FULTON COUNTY

Vision

People *Families* *Neighborhoods*

Mission

To serve, protect and govern in concert with local municipalities

Values

People *Customer Services*
Ethics *Resource Management*
Innovation *Equal Opportunity*

PURCHASING DEPARTMENT
REQUEST FOR INVITATION TO BID NO. 08ITB59461K-JD

W037 Hackett Road Elevated Water Tanks

For

DEPARTMENT OF PUBLIC WORKS

BID DUE TIME AND DATE: 11:00 AM., February 25, 2008
BID ISSUANCE DATE: January 22, 2008
PURCHASING CONTACT: Joyce Daniel at 404-730-5824
E-MAIL: joyce.daniel@fultoncountyga.gov

LOCATION: FULTON COUNTY PURCHASING DEPARTMENT
130 PEACHTREE STREET, S.W., SUITE 1168
ATLANTA, GA 30303

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INVITATION TO BID

W037 – HACKETT ROAD ELEVATED WATER TANKS

Sealed Bids for furnishing all materials, labor, tools, equipment and appurtenances necessary for the construction of the Hackett Road Elevated Water Tanks will be received by the Fulton County Department of Purchasing and Contract Compliance at 130 Peachtree Street, S.W. Suite 1168 Atlanta, GA 30303, until 11:00a.m., local time, on **Monday, February 25, 2008**, and then at said office publicly opened and read aloud.

Description of Project:

The Project consists of obtaining all permits, furnishing all materials and equipment, and performing all labor necessary for the construction of two 2,000,000 gallon capacity composite elevated water storage tanks located on County property near the intersection of Crossville Highway and Hackett Road in Roswell, Georgia.

Easements and Permits

There are no new easements required for this project. The County will apply for the land disturbance permit and the Georgia DOT utility permit. The building permit shall be applied for by the Contractor.

Bid Documents:

The Instructions to Bidders, Bid and Contract Requirements (Bid Form, Bid Bond, Performance Bond, Payment Bond, Contract Agreement), and other Documents (Drawings and/or Specifications) may be examined at the following locations:

AGC Builders Exchange
1940 The Exchange
STE 300
Atlanta, Georgia 30339

FW Dodge Corporation
2129 Northwest Parkway
STE 105
Marietta, Georgia 30067

Minority Business Development Agency
401 West Peachtree St
Summit Bldg STE 1715
Atlanta Georgia 30308

Fulton County
Public Works Department
141 Pryor ST, S.W., Ste 6001
Atlanta, Georgia 30303

Reed Construction Data
30 Technology Blvd
STE 100
Norcross Georgia 30092

This document and supporting documents can be downloaded at the Fulton County Website, http://www.fultoncountyga.gov under “Bid Opportunities”.

Applications for documents, along with a non-refundable $50.00 payment must be made to Fulton Construction Management Partners, care of Department of Public Works, 141 Pryor Street, S.W., Suite 6001, Atlanta, Georgia 30303. Payment must be in the form of a company or personal check payable to **Fulton Construction Management Partners**. Checks returned for any reason will result in the bid being deemed non-responsive. This amount includes all fees for printing and distribution and will be used to defray a portion of the printing cost that may have been incurred for the tendering of the Project. Partial sets of the bid document will not be issued.

For payment information, contact Pamela Cody, FCMP, Department of Public Works at 404-612-0880. All other questions should be addressed by the procedures outlined in this ITB to Joyce Daniel, Fulton County Department of Purchasing and Contract Compliance at 404-730-5824, joyce.daniel@fultoncountyga.gov.

Term of Contract:

The Bidder agrees hereby to commence work under this Contract, with adequate personnel and equipment, on a date to be specified in a written order of the Contracting Officer and to fully complete all work under this Contract within **540** consecutive calendar days from and including said date.

The County will make payments, within **45** days, in response to the Contractor's monthly Applications for Payment, which are accompanied by the Engineer's Certificate for Payment, for work performed to date plus cost of stored materials, less retainage. Payments, Applications for Payment, Certificates for Payment, and retainage shall be in accordance with the provisions of the Contract Documents.

No Contact Provision

It is the policy of Fulton County that the evaluation and award process for County contracts shall be free from both actual and perceived impropriety, and that contacts between potential vendors and County officials, elected officials and staff regarding pending awards of County contracts shall be prohibited.

A. No person, firm, or business entity, however situated or composed, obtaining a copy of or responding to this solicitation, shall initiate or continue any verbal or written communication regarding this solicitation with any County officer, elected official, employee, or designated County representative, between the date of the issuance of this solicitation and the date of the County Manager's recommendation to the Board of Commissioners for award of the subject contract, except as may otherwise be specifically authorized and permitted by the terms and conditions of this solicitation.

B. All verbal and written communications initiated by such person, firm, or entity regarding this solicitation, if same are authorized and permitted by the terms and conditions of this solicitation, shall be directed to the Purchasing Agent.

C. Any violation of this prohibition of the initiation or continuation of verbal or written communications with County officers, elected officials, employees, or designated County representatives shall result in a written finding by the Purchasing Agent that the submitted Bid or proposal of the person, firm, or entity in violation is "non-responsive", and same shall not be considered for award.

Bid Contact

Information regarding the bid or bid requirements, either procedural or technical, may be obtained by submitting questions in writing to:

Fulton County Department of Purchasing and Contract Compliance
Attn: Joyce Daniel, Assistant Purchasing Agent
Fulton County Public Safety Building
130 Peachtree Street, S.W. Suite 1168
Atlanta, GA 30303
Phone: (404) 730-5824
Fax: (404) 335-5806

Reference Bid # 08ITB59461K-JD

Or joyce.daniel@fultoncountyga.gov

Basis of Award

The Contract, if awarded, will be awarded to the lowest responsive and responsible bidder. No bid may be withdrawn for a period of sixty (60) days after the date of bid opening except as permitted by O.C.G.A., §36-91-41 et seq., as amended. Each Bid must be accompanied by a Bid Bond in accordance with the Bid Bond Requirements provided in the Contract Documents, on a Surety Company's Standard Bid Bond Form acceptable to the County in an amount no less than 5% of the amount bid. The successful bidder will be required to furnish a Performance Bond and Payment Bond, **on or before** the issuance of Notice to Proceed, each in the amount of 100% of the Contract Amount. All other required Contract Documents must be fully completed and executed by the Contractor and his/her Surety, and submitted to the Owner **on or before** the issuance of the Notice to Proceed.

Pre-Bid Conference

Date:	**Thursday, January 31, 2008**
Time:	**9:00 AM**
Location:	Fulton County Department of Purchasing and Contract Compliance, Public Safety Building 130 Peachtree Street, S.W. Suite 1168 Atlanta, GA 30303

A optional pre-bid conference will be held in the Fulton County Department of Purchasing and Contract Compliance Conference Room, located at 130 Peachtree Street, S.W. Suite 1168, Atlanta, Georgia 30303. ***Inquiries regarding the solicitation either technical or otherwise may be submitted in writing prior to the pre-bid conference and will be addressed at the pre-bid conference.*** Any additional questions asked at the pre-bid conference must be submitted in written form at the pre-bid conference and will be responded to in the form of an addendum with the County's official responses.

The Pre-bid conference will be conducted for the purpose of explaining the County's bid process, the specifications/technical documents, and to provide non-binding verbal responses to questions concerning these bid specifications and to discuss issues from the bidders perspective. However, no verbal response provided at the pre-bid conference binds the County. Only those responses to written questions that are responded to by the County in written communications will be official.

END OF SECTION

INSTRUCTIONS TO BIDDERS

A. Contract Documents

The Contract Documents include the Contract Agreement, Contractor's Bid (including all documentation accompanying the Bid and any post-Bid documentation required by the County prior to the Notice of Award), Bonds, all Special Conditions, General Conditions, Supplementary Conditions, Specifications, Drawings and addenda, together with written amendments, change orders, field orders and the Construction Manager's written interpretations and clarifications issued in accordance with the General Conditions on or after the date of the Contract Agreement.

Shop drawing submittals reviewed in accordance with the General Conditions, geotechnical investigations and soils report and drawings of physical conditions in or relating to existing surface structures at or contiguous to the site are not Contract Documents.

The Contract Documents shall define and describe the complete work to which they relate.

B. Bid Preparation and Execution

All Bids must be made on the Bid forms contained herein. The original signed Bid with three (3) copies shall be submitted in a sealed envelope, addressed to the Department of Purchasing and Contract Compliance, Fulton County Public Safety Building, 130 Peachtree Street, S.W., Suite 1168 Atlanta, Georgia 30303, and labeled "Bid for ITB**-08ITB59461K-JD W037 – HACKETT ROAD ELEVATED WATER TANKS.**

REQUIRED SUBMITTALS: The bidder **must complete and execute** the following:

1. Bid Form
2. Acknowledgement of each Addendum
3. Bid Bond
4. Purchasing Forms (See Submittal Check List at end of this Section), fully executed
5. Contract Compliance Forms (See Submittal Check List at end of this Section), fully executed
6. Risk Management Insurance Provisions Form

Any bids received after the stated time and date will not be considered. It shall be the sole responsibility of the bidder to have his/her bid delivered to the Fulton County Department of Purchasing and Contract Compliance for receipt on or before the stated time and date (see Section 00020). If a bid is sent by U.S. Mail, the bidder shall be responsible for its timely delivery to the Purchasing Department. Bids delayed by mail will not be considered, shall not be opened, and arrangements shall be made for their return at the bidder's request and expense.

Bid shall be publicly opened, with only the names and total bid price of the bidders disclosed at the opening.

C. Addenda and Interpretations

No interpretations of the meaning of the Drawings, Specifications or other pre-bid documents will be made to any Bidder orally.

Bidders requiring clarification or interpretation of the Contract Documents shall make a request in writing, either by mail, hand delivery, e-mail or fax, to the Purchasing Agent at the address below. To be given consideration, requests must be received no later than

2:00 PM, Thursday, February 14, 2008. The County will not respond to any requests, oral or written, received after this date. Telephone inquiries will not be accepted.

Fulton County Department of Purchasing and Contract Compliance
Attn: Joyce Daniel, Assistant Purchasing Agent
Fulton County Public Safety Building
130 Peachtree Street, S.W., 1168
Atlanta, GA 30303
Fax: (404) 335-5806
joyce.daniel@fultoncountyga.gov
Reference Bid # 08ITB59461K-JD

Only communications from firms that are in writing and signed will be recognized by the County as duly authorized expressions on behalf of proposers/bidders. Any and all such interpretations and any supplemental instructions will be in the form of written Addenda to the Contract Documents which, if issued, will be mailed, shipped or faxed to all prospective Bidders (at the respective addresses furnished) prior to the date fixed for the opening of Bids.

Failure of Bidders to receive or acknowledge any Addendum shall not relieve them of any obligation under the Bid. All Addenda shall become part of the Contract Documents.

D. **Site Examination**

There will not be a scheduled site visit for this project. However, bidders are encouraged to visit the project site on their own. The project is located near the intersection of Crossville Highway and Hackett Road in Roswell Georgia as shown on the site plan in Appendix A.

