:_____
Phone & Fax:_____

*Architect or Engineer:_____
Contact:_____
Phone & Fax:_____
Email:_____

b. The awarded bid amount and project start date. _____
c. Final cost of project and completion date. _____
d. Number of change orders. _____
e. Contracted project completion in days. _____
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g. List previous contracts your company performed for Chatham County by Project Title, date and awarded/final cost.
h. Has contractor ever failed to complete a project?_____ If so, provide explanation.
i. Have any projects ever performed by contractor been the subject of a claim or lawsuit by or against the contractor? _____ If yes, please identify the nature of such claim or lawsuit, the court in which the case was filed and the details of its resolution.

LEGAL NOTICE
CC NO. **165152**
Invitation to Bid

Sealed Bids will be received until **2:00 P.M**. on **FEBRUARY 14, 2012** and publicly opened in **Chatham County Purchasing & Contracting Department, at The Chatham County Citizens Service Center, 1117 Eisenhower Drive, Suite C, Savannah, Georgia,** for: **BID NO : 12-0004-4 CHATHAM COUNTY FLEET OPERATIONS - PHASE I - SITE WORK. PRE-BID CONFERENCE: 2:00 P.M., JANUARY 31, 2012. A PreBid Conference will be held at the Chatham County Citizens Service Center, 1117 Eisenhower Drive, Suite C, Savannah, Georgia. You are encouraged to attend.**

Bid Packages and Plan sheets are available and **must be purchased from Clayton Digital Reprographics (CDR) located at 1000-I Eisenhower Drive, Savannah, Georgia, 31406. CDR phone: 912-352-3880, fax 912-352-3881, e-mail:** cdrsouth@cdrepro.com
The Bid Package can be downloaded and printed from the County website http://purchasing.chathamcounty.org **Also, all firms requesting to do business with Chatham County must also register on-line at** website http://purchasing.chathamcounty.org
For any additional questions regarding this bid , please contact Robert Marshall, Senior Procurement Specialist, at 912-790-1622.or rmarshal@chathamcounty.org
Bid Bond shall be required at the time of bid. (5% of total bid)
Payment and Performance Bonds (100% of bid) will be required for this project at the time of contract award.

CHATHAM COUNTY HAS THE AUTHORITY TO REJECT ALL BIDS AND WAIVE MINOR FORMALITIES.

"CHATHAM COUNTY IS AN EQUAL OPPORTUNITY EMPLOYER, M/F/H. ALL BIDDERS ARE TO BE EQUAL OPPORTUNITY EMPLOYERS"

MARGARET H. JOYNER, PURCHASING AGENT

SAVANNAH NEWS/PRESS INSERT: Jan. 16, Feb.1, 2012
Please send affidavit to:
Chatham County Purchasing & Contracting Department
P.O. Box 15180
Savannah, Georgia 31416
(912) 790-1622