E. **Bidder's Modification and Withdrawal of Bids**

A Bidder may modify or withdraw its bid by written request, provided that the request is received by the County prior to the bid due date and time at the address to which bids are to be submitted. Provided further, that in case of an electronic request (i.e. facsimile, e-mail, etc.) a written confirmation thereof over the authorized signature of the Bidder must be received by the County at the address to which original Bids are to be submitted within three (3) calendar days after issue of the electronic message. Following withdrawal of its bid, the Bidder may submit a new bid, providing delivery is affected prior to the established bid opening date and time. **No bid may be withdrawn after bid due date for sixty (60) calendar days.**

F. **Bid and Contract Security**

A Bid Bond for an amount equal to five percent (5%) of the bid amount must accompany each Proposal. The bid bond shall be submitted in a separate, sealed envelope marked "Bid Bond".

Bids must be accompanied by a bid bond or certified check in an amount of five percent (5%) of the TOTAL AMOUNT of the base bid. The bid bond or certified check shall apply ONLY TO THIS BID. The bid name and contract number must appear on the security instrument. The bond must remain in full force and effect until the Bidder executes the final Contract. Bids not satisfying the bonding requirements of this project will be declared non-responsive.

Any bid bond, performance bond, payment bond, or security deposit required for public works construction contract shall be approved and filed with purchasing agent. At the option of the County, if the surety named in the bond is other than a surety company

authorized by law to do business in this state pursuant to a current certificate of authority to transact surety business by the Commissioner of Insurance, such bond shall not be approved and filed unless such surety is on the United States Department of Treasury's list of approved bond sureties.

A Purchasing Agent shall approve as to form and as to the solvency of the surety any bid bond, performance bond, or payment bond required by this. In the case of a bid bond, such approval shall be obtained prior to acceptance of the bid or proposal. In the case of payment bonds and performance bonds, such approval shall be obtained prior to the execution of the contract.

Whenever, in the judgment of the County:
(1) Any surety on a bid, performance, or payment bond has become insolvent;
(2) Any corporation surety is not longer certified or approved by the Commissioner of Insurance to do business in the state; or
(3) For any cause there are no longer proper or sufficient sureties on any or all the bonds

The County may require the contractor to strengthen any or all of the bonds or to furnish a new or additional bond or bonds within ten days. Thereupon, if so ordered by the County, all work on the contract shall cease unless such new or additional bond or bonds are furnished. If such bond or bonds are not furnished within such time, the County may terminate the contract and complete the same as the agent of and at the expense of the contractor and his or her sureties.

As a condition of responsiveness the bidder must contain a Bid Bond for an amount equal to 5% of the bid amount. The Bid Bond shall be included in a separate envelope marked on the outside "Bid Bond". Checks or letters of credit of any type will not be accepted. A certified cashier's check will be acceptable. Provide a completed and fully executed Bid Bond. When the bidder's package is opened, a purchasing agent will verify the presence of the Bid Bond and remove it from the Proposal Package.

If the bidder withdraws its bid from the competition after the selection of its bid for a reason not authorized by Georgia law, the County will proceed on the Bid Bond, along with any other available remedies.

The Surety of the Bid Bond shall be from a surety company authorized to do business in the State of Georgia, shall be listed in the Department of Treasury Circular 570, and shall have an underwriting limitation in excess of 100% of the bid amount. The Bonds and Surety shall be subject to approval by the County Attorney.

Attorneys-in-fact for bidders who sign bid bonds or contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.

G. **Right to Reject Bids**

The County reserves the right to reject any or all bids and to waive informalities. No bids will be received after the time set for opening bids. Any unauthorized conditions, limitations or provisions attached to the Bid, except as provided herein, will render it informal and may cause its rejection. Unbalanced bids will be subject to rejection. Any bidder may withdraw his/her bid, either personally or by telegraphic or written request, at any time prior to the scheduled closing time for receipt of bids. Telegraphic or written requests for withdrawal must be in the possession of the County prior to the closing time for receipt of bids.

H. **Applicable Laws**

All applicable laws and regulations of the State of Georgia and ordinances and regulations of Fulton County shall apply. Protestors shall seek resolution of their complaints in the

manner provided in the Fulton County Code of Laws §2-324, which is incorporated by reference herein.

I. **Examination of Contract Documents**

Prospective bidders shall examine the contract documents and before submitting a bid, shall make a written request to the County for an interpretation or correction of any ambiguity, in consistency or error therein which could be discovered by a bidder. At the bid opening each bidder shall be presumed to have read and be familiar with the contract documents.

J. **Termination**

The County may terminate the contract resulting from this solicitation at any time the vendor fails to carry out the contract provisions, if in the opinion of the County, the performance of the contract is unreasonably delayed, or the vendor is in direct violation of the contract conditions. The County shall provide the vendor with notice of any conditions which violate or endanger the performance of the contract and, if after such notice the contractor fails to remedy such conditions within thirty (30) days, to the satisfaction of the County, the County may exercise their option in writing to terminate the Contract without further notice to the Contractor and order the Contractor to stop work immediately and vacate the premises. Vendor agrees by its bid submission that the County's decision is final and valid.

K. **Indemnification and Hold Harmless Agreement**

See Section 00490, Insurance and Risk Management Provisions, Indemnification and Hold Harmless Agreement.

L. **Bid Opening**

Bids will be opened in public and read aloud. All bidders are requested to be present at the opening.

M. **Determination of Successful Bidder**

Fulton County desires to complete this work in a timely manner. The Contract will be awarded to the lowest responsive, responsible bidder(s), if awarded. Award will be made on the basis of the prices given in the Base Bid, not including alternates.

1. **Responsibility:** The determination of the bidder's responsibility will be made by the County based on whether the bidder meets the following minimum requirements:

    a. The County reserves the right to reject any bid if the evidence submitted by, or investigation of, the bidder fails to satisfy the County that he/she is properly qualified to carry out the obligations of the Contract.
    b. Is properly licensed to perform this type of work in Fulton County. Bidders must have a utility contractors license to perform this work. O.C.G.A. §43-14-8.3 (h)
    c. Maintains a permanent place of business individually or in conjunction with the prime contractor.
    d. Has the appropriate and adequate technical experience. Designated Project Manager must be proficient in all aspects of contracted work.
    e. Has adequate personnel and equipment to do the work expeditiously.
    f. Has suitable financial means to meet obligations incidental to the work.

2. **Responsiveness:** The determination of responsiveness will be made by the County based on a consideration of whether the bidder has submitted a complete Bid form without irregularities, excisions, special conditions, or alternative bids for any item unless specifically requested in the Bid form.

N. **Wage Clause**

Pursuant to 102-391, Each Contractor shall agree that in the performance of the Contract he will comply with all lawful agreements, if any, which the Contractor had made with any association, union, or other entity, with respect to wages, salaries, and working conditions, so as not to cause inconvenience, picketing, or work stoppage.

O. **Notice of Award of Contract**

As soon as possible, and within sixty (60) days after receipt of bids, the County shall notify the successful Bidder of the Award of Contract.

The award shall be made by the Board of Commissioners of Fulton County to the lowest responsive, responsible bidder(s) as soon as possible after receipt of bids, taking into consideration price and the responsiveness to the requirements set forth in the Invitation for Bid. In such case, no claim shall be made by the selected Contractor(s) for loss of profit if the contract is not awarded or awarded for less work than is indicated and for less than the amount of his bid. The total of the awarded contract shall not exceed the available funds allocated for this project.

Should the County require additional time to award the contract, the time may be extended by mutual agreement between the County and the successful bidder. If an Award of Contract has not been made within sixty (60) days from the bid date or within the extension mutually agreed upon, the Bidder may withdraw the Bid without further liability on the part of either party.

Any award made by the Board of Commissioners as a result of this bid will begin from the date of the notice to proceed. The Bidder agrees hereby to commence work under this Contract, with adequate personnel and equipment, on a date to be specified in a written order from the user department. The contract shall become effective on the Contract Date and shall continue in effect until the end of the term of the contract or until the project has been closed-out unless earlier terminated pursuant to the termination provisions of the contract.

P. **Execution of Contract Documents**

Upon notification of Award of Contract, the County shall furnish the Contractor the conformed copies of Contract Documents for execution by the Contractor and Contractor's surety.

Within ten (10) days after receipt the Contractor shall return all the documents properly executed by the Contractor and the Contractor's surety. Attached to each document shall be an original power-of-attorney for the person executing the bonds for the surety and certificates of insurance for the required insurance coverage.

After receipt of the documents executed by the Contractor and his surety with the power-of-attorney and certificates of insurance, the County shall complete the execution of the documents. Distribution of the completed documents will be made upon completion.

Should the contractor and/or surety fail to execute the documents within the time specified, the County shall have the right to proceed on the Bid Bond accompanying the bid.

If the County fails to execute the documents within the time limit specified, the Contractor shall have the right to withdraw the Contractor's bid without penalty.

Should an extension of any of the time limits stated above be required, this shall be done only by mutual agreement between both parties.

Any agreement or contract resulting from the acceptance of a bid shall be on a County approved document form. The County reserves the right to reject any agreement that does not conform to the Invitation for Bid and any County requirements for agreements and contracts. The County reserves the right to modify the agreement resulting from this bid upon the recommendation of the County Attorney.

Q. **Joint Venture**

Any Bidder intending to respond to this solicitation as a joint venture must submit an executed joint venture agreement with its offer. The agreement must designate those persons or entities authorized to execute documents or otherwise bind the joint venture in all transactions with Fulton County, or be accompanied by a document, binding upon the joint venture and its constituent members, making such designation. Offers from joint ventures that do not include these documents will be rejected as being non-responsive.

R. **Contractors Compliance With All Assurances And/Or Promises Made In Response To Procurement**

Should any Bidder submit a response to the County promising to provide a certain level of service for either the scope of work, MFBE participation, or any other matter, including where such promise or assurance is greater than what is required by the procurement documents, and should this response containing the promise or assurance be accepted by the County and made a part of the Contract Documents, then this degree or level of service promised by the bidder relating to the scope of work, MFBE participation, or other matter shall be considered to be a material part of the Agreement between the bidder and the County, such that the bidder's failure to provide the agreed upon degree or level of service or participation shall be a material breach of the Agreement giving the County just cause to terminate the Agreement for cause, pursuant to the General Conditions of the Agreement.

S. **Georgia Security and Immigration Compliance Act**

1. Effective as of July 1, 2007, and pursuant to O.C.G.A. 13-10-91, every public employer, every contractor of a public employer, and every subcontractor of a public employer's contractor must register and participate in a federal work authorization program as follows:

    a. No public employer shall enter into a contract for the physical performance of services within this state unless the contractor registers and participates in a federal work authorization program to verify the work eligibility information all new employees.

    b. No contractor or subcontractor who enters into a contract with a public employer shall enter into such a contract or subcontract in connection with the physical performance of services within this state unless such contractor or subcontractor registers and participates in a federal work authorization program to verify the work eligibility information of all new employees.

2. In accordance with O.C.G.A. 13-10-91, the requirements of paragraphs (a) and (b) of paragraph (1) shall apply to public employers, their contractors and subcontractors, as follows:

a. On or after July 1, 2007, to public employers, contractors, or subcontractors of 500 or more employees;

b. On or after July 1, 2008, to public employers, contractors or subcontractors of 100 or more employees; and

c. On or after July 1, 2009, to all other public employers, their contractors, or subcontractors.

See Section 00420, Purchasing Forms & Instructions for declarations and affidavits.

T. **Bid General Requirements**

The following information pertains to the submission of a Bid to Fulton County, and contains instructions on how Bids must be presented in order to be considered. Listed below are the requirements for all Bidders interested in doing business with Fulton County.

1. The Bid sheets included in this Invitation to Bid ("Bid") must be fully completed and returned with the Bid unless otherwise specified in writing by the Purchasing Department. Type or neatly print the date, company name, and the full legal name and title of the person(s) signing the Bid in the place provided at the bottom of each Bid sheet. Any additional sheets submitted must contain the same signature and Bidder information.

2. All signatures must be executed by person(s) having contracting authority for the Bidder.

3. Absolutely no fax Bids or reproduction Bids will be accepted, except that photocopies may be submitted in addition to the original when multiple copies of the Bid are specifically requested in the solicitation.

4. The envelope in which the Bid response is submitted must be sealed and clearly labeled with the Bid number, project title, due date and time, and the name of the company or individual submitting the proposal. Bids must be received by the opening date and time shown on this Bid in order to be considered. The Purchasing Agent has no obligation to consider Bids which are not in properly marked envelopes. Contract Compliance submittals shall be submitted in a separate sealed envelope or package.

5. The original and the required number of copies of the Bid must be returned to:

   Joyce Daniel Assistant Purchasing Agent
   Fulton County Department of Purchasing and Contract Compliance
   130 Peachtree Street, S.W., Suite 1168
   Atlanta, Georgia 30303

   Any inquiries, questions, clarifications or suggestions regarding this solicitation should be submitted in writing to the Purchasing Contact Person. Contact with any other County personnel in regard to a current solicitation is strictly prohibited in accordance with Fulton County "No Contact Provision" policy outlined in Section 35 and in Section 00020, Invitation to Bid.

6. Show information and prices in the format requested. Prices are to be quoted F.O.B. Destination, and must include all costs chargeable to the Contractor executing the Contract, including taxes. Unless otherwise provided in the Contract, Fulton County shall have no liability for any cost not included in the price. The Contractor shall

provide Fulton County the benefit through a reduction in price of any decrease in the Contractor's costs by reason of any tax exemption based upon Fulton County's status as a tax-exempt entity.

7. All prices Bid must be audited by the Bidder to ensure correctness before the Bid is submitted. The Bidder is solely responsible for the accuracy of information placed on a Bid sheet, including prices. Clerical or mathematical error is insufficient to void a successful Bid but a Bidder may withdraw a sealed Bid prior to opening without a penalty.

8. All prices must be submitted in the format requested and less all trade discounts. When multiple items are being Bid, Bidder must show both the unit price and the total extended price for each item. When applicable, the Bidder must include an additional lump sum Bid for groups or items. In the event a Bidder is offering an additional discount on groups of items, Bidder must indicate the total lump sum Bid for the particular group of items before any extra discount, the amount of extra discount, and the net total for the particular group. In the event of an extension error, unit pricing shall prevail.

9. By submitting a signed Bid, Bidder agrees to accept an award made as a result of that Bid under the terms and conditions spelled out in the Bid documents. In the event of a conflict between the different Bid documents, the County's cover Contract (if used) shall have precedence, followed in order by the Invitation to Bid, Purchase Order, Bid, Contractor's Warranty Agreement, Maintenance Agreement, and/or other Contractor provided agreements.

10. A Bidder may submit only one (1) Bid response for each specific Bid solicitation unless otherwise authorized in the specifications.

11. All prices submitted by the Bidder to Fulton County must be guaranteed by the authorized person(s) against any price increase for the time period designated in the Bid specifications, and Fulton County must be given the benefit of any price decrease occurring during such designated time period.

12. All items Bid must be new. Used, rebuilt and refurbished items will not be considered unless specifically authorized by Fulton County in the written specifications.

13. All Bidders must specify in the Bid response the earliest actual delivery date for each item unless otherwise specified in writing by Fulton County. The delivery date may be a factor in deciding the Bidder's capability to perform.

14. A successful Bidder's delivery ticket(s) and invoice(s) must list each item separately and must show Fulton County's purchase order number as well as the proper department and address to which delivery was made, as listed on the purchase order or in the Bidder's contract with Fulton County.

15. Unless clearly shown as "no substitute" or words to that effect, any items in this invitation to Bid which have been identified, described or referenced by a brand name or trade name are for reference only. Such identification is intended to be descriptive but not restrictive, and is to indicate the general quality and characteristics of products that may be offered. Each item Bid must be individually identified as to whether it is a specified item or an equivalent item by typing or printing after the item(s): The brand name; model or manufacturer's number, or identification regularly used in the trade. Deviations from the specifications must be clearly and fully listed on the Bid sheet, including photographs or cuts, specifications, and dimensions of the proposed "alternate". Fulton County is the sole judge of "exact equivalent", or "alternate". The

factors to be considered are: function, design, materials, construction, workmanship, finishes, operating features, overall quality, local service facilities, warranty terms and service, and other relevant features of item(s) Bid.

16. For all Bids, Fulton County reserves the right to request representative samples. If requested, samples must be delivered at the Bidder's cost within three (3) business days. Samples are submitted at the risk of the Bidder and may be subjected to destructive tests by Fulton County. Samples must be plainly tagged with Fulton County's Bid number, item name, manufacturer, and the name of the Bidder.

17. Item(s) Bid must be complete and ready to operate. No obvious omissions of components or necessary parts shall be made even though the specifications may not detail or mention them. Unit(s) must be furnished with factory installed equipment and must be comparable with the basic form, fit, and functional requirements which are all to be included in the base price as well as any other equipment included as standard by the manufacturer or generally provided to the buying public.

18. All successful Bidders must assume full responsibility for all item(s) damaged prior to F.O.B. Destination delivery and agree to hold harmless Fulton County of all responsibility for prosecuting damage claims.

19. All successful Bidders must assume full responsibility for replacement of all defective or damaged goods within thirty (30) days of notice by Fulton County of such defect or damage.

20. All successful Bidders must assume full responsibility for providing or ensuring warranty service on any and all items including goods, materials, or equipment provided to the County with warranty coverage. If a successful Bidder is not the manufacturer, all manufacturers' warranties must be passed through to Fulton County. The Bidder and not Fulton County is responsible for contacting the manufacturer of the warranty service provided during the warranty period and supervising the completion of the warranty service to the satisfaction of Fulton County.

21. As a successful Bidder providing any equipment which requires fitting and assembly, the Bidder shall be solely responsible for such installation being performed by a manufacturer's authorized or approved servicer or an experienced worker, utilizing workmanship of the highest caliber. The Bidder must verify all dimensions at the site, shall be responsible for their correctness, and shall be responsible for the availability of replacement parts when specified in writing by Fulton County in the specifications, purchase order, or other contract.

22. A successful Bidder is solely responsible for disposing of all wrappings, crating, and other disposable material upon deliver of item(s).

23. All Bidders are required to be authorized distributors or regularly engaged in the sale or distribution of the type of goods, materials, equipment or services for which the Bidder is submitting a Bid response in addition, all Bidders are required to provide Fulton County with three (3) written references documenting the successful completion of Bids or contracts for the types of items including goods, materials, equipment, or services for which the Bidder is submitting a Bid response. In instances where a Bidder has never supplied such goods, material, equipment, or services before, the Bidder must submit with the Bid response a statement and supporting documentation demonstrating such expertise, knowledge, or experience to establish the Bidder as a responsible Bidder, capable of meeting the Bid requirements should an award be made. No exceptions to this provision will be made unless authorized in the Bid specifications.

24. Bidders may be required to furnish evidence that they maintain permanent places of business of a type and nature compatible with their Bid proposal, and are in all respects competent and eligible vendors to fulfill the terms of the specifications. Fulton County may make such investigations as it deems necessary to determine the ability of the Bidder to perform such work, and reserves the right to reject any Bidder if evidence fails to indicate that the Bidder is qualified to carry out the obligation of the Contract and to complete the work satisfactorily.

25. All Bidders must comply with all Fulton County Purchasing laws, policies, and procedures, non-discrimination in contracting and procurement ordinances, and relevant state and federal laws including but not limited to compliance with EEOC hiring guidelines and requirements under the Americans with Disabilities Act. Successful Bidder must obtain all permits, licenses, and inspections as required and furnish all labor, materials, insurance, equipment, tools, supervision, and incidentals necessary to accomplish the work in these specifications.

26. If a successful Bidder is unable or unwilling to enter into a Contract with Fulton County subsequent to being granted an award, or who fails to perform in accordance with the Bid specifications the Bidder will be subject to damages and all other relief allowed by law.

27. Successful Bidders contract directly with Fulton County and are the party or parties obligated to perform. Contracts may not be assigned and any failure to perform the Contract in accordance with the specifications will constitute a breach of Contract and may result in a Bidder being found to be “non-responsive” in the future.

28. In case of default by the successful Bidder, Fulton County may procure the articles for services from another source and hold the successful Bidder responsible for any resulting excess cost.

29. The County may award any Bid in whole or in part to one or more vendors or reject all Bids and/or waive any technicalities if it is in the best interests of the County to do so. In the event that all Bids are not rejected, Bids for items including goods, materials, equipment, and services will be awarded to the lowest “responsible” Bidder(s) as determined by Fulton County. Submitting the lowest Bid, as published at the Bid opening, does not constitute an award or the mutual expectation of an award of a Contract and purchase order. For purposes of this notice and the attached Bid sheets, a purchase order is a Contract to provide items including goods, materials, equipment, and services and is intended to have the full force and effect of a Contract. A breach of the terms and conditions of a purchase order constitutes a breach of Contract.

30. Bids for projects that are solicited pursuant to the Georgia Local Government Public Works Construction Law (O.C.G.A. § 36-91-1 et seq.) may withdrawn as follows:

    Competitive sealed Bids (“Bid”) may not be revoked or withdrawn until 60 days after the time set by the governmental entity for opening of Bids. At the end of this time period, the Bid will cease to be valid, unless the Bidder provides written notice to the County prior to the scheduled expiration date that the Bid will be extended for a time period specified by the County.

31. In the evaluation of the Bids, any award will be subject to the Bid being:

    a. Compliant to the specification – meets form, fit, and function requirements stated or implied in the specification.
    b. Lowest cost to the County over projected useful life.

c. Administratively Compliant – Including all required bonds, insurance, established quality of work and general reputation, financial responsibility, relevant experience, and related criteria.

32. All proposals and Bids submitted to Fulton County are subject to the Georgia "Open Records Act", Official Code of Georgia, Annotated (O.C.G.A.) §50-18-70 et seq.

33. All proposals and Bids submitted to Fulton County involving Utility Contracting are subject to the Georgia law governing licensing of Utility Contractors, O.C.G.A. §43-14-8.2(h). The Utility Contractor License number of the person who will perform the utility work shall be written on the face of the Bid envelope.

34. The apparent silence of this specification, and any supplement thereto, as to details, of the omission from it of a detailed description concerning any point, will be regarded as meaning only the best commercial practices are to prevail. Only materials of the highest quality, correct type, size, and design are to be used. All interpretations of this specification will be made upon the basis of this statement, with Fulton County interpretation to prevail.

35. It is the policy of Fulton County that the evaluation and award process for County contracts shall be free from both actual and perceived impropriety, and that contacts between potential vendors and County officials, elected officials and staff regarding pending awards of County contracts shall be prohibited.

    a. No person, firm, or business entity, however situated or composed, obtaining a copy of or responding to this solicitation, shall initiate or continue any verbal or written communication regarding this solicitation with any County officer, elected official, employee, or designated County representative, between the date of the issuance of this solicitation and the date of the County Manager's recommendation to the Board of Commissioners for award of the subject contract, except as may otherwise be specifically authorized and permitted by the terms and conditions of this solicitation.

    b. All verbal and written communications initiated by such person, firm, or entity regarding this solicitation, if same are authorized and permitted by the terms and conditions of this solicitation, shall be directed to the Purchasing Agent.

    c. Any violation of this prohibition of the initiation or continuation of verbal or written communications with County officers, elected officials, employees, or designated County representatives shall result in a written finding by the Purchasing Agent that the submitted Bid or proposal of the person, firm, or entity in violation is "non-responsive", and same shall not be considered for award.

36. Any Bidder intending to respond to this solicitation as a Joint Venture must submit an executed Joint Venture Agreement with this Bid. This agreement must designate those persons or entities authorized to execute documents or otherwise bind the Joint Venture in all transactions with Fulton County, or are accompanied by a document, binding upon the Joint Venture and its constituent members, making such designation. Bids from Joint Ventures that do not include these documents will be rejected as being "non-responsive".

37. Any Bidder intending to respond to this solicitation must complete all of the Procurement Affidavit Forms provided in this solicitation. Bids that do not include these completed documents will be rejected as being "non-responsive".

Required Bid Submittal Check List for Invitation to Bid (ITB)

The following submittals shall be completed and submitted with each bid (see table below "Required Bid Submittal Check List."). **Please check to make sure that the required submittals are in the envelope before it is sealed. Failure to submit all required submittals may deem your proposal non-responsive.**

Submit one (1) Original bid, signed and dated and **three (3) complete** copies of the Original Bid including all required documents.

Item #	Required Bid Submittal Check List	Check (√)
1	Bid Form (Section 00300) – All dollar amounts must be both in writing AND figures and represent prices for the published scope of work without exceptions.	
2	Acknowledgement of each Addendum (acknowledged both on the Bid Form, Section 00300, and on the form included with each addendum).	
3	Bid Bond (Section 00410) (separate envelope if Public Works Construction project)	
4	Purchasing Forms (Section 00420) Form A - Non-Collusion Affidavit of Prime Bidder/Offeror Form B - Certificate of Acceptance of Request for Bid/Proposal Requirements Form C - Georgia Utility Contractor License Form D - Certificate Regarding Debarment Form E - Disclosure Form & Questionnaire Form F - Declaration of Employee-Number Categories Form G - Georgia Security and Immigration Contractor Affidavit and Agreement Form H - Georgia Security and Immigration Subcontractor Affidavit	
5	Office of Contract Compliance Requirements (Section 00430) Exhibit A - Promise of Non-Discrimination (for Prime and each Sub) Exhibit B - Employment Record (for Prime and each Sub) Exhibit C - Schedule of Intended Subcontractor Utilization Exhibit D - Letter of Intent to Perform as Subcontractor Exhibit E - Declaration Regarding Subcontractor Practices Exhibit F - Joint Venture Disclosure Affidavit Exhibit G - Prime Contractor/Subcontractor Utilization Report Equal Business Opportunity Plan (EBO Plan)	
6	Risk Management Insurance Provisions Form (Section 00490) and proof of insurance, either letter from insurer or Certificate of Insurance.	
7		
8		
9		

END OF SECTION

BID FORM

Submitted To: Fulton County Government

Submitted By: _____

For: **ITB# 08ITB59461K-JD**
W037 HACKETT ROAD ELEVATED WATER TANKS

Submitted on _____, 20__.

The undersigned, as Bidder, hereby declares that the only person or persons interested in the Bid as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this Bid or in the Contract to be entered into; that this Bid is made without connection with any other person, company or parties making a Bid; and that it is in all respects fair and in good faith without collusion or fraud.

The Bidder further declares that he has examined the site of the work and informed himself fully in regard to all conditions pertaining to the place where the work is to be done; that he has examined the Drawings and Specifications for the work and contractual documents relative thereto, and has read all instructions to Bidders and General Conditions furnished prior to the openings of bids; that he has satisfied himself relative to the work to be performed.

The Bidder proposes and agrees, if this Bid is accepted, to contract with the Board of Commissioners of Fulton County, Atlanta, Georgia, in the form of contact specified, to furnish all necessary materials, equipment, machinery, tools, apparatus, means of transportation and labor necessary, and to complete the construction of the work in full and complete accordance with the shown, noted, and reasonably intended requirements of the Specifications and Contract Documents to the full and entire satisfaction of the Board of Commissioners of Fulton County, Atlanta, Georgia, with a definite understanding that no money will be allowed for extra work except as set forth in the attached General Conditions and Contract Documents for the following prices.

THE BID TOTAL IS THE AMOUNT UPON WHICH THE BIDDER WILL BE FORMALLY EVALUATED AND WHICH WILL BE USED TO DETERMINE THE LOWEST RESPONSIBLE BIDDER. Please make sure that all line items below are accurately calculated and total up to this inclusive amount.

The base bid may not be withdrawn or modified for a period of sixty (60) days following the receipt of bids.

BID TOTAL: ITEMS 1 THROUGH 6 (BELOW), INCLUSIVE, IN THE

AMOUNT OF: _____

_____DOLLARS

($_____).

Make sure that all line items below are accurately calculated and total up to the inclusive BID TOTAL amount entered on Page 1.

Method of Bidding

The unit or lump sum price for each of the several items in the Bid of each Bidder shall include its pro rata share of overhead and profit so that the sum of the products, obtained by multiplying the quantity shown for each item by the unit price, represents the total Bid. Any Bid not conforming to this requirement may be rejected. Additionally, Unbalanced Bids or conditional Bids will be subject to rejection. The special attention of all Bidders is called to this provision, for should conditions make it necessary to revise the quantities, no limit will be fixed for such increased or decreased quantities nor extra compensation allowed.

ITEM 1 - Composite Elevated Water Tanks		
Composite Elevated Water Tanks	LS	$_____
CASH ALLOWANCES IF DIRECTED BY ENGINEER		
ITEM 2 – Testing Allowance		
Soils and Concrete Testing	LS	$ 15,000.00
ITEM 3 – Instrumentation Allowance		
Instrumentation Interface Work	LS	$20,000.00
ITEM 4 – Landscaping Allowance		
Landscaping	LS	$ 15,000.00
ITEM 5 – Unforeseen Utility Conflicts Allowance		
Unforeseen Utility Conflicts	LS	$50,000.00
Item 6 – Mixing system Allowance		
Mixing system Allowance	LS	$90,000.00
BID TOTAL – Items 1 through 6 (also enter on previous page)		**$**_____

The Bidder agrees hereby to commence work under this Contract, with adequate personnel and equipment, on a date to be specified in a written order of the Contracting Officer and to fully complete all work under this Contract within **five hundred and forty (540)** consecutive calendar days from and including said date.

The Bidder declares that he understands that the quantities shown for the unit prices items are subject to either increase or decrease, and that should the quantities of any of the items of work be increased, the Bidder proposes to do the additional work at the unit prices stated herein; and should the quantities be decreased, the Bidder also understands that payment will be made on the basis of actual quantities at the unit price bid and will make no claim for anticipated profits for any decrease in quantities; and that actual quantities will be determined upon completion of work, at which time adjustments will be made to the contract amount by direct increase or decrease.

In case of discrepancies between the figures shown in the unit prices and the totals, the unit prices shall apply and the totals shall be corrected to agree with the unit prices. In case of discrepancies between written amounts and figures, written amounts shall take precedence over figures and the sum of all Bid extensions (of unit prices) plus lump sum items shall take precedence over BID TOTAL.

The Bidder furthermore agrees that, in the case of a failure on his part to execute the Contract Agreement and Bonds within ten (10) days after receipt of conformed contract documents for execution, the Bid Bond accompanying his bid and the monies payable thereon shall be paid into the funds of the Owner as liquidated damages for such failure.

Enclosed is a Bid Bond in the approved form, in the sum of:_____

_____Dollars

($_____) according to the conditions of "Instructions to Bidders" and provisions thereof.

The undersigned acknowledges receipt of the following addenda (list by the number and date appearing on each addendum) and thereby affirms that its Bid considers and incorporates any modifications to the originally issued Bidding Documents included therein.

ADDENDUM # _____DATED _____

ADDENDUM # _____DATED _____

ADDENDUM # _____DATED _____

ADDENDUM # _____DATED _____

BIDDER: _____

By: _____
[Name Typed or Printed]

_____
[Name Signed]

Title: _____

Business Address: _____

_____

_____

Business Phone: _____

Bidder's Contractor License No: _____
[State/County]

License Expiration Date: _____

Note: If the Bidder is a corporation, the Bid shall be signed by an officer of the corporation; if a partnership, it shall be signed by a partner. If signed by others, authority for signature shall be attached.

The full name and addresses of persons or parties interested in the foregoing Bid, as principals, are as follows:

Name	Address

The Bidder shall list below work he has done of similar nature to this bid as references that will afford the Owner opportunity to judge the Bidder's experience and skill.

PROJECT NAME AND OWNER	OWNERS REPRESENTATIVE	PHONE

END OF SECTION

BID BOND

No bid for a contract in Fulton County for work to be done shall be valid for any purpose unless the Contractor shall give a Bid Bond with good and sufficient surety payable to, in favor of, and for the protection of Fulton County. The Bid Bond shall not be less than 5% of the total amount payable by the terms of the Contract. No bid shall be read aloud or considered if a proper bid bond has not been submitted.

Surety companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State of Georgia.

Attestation for the corporation must be by the corporate officer; for a partnership by another partner; for an individual by a notary with the corporate seal.

BID BOND
W037 HACKETT ROAD ELEVATED WATER TANKS
FULTON COUNTY GOVERNMENT

KNOW ALL MEN BY THESE PRESENTS, THAT WE_____

_____

hereinafter called the PRINCIPAL, and _____

_____

hereinafter call the SURETY, a corporation chartered and existing under the laws of the State of _____and duly authorized to transact Surety business in the State of Georgia, are held and firmly bound unto the Fulton County Government (COUNTY), in the penal sum of _____

_____Dollars and Cents ($_____) good and lawful money of the United States of America, to be paid upon demand of the COUNTY, to which payment well and truly to be made we bind ourselves, our heirs, executors, and administrators and assigns, jointly and severally and firmly by these presents.

WHEREAS the PRINCIPAL has submitted to the COUNTY, for **W037 HACKETT ROAD ELEVATED WATER TANKS,** a Bid;

WHEREAS the PRINCIPAL desires to file this Bond in accordance with law:

NOW THEREFORE: The conditions of this obligation are such that if the Bid be accepted, the PRINCIPAL shall within ten (10) calendar days after receipt of written notification from the COUNTY of the award of the Contract execute the Contract in accordance with the Bid and upon the terms, conditions and prices set forth therein, in the form and manner required by the COUNTY, and execute sufficient and satisfactory Performance and Payments Bonds payable to the COUNTY, each in the amount of one hundred percent (100%) of the total contract price, in form and with security satisfactory to said COUNTY, then this obligation to be void; otherwise, to be and remain in full force and virtue in law; and the SURETY shall upon failure of the PRINCIPAL to comply with any or all of the foregoing requirements within the time specified above immediately pay to the COUNTY, upon demand the amount hereof in good and lawful money of the United States of America, not as a penalty, but as liquidated damages.

In the event suit is brought upon this Bond by the COUNTY and judgment is recovered, the SURETY shall pay all costs incurred by the COUNTY in such suit, including attorney's fees to be fixed by the Court.

Enclosed is a Bid Bond in the approved form, in the amount of _____

_____Dollars

($_____) being in the amount of five percent (5%) of the Contract Sum. The money payable on this bond shall be paid to the COUNTY, for the failure of the Bidder to execute a Contract within ten (10) days after receipt of the Contract and at the same time furnish a Payment Bond and Performance Bond.

(SIGNATURES ON NEXT PAGE)

IN TESTIMONY THEREOF, the PRINCIPAL and SURETY have caused these presents to be duly signed and sealed this _____day of _____, 200_.

ATTEST:

_____
PRINCIPAL

_____ BY_____

(SEAL)

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the Secretary of the Corporation named as principal in the within bond; that _____, who signed the said bond of said corporation; that I know this signature, and his/her signature thereto is genuine; and that said bond was duly signed, sealed and attested for in behalf of said Corporation by authority of its governing body.

_____
SECRETARY

(CORPORATE SEAL)

_____
SURETY

_____ BY_____

(SEAL)

END OF SECTION

PURCHASING FORMS & INSTRUCTIONS

This section contains the procurement forms that are required to be executed and submitted with the bid package. This section does not contain all forms required to be included with the bid package submittal.

To be deemed responsive to this ITB, Bidders must provide the information requested and complete in detail all Purchasing Forms. The appropriate individual(s) authorized to commit the Bidder to the Project must sign the Purchasing Forms. Bidders should reproduce each Purchasing Form, as required, and complete the appropriate portions of the forms provided in this section.

- Form A: Non-Collusion Affidavit of Prime Bidder/Offeror
- Form B: Certificate of Acceptance of Request for Bid/Proposal Requirements
- Form C: Contractor's Georgia Utility License Certification
- Form D: Certification Regarding Debarment
- Form E: Disclosure Form and Questionnaire
- Form F: Declaration of Employee-Number Categories
- Form G: Georgia Security and Immigration Contractor Affidavit and Agreement
- Form H: Georgia Security and Immigration Subcontractor Affidavit

FORM A: NON-COLLUSION AFFIDAVIT OF BIDDER/OFFEROR

STATE OF GEORGIA

COUNTY OF FULTON

I, _____ certify that pursuant to Fulton County Code Section 2-320 (11), this bid or proposal is made without prior understanding, agreement or connection with any corporation, firm or person submitting a bid for the same work, labor or service to be done or the supplies, materials or equipment to be furnished and is in all respects fair and without collusion or fraud. I understand collusive bidding is a violation of state and federal law and can result in fines, prison sentences and civil damages awards. I agree to abide by all conditions of this bid or proposal and certify that I am authorized to sign this bid or proposal for the bidder.

Affiant further states that pursuant to O.C.G.A. Section 36-91-21 (d) and (e), _____ has not, by itself or with others, directly or indirectly, prevented or attempted to prevent competition in such bidding or proposals by any means whatsoever. Affiant further states that (s)he has not prevented or endeavored to prevent anyone from making a bid or offer on the project by any means whatever, nor has Affiant caused or induced another to withdraw a bid or offer for the work.

Affiant further states that the said offer of _____ is bona fide, and that no one has gone to any supplier and attempted to get such person or company to furnish the materials to the bidder only, or if furnished to any other bidder, that the material shall be at a higher price.

_____
(COMPANY NAME)

_____
(PRESIDENT/VICE PRESIDENT)

Sworn to and subscribed before me this _____ day of _____, 200__.

_____
(SECRETARY/ASSISTANT SECRETARY)

(Affix corporate seal here, if a corporation)

Notary Public: _____

County: _____

Commission Expires: _____

NOTE:

IF THE OFFEROR IS A PARTNERSHIP, ALL OF THE PARTNERS AND ANY OFFICER, AGENT, OR OTHER PERSON WHO MAY HAVE REPRESENTED OR ACTED FOR THEM IN BIDDING FOR OR PROCURING THE CONTRACT SHALL ALSO MAKE THIS OATH.

IF THE OFFEROR IS A CORPORATION, ALL OFFICERS, AGENTS, OR OTHER PERSONS WHO MAY HAVE ACTED FOR OR REPRESENTED THE CORPORATION IN BIDDING FOR OR PROCURING THE CONTRACT SHALL MAKE THE OATH.

FORM B: FULTON COUNTY CERTIFICATE OF ACCEPTANCE OF BID/PROPOSAL REQUIREMENTS

This Is To Certify That On This Day Bidder/Proposer Acknowledges That He/She Has Read This Bid Document, Pages _____ To _____ Inclusive, Including Addendum(s) ____ To ____, And/Or Appendices ____ To ____, In Its Entirety, And Agrees That No Pages Or Parts Of The Document Have Been Omitted, That He/She Understands, Accepts And Agrees To Fully Comply With The Requirements Therein, And That The Undersigned Is Authorized By The Bidding/Proposing Company To Submit The Bid/Proposal Herein And To Legally Obligate The Bidder/Proposer Thereto.

Company: _____

Signature: _____

Name: _____

Title: _____

Date: _____

(Corporate Seal)

FORM C: CONTRACTOR'S GEORGIA UTILITY LICENSE CERTIFICATION

Contractor's Name: _____

Utility Contractor's Name: _____

Expiration Date of License:_____

(ATTACHED COPY OF LICENSE)

I certify that the above information is true and correct and that the classification noted is applicable to the Bid for this Project.

Signed: _____

Date: _____

FORM D: CERTIFICATION REGARDING DEBARMENT

(1) The Offeror certifies that neither it or its subcontractors is presently debarred, suspended, proposed for debarment, declared ineligible, or otherwise excluded from doing business with any government agency. Any such exclusion may cause prohibition of your firm from participating in any procurement by the Fulton County Government.

(2) If the Offeror is unable to certify to any of the statements in this certification, such Offeror or subcontractor shall attach an explanation to this bid or proposal.

INSTRUCTIONS FOR CERTIFICATION

By signing and submitting this certification, the Offeror is providing the certification set out below:

(1) The certification in this clause is a material representation of fact upon which reliance will be placed. If it is later determined that the prospective vendor knowingly rendered a false certification, the Purchasing Agent may pursue all available remedies, including suspension and/or debarment, for withdrawal of award or termination of a contract.

(2) The prospective Offeror shall provide immediate written notice to the Purchasing Agent if at anytime the Offeror learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

(3) Offeror shall be under a continuing duty to immediately inform the Purchasing Agent in writing of any changes, if as a result of such changes, the Offeror certification regarding debarment is affected.

DEBARMENT ORDINANCE

The following Section 2-322 of Fulton County Code of Laws establishes the procedure for the debarment of contractors.

(a) ***Authority to suspend.***

After reasonable notice to the entity involved and reasonable opportunity for that entity to be heard, the Purchasing Agent, after consultation with user department, the County Manager and the County Attorney shall have the authority to suspend an entity for cause from consideration for award of county contracts. As used in this section, the term entity means any business entity, individual, firm, contractor, subcontractor or business corporation, partnership, limited liability corporation, firm, contractor, subcontractor or business structured; provided, further, that any such entity shall also be subject to suspension under this section if any of its constituents, members, subcontractors at any tier of such entity's and the entity, or any constituent or member, knew or should have known of the commission of the act. The suspension shall be for a period not to exceed three (3) years unless cause is based on a felony conviction for an offense related or associated with fraudulent contracting or misappropriation of funds wherein the suspension shall not exceed seven (7) years.

(b) ***Causes for Suspension. The causes for suspension include:***

(1) Conviction for commission of a criminal offense as an incident to obtain or attempting to obtain a public or private contract or subcontract, or in performance of such contract or subcontract;

(2) Conviction of state or federal statutes of embezzlement, theft, forgery, bribery, falsification or destruction of records, receiving stolen property or other offense indicating a lack of business integrity or business honesty which currently, seriously and directly affects responsibility as a county contractor.

(3) Conviction of state or federal anti-trust statues arising out of the solicitation and submission of bids and proposals;

(4) Violation of contract provisions, as set forth below, of a character which is regarded by the Purchasing Agent to be so serious as to justify suspension action:

a. Failure to perform in accordance with the specifications within a time limit provided in a county contract;

b. A recent record of failure to perform or unsatisfactory performance in accordance with the terms of one or more contracts; provided, that failure to perform or unsatisfactory performance caused by acts beyond the control of the contractor shall not be considered to be a basis for suspension;

c. Material representation of the composition of the ownership or workforce or business entity certified to the county as a minority business enterprise; or

d. Falsification of any documents.

(5) For violation of the ethical standards set forth in Fulton County Code Chapter 9, Code of Ethics.

(6) Knowing misrepresentation to the county, of the use which a majority owned contractor intends to make a minority business enterprise (a business entity at least 51 percent of which is owned and controlled by minority persons, as defined in Fulton County Code Chapter 6, Article B, Minority Business Enterprise Affirmative Action Program and certified as such by the County) as a subcontractor or a joint venture partner, in performing work under contract with the County.

Failure to fully and truthfully provide the information required, may result in the disqualification of your bid/proposal from consideration or termination of the Contract, once awarded. This document must be completed and included as a part of the bid/proposal package along with other required documents.

[SIGNATURES ON NEXT PAGE]

Under penalty of perjury, I declare that I have examined this certification and all attachments hereto, if applicable, to the best of my knowledge and belief, and all statements contained hereto are true, correct, and complete.

On this _____ day of _____, 200__

_____
(Legal Name of Offeror) (Date)

_____
(Signature of Authorized Representative) (Date)

_____
(Title)

FORM E: DISCLOSURE FORM AND QUESTIONNAIRE

1. Please provide the names and business addresses of each of the Offeror's firm's officers and directors.

   For the purposes of this form, the term "Offeror" means an entity that responds to a solicitation for a County contract by either submitting a proposal in response to a Request for Proposal or a Request for Qualification or a Bid in response to an Invitation to Bid.

   Describe accurately, fully and completely, their respective relationships with said Offeror, including their ownership interests and their anticipated role in the management and operations of said Offeror.

2. Please describe the general development of said Offeror's business during the past five (5) years, or such shorter period of time that said Offeror has been in business.

3. Please state whether any employee, agent or representative of said Offeror who is or will be directly involved in the subject project has or had within the last five (5) years: (i) directly or indirectly had a business relationship with Fulton County; (ii) directly or indirectly received revenues from Fulton County; or (iii) directly or indirectly receives revenues from the result of conducting business on Fulton County property or pursuant to any contract with Fulton County. Please describe in detail any such relationship.

LITIGATION DISCLOSURE:

Failure to fully and truthfully disclose the information required, may result in the disqualification of your bid or proposal from consideration or termination of the Contract, once awarded.

1. Please state whether any of the following events have occurred in the last five (5) years with respect to said Offeror. If any answer is yes, explain fully the following:

   (a) whether a petition under the federal bankruptcy laws or state insolvency laws was filed by or against said Offeror, or a receiver fiscal agent or similar officer was appointed by a court for the business or property of said Offeror;

   (b) whether Offeror was subject of any order, judgment, or decree not subsequently reversed, suspended or vacated by any court of competent jurisdiction, permanently enjoining said Offeror from engaging in any type of business practice, or otherwise eliminating any type of business practice; and

   (c) whether said Offeror's business was the subject of any civil or criminal proceeding in which there was a final adjudication adverse to said or Offeror, which directly arose from activities conducted by the business unit or corporate division of said Offeror which submitted a bid or proposal for the subject project. If so please explain.

2. Have you or any member of your firm or team to be assigned to this engagement been indicted or convicted of a criminal offense within the last five (5) years?

   Circle One: YES NO

3. Have you or any member of your firm or team ever been terminated (for cause or otherwise) from any work being performed for Fulton County or any other Federal, State or Local Government ?

   Circle One: YES NO

4. Have you or any member of your firm or team been involved in any claim or litigation adverse to Fulton County or any other Federal, State or Local Government, or private entity during the last three (3) years?

   Circle One: YES NO

5. Has any offeror, member of offeror's team, or officer of any of them (with respect to any matter involving the business practices or activities of his or her employer), been notified within the five (5) years preceding the date of this offer that any of them are the target of a criminal investigation, grand jury investigation, or civil enforcement proceeding?

   Circle One: YES NO

If you have answered "YES" to any of the above questions, please indicate the name(s) of the person(s), the nature, and the status and/or outcome of the information, indictment, conviction, termination, claim or litigation, the name of the court and the file or reference number of the case, as applicable. Any such information should be provided on a separate page, attached to this form and submitted with your proposal.

NOTE: If any response to any question set forth in this questionnaire has been disclosed in any other document, a response may be made by attaching a copy of such disclosure. (For example, said Offeror's most recent filings with the Securities and Exchange Commission ("SEC") may be provided if they are responsive to certain items within the questionnaire.) However, for purposes of clarity, Offeror should correlate its responses with the exhibits by identifying the exhibit and its relevant text.

Disclosures must specifically address, completely respond and comply with all information requested and fully answer all questions requested by Fulton County. Such disclosure must be submitted at the time of the bid or proposal submission and included as a part of the bid/proposal submitted for this project. Disclosure is required for Offerors, joint venture partners and first-tier subcontractors.

Failure to provide required disclosure, submit officially signed and notarized documents or respond to any and all information requested/required by Fulton County can result in the bid/proposal declared as non-responsive. This document must be completed and included as a part of the bid/proposal package along with other required documents.

[SIGNATURES ON NEXT PAGE]

Under penalty or\f perjury, I declare that I have examined this questionnaire and all attachments hereto, if applicable, to the best of my knowledge and belief, and all statements contained hereto are true, correct, and complete.

On this _____ day of _____, 200__

_____
(Legal Name of Proponent) (Date)

_____
(Signature of Authorized Representative) (Date)

_____
(Title)

Sworn to and subscribed before me,

this _____ day of _____, 200__

_____
(Notary Public) (Seal)

Commission Expires _____
(Date)

FORM F: DECLARATION OF EMPLOYEE-NUMBER CATEGORIES

Please affirmatively indicate by checking the appropriate box the employee-number category applicable to your company:

☐ 500 or more employees

☐ 100 or more employees

☐ fewer than 100 employees

Company Name: _____

I certify that the above classification is true and correct.

Signed: _____

Printed: _____

Title: _____

Date: _____

FORM G: GEORGIA SECURITY AND IMMIGRATION CONTRACTOR AFFIDAVIT AND AGREEMENT

Instructions:

Contractors must attest to compliance with the requirements of O.C.G.A 13-10-91 and the Georgia Department of Labor Rule 300-10-01-.02 by executing the Contractor Affidavit provided. The affidavit should be executed by Contractors who have indicated on Form F, Declaration of Employee-Number Categories, that they have 500 or more employees.

STATE OF GEORGIA

COUNTY OF FULTON

FORM G: GEORGIA SECURITY AND IMMIGRATION 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 engaged in the physical performance of services under a contract with **[insert name of prime contractor]** _____ on behalf of **Fulton County Government** 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 to this contract with **Fulton County Government**, 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 **Fulton County Government** at the time the subcontractor(s) is retained to perform such service.

_____
EEV/Basic Pilot Program* User Identification Number

_____
BY: Authorized Officer of Agent
(Insert Subcontract Name)

_____
Title of Authorized Officer or Agent of Subcontractor

_____
Printed Name of Authorized Officer or Agent

Sworn to and subscribed before me this _____ day of _____, 200__.

Notary Public: _____

County: _____

Commission Expires: _____

NOTE:

*** 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).**

FORM H: GEORGIA SECURITY AND IMMIGRATION SUBCONTRACTOR AFFIDAVIT

Instructions:

In the event that your company is awarded the contract for this project, and will be utilizing the services of any subcontractor(s) in connection with the physical performance of services pursuant to this contract, the following affidavit must be completed by such subcontractor(s). Your company must provide a copy of each such affidavit to Fulton County Government, Department of Purchasing & Contract Compliance with the proposal submittal.

All subcontractor affidavit(s) shall become a part of the contract and all subcontractor(s) affidavits shall be maintained by your company and available for inspection by Fulton County Government at any time during the term of the contract. All subcontractor(s) affidavit(s) shall become a part of any contractor/subcontractor agreement(s) entered into by your company.

STATE OF GEORGIA

COUNTY OF FULTON

FORM H: GEORGIA SECURITY AND IMMIGRATION 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 **[insert name of prime contractor]** _____behalf of **Fulton County Government** 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 of Agent
(Insert Subcontract Name)

_____
Title of Authorized Officer or Agent of Subcontractor

_____
Printed Name of Authorized Officer or Agent

Sworn to and subscribed before me this _____ day of _____, 200__.

Notary Public: _____

County: _____

Commission Expires: _____

NOTE:

*** 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).**

CONTRACT COMPLIANCE REQUIREMENTS

NON-DISCRIMINATION IN CONTRACTING AND PROCUREMENT

Policy Statement: It is the policy of Fulton County Government that discrimination against businesses by reason of the race, color, gender or national origin of the ownership of any such business is prohibited. Furthermore, it is the policy of the Board of Commissioners ("Board") that Fulton County and all vendors and contractors doing business with Fulton County shall provide to all businesses the opportunity to participate in contracting and procurement paid, in whole or in part, with monetary appropriations of the Board. Similarly, it is the policy of the Board that the contracting and procurement practices of Fulton County should not implicate Fulton County as either an active or passive participant in the discriminatory practices engaged in by private contractors seeking to obtain contracts with Fulton County.

Equal Business Opportunity Plan (EBO Plan): In addition to the proposal submission requirements, each vendor **must** submit an Equal Business Opportunity Plan (EBO Plan) with their bid/proposal. The EBO Plan is designed to enhance the utilization of a particular racial, gender or ethnic group by a bidder/proposer, contractor, or vendor or by Fulton County. The respondent **must** outline a plan of action to encourage and achieve diversity and equality in the available procurement and contracting opportunities with *this solicitation*.

The EBO Plan **must** identify and include:

1. Potential opportunities within the scope of work of *this solicitation* that will allow for participation of racial, gender or ethnic groups.

2. Efforts that will be made by the bidder/proposer to encourage and solicit minority and female business utilization in this solicitation.

Fulton County encourages joint ventures, teaming, partnering and mentor-protégé relationships with minority and female businesses in an effort to achieve contracting and procurement diversity.

Prompt Payment: The prime contractor must certify in writing and must document on the Exhibit G Form (Prime Contractor/Subcontractor Utilization Report) that all subcontractors, sub-consultants and suppliers have been promptly paid for work and materials, (less any retainage by the prime contractor prior to receipt of any further progress payments). In the event the prime contractor is unable to pay subcontractors, sub-consultants or suppliers until it has received a progress payment from Fulton County, the prime contractor shall pay all subcontractors, sub-consultants or suppliers funds due from said progress payments within forty-eight (48) hours of receipt of payment from Fulton County. In no event shall a subcontractor, sub-consultant or supplier be paid later than fifteen (15) days as provided for by state law.

REQUIRED FORMS AND EBO PLAN:

In order to be compliant with the intent and provisions of the Fulton County Non-Discrimination in Purchasing and Contracting Ordinance (99-0960), bidders/proposers must submit the following completed documents. Failure to provide this information shall result in the bid/proposal being deemed non-responsive:

- **Exhibit A** - Promise of Non-Discrimination (for Prime and each Sub-contractor)
- **Exhibit B** - Employment Report (for Prime and each Sub-contractor)
- **Exhibit C** - Schedule of Intended Subcontractor Utilization
- **Exhibit D** - Letter of Intent to Perform As a Subcontractor or Provide Materials or Services
- **Exhibit E** - Declaration Regarding Subcontractor Practices
- **Exhibit F** - Joint Venture Disclosure Affidavit
- **Equal Business Opportunity Plan (EBO Plan)** – This document is not a form. It is a statement created by the bidder/proposer on its company letter head addressing the EBO Plan requirements.

All Contract Compliance documents (Exhibits A – F and EBO Plan) are to be placed in a **separate sealed envelope** clearly marked "Contract Compliance". The EBO Plan must be submitted on company letterhead. These documents are considered part of and should be submitted with the Technical Proposal.

The following document must be completed as instructed if awarded the bid:

- **Exhibit G** - Prime Contractor's Subcontractor Utilization Report

EXHIBIT A – PROMISE OF NON-DISCRIMINATION

"Know all persons by these presents, that I/WE (_____),
Name

_____ _____
Title Firm Name

Hereinafter "Company"), in consideration of the privilege to bid on or obtain contracts funded, in whole or in part, by Fulton County, 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 any bid submitted to Fulton County for the performance of any resulting there from,

(2) That it is and shall be the policy of this Company to provide equal opportunity to all businesses seeking to contract or otherwise interested in contracting with this Company without regard to the race, color, gender or national origin of the ownership of this business,

(3) That the promises of non-discrimination as made and set forth herein shall be continuing in nature and shall remain in full force and effect without interruption,

(4) That the promise of non-discrimination as made and set forth herein shall be made a part of, and incorporated by reference into, any contract or portion thereof which this Company may hereafter obtain,

(5) That the failure of this Company to satisfactorily discharge any of the promises of non-discrimination as made and set forth herein shall constitute a material breach of contract entitling the Board to declare the contract in default and to exercise any and all applicable rights and remedies, including but not limited to cancellation of the contract, termination of the contract, suspension and debarment from future contracting opportunities, and withholding and/or forfeiture of compensation due and owning on a contract; and

(6) That the bidder shall provide such information as may be required by the Director of Contract Compliance pursuant to Section 4.4 of the Fulton County Non-Discrimination in Purchasing and Contracting Ordinance.

SIGNATURE: _____

ADDRESS: _____

_____

TELEPHONE NUMBER: _____

EXHIBIT B – EMPLOYMENT REPORT

The demographic employment make-up for the bidder **must** be identified and submitted with this bid/proposal. In addition, if subcontractors will be utilized by the bidder/proposer to complete this project, then the demographic employment make-up of the subcontractor(s) must be identified and submitted with this bid.

EMPLOYEES

CATEGORY	NATIVE INDIAN		AFRICAN AMERICAN		ASIAN AMERICAN		HISPANIC AMERICAN		CACUSIAN AMERICAN		OTHER	
Male/Female	M	F	M	F	M	F	M	F	M	F	M	F
Mgmt/Official												
Professional (Arch., P.E., etc.)												
Supervisors												
Office/ Clerical												
Craftsmen												
Laborers												
Others (Specify)												
TOTALS												

FIRM'S NAME:_____

ADDRESS:_____

_____

TELEPHONE NUMBER:_____

This completed form is for (Check one) _____Bidder/Proposer _____Subcontractor

Submitted by: _____ Date Completed:_____

EXHIBIT C – SCHEDULE OF INTENDED SUBCONTRACTOR UTILIZATION

If the bidder/proposer intends to subcontract any portion of this scope of work/service(s), this form **must be** completed and **submitted with the bid/proposal.** All prime bidders/proposers **must** include Letter(s) of Intent (Exhibit D) in the bid document for all subcontractors who will be utilized under the scope of work/services.

Prime Bidder/Proposer: _____

ITB/RFP NUMBER: _____

Project Name or Description of Work/Service(s): _____

_____

_____

1. My firm, as Prime Bidder/Proposer on this scope of work/service(s) is_____is not____a minority or female owned and controlled business. (Please indicate below the portion of work, including, percentage of bid amount that your firm will carry out directly):

   _____

   _____

   If the Prime Bidder/Proposer is a Joint Venture, please complete Exhibit F: Joint Venture Disclosure Affidavit and attach a copy of the executed Joint Venture Agreement.

2. Sub-Contractors (Including suppliers) to be utilized in the performance of this scope of work/service(s), if awarded, are:

SUBCONTRACTOR NAME: _____

ADDRESS: _____

_____

PHONE: _____

CONTACT PERSON: _____

ETHNIC GROUP*: _____ COUNTY CERTIFIED** _____

WORK TO BE PERFORMED: _____

_____

DOLLAR VALUE OF WORK: $_____ PERCENTAGE VALUE: _____%

***Ethnic Groups: African American (AABE); Asian American (ABE); Hispanic American (HBE); Native American (NABE); White Female American (WFBE);**
****If yes, attach copy of recent certification letter.**

EXHIBIT C – SCHEDULE OF INTENDED SUBCONTRACTOR UTILIZATION

SUBCONTRACTOR NAME:_____
ADDRESS:_____

_____

PHONE:_____
CONTACT PERSON:_____
ETHNIC GROUP*:_____ COUNTY CERTIFIED**_____
WORK TO BE PERFORMED:_____
DOLLAR VALUE OF WORK: $_____ PERCENTAGE VALUE:_____ %

SUBCONTRACTOR NAME:_____
ADDRESS:_____

_____

PHONE:_____
CONTACT PERSON:_____
ETHNIC GROUP*:_____ COUNTY CERTIFIED**_____
WORK TO BE PERFORMED:_____
DOLLAR VALUE OF WORK: $_____ PERCENTAGE VALUE:_____ %

SUBCONTRACTOR NAME:_____
ADDRESS:_____

_____

PHONE:_____
CONTACT PERSON:_____
ETHNIC GROUP*:_____ COUNTY CERTIFIED**_____
WORK TO BE PERFORMED:_____
DOLLAR VALUE OF WORK: $_____ PERCENTAGE VALUE:_____ %

SUBCONTRACTOR NAME:_____
ADDRESS:_____

_____

PHONE:_____
CONTACT PERSON:_____
ETHNIC GROUP*:_____ COUNTY CERTIFIED**_____
WORK TO BE PERFORMED:_____
DOLLAR VALUE OF WORK: $_____ PERCENTAGE VALUE:_____ %

***Ethnic Groups: African American (AABE); Asian American (ABE); Hispanic American (HBE); Native American (NABE); White Female American (WFBE); **If yes, attach copy of recent certification letter.**

EXHIBIT C – SCHEDULE OF INTENDED SUBCONTRACTOR UTILIZATION

Total Dollar Value of Subcontractor Agreements: ($)

Total Percentage Value: (%)

CERTIFICATION: The undersigned certifies that he/she has read, understands and agrees to be bound by the Bid provisions, including the accompanying Exhibits and other terms and conditions regarding sub-contractor utilization. The undersigned further certifies that he/she is legally authorized by the Bidder to make the statement and representation in this Exhibit and that said statements and representations are true and correct to the best of his/her knowledge and belief. The undersigned understands and agrees that if any of the statements and representations are made by the Bidder knowing them to be false, or if there is a failure of the intentions, objectives and commitments set forth herein without prior approval of the County, then in any such event the Contractor's acts or failure to act, as the case may be, shall constitute a material breach of the contract, entitling the County to terminate the Contract for default. The right to so terminate shall be in addition to, and in lieu of, any other rights and remedies the County may have for other defaults under the contract.

Signature/Title:_____

Firm or Corporate Name:_____

Address:_____

_____

Telephone: ( )_____

Fax Number: ( )_____

Email Address:_____

EXHIBIT D

LETTER OF INTENT TO PERFORM AS A SUBCONTRACTOR OR PROVIDE MATERIALS OR SERVICES

This form must be completed by ALL known subcontractors/suppliers and submitted with the bid. The Prime Contractor must submit Letters of Intent for ALL known subcontractors/suppliers at time of bid submission.

To: _____
(Name of Prime Contractor Firm)

From: _____
(Name of Subcontractor Firm)

ITB/RFP Number: _____

Project Name: _____

The undersigned is prepared to perform the following described work or provide materials or services in connection with the above project (specify in detail particular work items, materials, or services to be performed or provided):

Description of Work	Project Commence Date	Project Completion Date	Estimated Dollar Amount

_____ _____
(Prime Bidder) **(Subcontractor)**

Signature _____ **Signature** _____

Title _____ **Title** _____

Date _____ **Date** _____

EXHIBIT E – DECLARATION REGARDING SUBCONTRACTING PRACTICES

If the bidder/proposer **does not intend to subcontract** any portion of the scope of work services(s), this form **must be** completed and submitted with the bid.

_____ Hereby declares that it is my/our intent to
(Bidder)

Perform 100% of the work required for _____
(IFB/RFP Number)

_____
(Description of Work)

In making this declaration, the bidder/proposer states the following:

1. That the bidder does not customarily subcontract elements of this type project, and normally performs and has the capability to perform and will perform **all elements** of the work on this project with his/her own current work forces;

2. If it should become necessary to subcontract some portion of the work at a later date, the bidder will comply with all requirements of the County's Non-Discrimination Ordinance in providing equal opportunities to all firms to subcontract the work. The determination to subcontract some portion of the work at a later date shall be made in good faith and the County reserves the right to require additional information to substantiate a bidder's decision to subcontract work following the award of the contract. Nothing contained in this provision shall be employed to circumvent the spirit and intent of the County's Non-Discrimination Ordinances;

3. The bidder will provide, upon request, information sufficient for the County to verify Item Number one.

AUTHORIZED COMPANY REPRESENTATIVE

Name: _____ **Title:** _____ **Date:** _____

Signature: _____

Firm: _____

Address: _____

Phone Number: _____

Fax Number: _____

Email Address: _____

EXHIBIT F – JOINT VENTURE DISCLOSURE AFFIDAVIT

IFB No._____

Project Name_____

This form must be completed and submitted with the bid if a Joint Venture approach is to be undertaken.

The firms listed below do hereby declare that they have entered into a joint venture agreement pursuant to the above mentioned project. The information requested below is to clearly identify and explain the extent of participation of each firm in the proposed joint venture. All items must be properly addressed before the business entity can be evaluated.

1. Firms:

    1) Name of Business:_____
    Street Address: _____
    City/State/Zip:_____
    County: _____
    Nature of Business:_____

    2) Name of Business:_____
    Street Address: _____
    City/State/Zip:_____
    County: _____
    Nature of Business:_____

    3) Name of Business:_____
    Street Address: _____
    City/State/Zip:_____
    County: _____
    Nature of Business:_____

NAME OF JOINT VENTURE (If applicable):_____

OFFICE ADDRESS:_____

PRINCIPAL OFFICE:_____

OFFICE PHONE:_____

EXHIBIT F – JOINT VENTURE DISCLOSURE AFFIDAVIT CONTINUED

Note: Attach additional sheets as required

2. Describe the capital contributions by each joint venturer and accounting thereof. Indicate the percentage make-up for each joint venture partner.

3. Describe the financial controls of the joint venture, e.g., will a separate cost center be established? Which venturer will be responsible for keeping the books? How will the expense therefore be reimbursed? What is the authority of each joint venture to commit or obligate the order?

4. Describe any Ownership, options for Ownership, or loans between the joint ventures. Identify terms thereof.

5. Describe the estimate contract cash flow for each joint venturer.

6. To what extent and by whom will the on-site work be supervised?

7. To what extent and by whom will the administrative office be supervised?

8. Which joint venturer will be responsible for material purchases including the estimated cost thereof? How will the purchase be financed?

9. Which joint venturer will provide equipment? What is the estimated cost thereof? How will the equipment be financed?

10. Describe the experience and business qualifications of each joint venturer.

11. Submit a copy of all joint venture agreements and evidence of authority to do business in the State of Georgia as well as locally, to include all necessary business licenses.

12. Percent of ownership by each joint venture in terms of profit and loss sharing:_____

13. The authority of each joint venturer to commit or obligate the other:_____

14. Number of personnel to be involved in project, their crafts and positions and whether they are employees of the small business enterprise, the majority firm or the joint venture:____

EXHIBIT F – JOINT VENTURE DISCLOSURE AFFIDAVIT CONTINUED

15. Identification of control and participation in venture; list those individuals who are responsible for day-to-day management and policy decision-maker, including, but not limited to, those with prime responsibility for areas designated below; (use additional sheets if necessary)

Name	Race	Sex	Financial Decisions	Supervision Field Operation

In connection with any work that these firms, as a joint venture, might be authorized to perform in connection with above captioned contract, we each do hereby authorize representatives of the Fulton County Department of Purchasing and Contract Compliance and Departments of Finance, under the direction of the County Manger's Office, to examine, from time to time, the books, records and files to the extent that such relate to this County project.

WE DO SOLEMNLY DECLARE AND AFFIRM UNDER THE PENALTIES OF PERJURY THAT THE CONTENTS OF THE FOREGOING DOCUMENT ARE TRUE AND CORRECT, AND THAT WE ARE AUTHORIZED, ON BEHALF OF THE ABOVE FIRMS, TO MAKE THIS AFFIDAVIT AND GRANT THE ABOVE PRIVILEGE.

FOR:_____
(Company)

Date:_____ _____
(Signature of Affiant)

_____
(Printed Name)

_____
(Company)

Date:_____ _____
(Signature of Affiant)

_____
(Printed Name)

State of_____**:**

County of_____**:**

On this _____ **day of** _____**, 20**_____**, before me, appeared**

_____**, the undersigned known to me to be the person described in the foregoing Affidavit and acknowledge that he (she) executed the same in the capacity therein stated and for the purpose therein contained.**

EXHIBIT G – PRIME CONTRACTOR/SUBCONTRACTOR UTILIZATION REPORT

This report is required to be submitted by the tenth day of each month, with a copy of your payment invoice (schedule of values/payment application) to Contract Compliance. Failure to comply may result in the County commencing proceedings to impose sanctions on the successful bidder, in addition to purchasing any other available legal remedy. Sanctions may include the suspending of any payment or part thereof, termination or cancellation of the contract, and the denial to participate in any future contracts awarded by Fulton County.

REPORTING PERIOD		PROJECT NAME:	
FROM:		PROJECT NUMBER:	
TO:		PROJECT LOCATION:	

PRIME CONTRACTOR		Contract Award Date	Contract Award Amount	Change Order Amount	Contract Period	% Complete to Date
Name:						
Address:						
Telephone #:						

AMOUNT OF REQUISITION THIS PERIOD:$_____
TOTAL AMOUNT REQUISITION TO DATE:$_____

SUBCONTRACTOR UTILIZATION (add additional rows as necessary)

Name of Sub-contractor	Description of Work	Contract Amount	Amount Paid To Date	Amount Requisition This Period	Contract Period Starting Date	Ending Date
TOTALS						

Executed By:_____ _____
(Signature) (Printed Name)

END OF SECTION

INSURANCE AND RISK MANAGEMENT PROVISIONS

It is Fulton County Government's practice to obtain Certificates of Insurance from our Contractors and Vendors. Insurance must be written by a licensed agent in a company licensed to write insurance in the State of Georgia, with an A.M. Best rating of at least A- VI, subject to final approval by Fulton County. Respondents shall submit with the bid/proposal evidence of insurability satisfactory to Fulton County Government as to form and content. Either of the following forms of evidence is acceptable:

- A letter from an insurance carrier stating that upon your firm/company being the successful Bidder/Respondent that a Certificate of Insurance shall be issued in compliance with the Insurance and Risk Management Provisions outlined below.

- A Certificate of Insurance complying with the Insurance and Risk Management Provisions outlined below (Request for Bid/Proposal number and Project Name, Number, and Description must appear on the Certificate of Insurance).

Upon award, the Contractor/Vendor must maintain at their expense, insurance with policy limits equal to or greater than the limits described below. Any and all Insurance Coverage(s) and Bonds required under the terms and conditions of the contract shall be maintained during the entire length of the contract, including any extensions or renewals thereto, and until all work has been completed to the satisfaction of Fulton County Government.

Accordingly the Respondent shall provide a certificate evidencing the following:

1. WORKERS COMPENSATION/EMPLOYER'S LIABILITY INSURANCE – STATUTORY (In compliance with the Georgia Workers Compensation Acts and any other State or Federal Acts or Provisions in which jurisdiction may be granted)

Employer's Liability Insurance	BY ACCIDENT	EACH ACCIDENT	$1,000,000
Employer's Liability Insurance	BY DISEASE	POLICY LIMIT	$1,000,000
(Aggregate)	BY DISEASE	EACH EMPLOYEE	$1,000,000

2. COMMERCIAL GENERAL LIABILITY INSURANCE (Including contractual Liability Insurance)

Bodily Injury and Property Damage Liability	Each Occurrence	$1,000,000
(Other than Products/Completed Operations)	General Aggregate	$2,000,000
Products\Completed Operation	Aggregate Limit	$2,000,000
Personal and Advertising Injury	Limits	$1,000,000
Fire Damage	Limits	$100,000

3. BUSINESS AUTOMOBILE LIABILITY INSURANCE

Combined Single Limits	Each Occurrence	$1,000,000
(Including operation of non-owned, owned, and hired automobiles).		

4. ELECTRONIC DATA PROCESSING LIABILITY

(Required if computer contractor)	Limits	$1,000,000

5. UMBRELLA LIABILITY

(In excess of above noted coverages)	Each Occurrence	$10,000,000

6. PROFESSIONAL LIABILITY

	Each Occurrence	$5,000,000

(To be provided when the Contract includes specified Professional Services, and will be written with all Environmental/Pollution exclusions deleted).

7. ENVIRONMENTAL/POLLUTION LIABILITY

	Each Occurrence	$2,000,000

8. FIDELITY BOND

(Employee Dishonesty)	Each Occurrence	$100,000

9. BUILDERS RISK: "All-risk" form of builder's risk insurance providing coverage against loss or damage by fire or other peril on an "all-risk" form, including demolition and increased cost of construction, debris removal and the full replacement cost of the Project foundations and containing an agreed amount endorsement, and, until Final Completion and Acceptance of the Project. Such policy of insurance shall contain at least the following sub-limits of insurance and deductibles:

Sub-limits:

Property in Transit	$1,000,000
Property in Offsite Storage	$1,000,000
Plans & Blueprints	$25,000
Debris Removal	25% of Insured Physical Loss
Delay in Completion / Soft Cost	TBD

Deductibles:

Flood and Earthquake	$25,000
Water Damage other than Flood	$100,000
All other Perils	$10,000

Owner and Contractor waive all rights against each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section, or other property insurance applicable to the Work, accept such rights as they have to the proceeds of such insurance.

The policy will name Fulton County, The Contractor and Subcontractors of all tiers as Insureds under the policy.

Certificates of Insurance

Certificates shall state that the policy or policies shall not expire, be cancelled or altered without at least forty-five (45) days prior written notice to Fulton County Government. Policies and Certificates of Insurance are to list Fulton County Government as an Additional Insured (except for Workers' Compensation) and shall conform to all terms and conditions (including coverage of the indemnification and hold harmless agreement) contained in the Insurance and Risk Management Provisions. The General Liability Additional Insured language should apply to on-going and completed-operations, using ISO form CG 2010 (11/85 version) or equivalent.

If Fulton County Government shall so request, the Respondent, Contractor or Vendor will furnish the County for its inspection and approval such policies of insurance with all endorsements, or confirmed specimens thereof certified by the insurance company to be true and correct copies.

Such certificates and notices **must** identify the "Certificate Holder" as follows:

Fulton County Government - Purchasing and Contract Compliance Department
130 Peachtree Street, S.W.
Suite 1168
Atlanta, Georgia 30303-3459

Certificates **must** list Project Name and Project Number.

It is understood that **Insurance in no way Limits the Liability of the Contractor/Vendor.**

USE OF PREMISES

Contractor shall confine its apparatus, the storage of materials and the operations of its workers to limits/requirements indicated by law, ordinance, permits and any restrictions of Fulton County Government and shall not unreasonably encumber the premises with its materials.

PROTECTION OF PROPERTY

Contractor will adequately protect its own work from damage, will protect Fulton County Government's property from damage or loss and will take all necessary precautions during the progress of the work to protect all persons and the property of others from damage or loss.

Contractor shall take all necessary precautions for the safety of employees of the work and shall comply with all applicable provisions of the Federal, State and local safety laws and building codes to prevent accidents or injury to persons on, about, or adjacent to the premises where work is being performed.

Contractor shall erect and properly maintain at all times as required by the conditions and progress of the work, all necessary safeguards for the protection of its employees, Fulton County Government employees and the public and shall post all applicable signage and other warning devices to protect against potential hazards for the work being performed.

INDEMNIFICATION AND HOLD HARMLESS AGREEMENT

Contractor/Vendor hereby agrees to release, indemnify, defend and hold harmless Fulton County, its Commissioners, officers, employees, subcontractors, successors, assigns and agents, from and against any and all losses (including death), claims, damages, liabilities, costs and expenses (including but not limited to all actions, proceedings, or investigations in respect thereof and any costs of judgments, settlements, court costs, attorney's fees or expenses, regardless of the outcome of any such action, proceeding, or investigation), caused by, relating to, based upon or arising out of any act or omission by Contractor/Vendor, its directors, officers, employees, subcontractors, successors, assigns or agents, or otherwise in connection (directly or indirectly) with its acceptance, or the performance, or nonperformance, of its obligations under these agreements. Such obligations shall not be construed to negate, abridge or otherwise reduce any other rights or obligations of indemnity which would otherwise exist as to any party or person as set forth in this paragraph.

Contractor/Vendor's obligation to protect, defend, indemnify and hold harmless, as set forth hereinabove, shall also include, but is not limited to, any matter arising out of any actual or alleged infringement of any patent, trademark, copyright, or service mark, or other actual or alleged unfair competition disparagement of product or service, or other tort or any type whatsoever, or any actual or alleged violation of trade regulations.

Contractor/Vendor further agrees to protect, defend, indemnify and hold harmless Fulton County, its Commissioners, officers, employees, subcontractors, successors, assigns and agents from and against any and all claims or liability for compensation under the Worker's Compensation Act, Disability Benefits Act, or any other employee benefits act arising out of injuries sustained by any employees of Contractor/Vendor. These indemnities shall not be limited by reason of the listing of any insurance coverage.

If the bid/quotation involves construction services, the Contractor/Vendor will be responsible fully for any and all damage to the work during the course of construction, until the point of Final Acceptance by Fulton County.

FULTON COUNTY ACKNOWLEDGES THAT ALL PROVISIONS OF THIS INDEMNITY AGREEMENT MAY NOT BE APPLICABLE TO THE CONTRACTOR/VENDOR'S BUSINESS. TO THE EXTENT THAT CONTRACTOR/VENDOR MAY DEMONSTRATE SUCH NONAPPLICABILITY, FULTON COUNTY MAY NEGOTIATE AMENDMENTS TO THIS AGREEMENT AS THE CIRCUMSTANCES DICTATE.

CONTRACTOR/VENDOR ACKNOWLEDGES HAVING READ, UNDERSTANDING, AND AGREEING TO COMPLY WITH THIS INDEMNIFICATION AND HOLD HARMLESS AGREEMENT, AND THE REPRESENTATIVE OF THE CONTRACTOR/VENDOR IDENTIFIED BELOW IS AUTHORIZED TO SIGN CONTRACTS ON BEHALF OF THE RESPONDING CONTRACTOR/VENDOR.

COMPANY: _____ SIGNATURE: _____

NAME: _____ TITLE: _____

DATE: _____

END OF SECTION

OWNER - CONTRACTOR AGREEMENT

W037 HACKETT ROAD ELEVATED WATER TANKS

Contractor: _____ Project No. _____

Address: _____ Telephone: _____

Contact: _____ Facsimile: _____

THIS AGREEMENT is effective as of the _____ day of _____, 20 , by and between Fulton County, a political subdivision of the State of Georgia (hereinafter called the "County"), and the above named CONTRACTOR in accordance with all provisions of this Construction agreement, consisting of the following Contract Documents:

General Conditions
Special Conditions
Bid Form
Scope of Work and Technical Specifications
Drawings and Specifications
Exhibits
Purchasing Forms
Office of Contract Compliance Forms
Risk Management Insurance Provisions Forms

WITNESSETH: That the said Contractor has agreed, and by these presents does agree with the said County, for and in consideration of a Contract Price of _____($_____) and other good and valuable consideration, and under the penalty expressed on Bonds hereto attached, to furnish all equipment, tools, materials, skill, and labor of every description necessary to carry out and complete in good, firm, and substantial, and workmanlike manner, the Work specified, in strict conformity with the Drawings and the Specifications hereinafter set forth, which Drawings and Specifications together with the bid submittals made by the Contractor, General Conditions, Special Provisions, Detailed Specifications, Exhibits, and this Agreement, shall all form essential parts of this Contract. The Work covered by this Contract includes all Work indicated on Plans and Specifications and listed in the Bid entitled:

Project Number: 08ITB59461K-JD

W037 HACKETT ROAD ELEVATED WATER TANKS

The Contractor shall commence the Work with adequate force and equipment within 10 days from receipt of Notice to Proceed from the County, and shall complete the work within **Five Hundred Forty (540)** calendar days from the Notice to Proceed or the date work begins, whichever comes first. The Contractor shall remain responsible for performing, in accordance with the terms of the contract, all work assigned prior to the expiration of the said calendar days allowed for completion of the work even if the work is not completed until after the expiration of such days.

As full compensation for the faithful performance of this Contract, the County shall pay the Contractor in accordance with the General Conditions and the prices stipulated in the Bid, hereto attached.

It is further mutually agreed between the parties hereto that if, at any time after the execution of this Agreement and the Surety Bonds hereto attached for its faithful performance, the County shall deem the surety or sureties upon such bonds to be unsatisfactory, or, if, for any reason, such bonds cease to be adequate to cover the performance of the Work, the Contractor shall, at his expense, within five days after receipt of notice from the County so to do, furnish an additional bond or bonds in such form and amount, and with such surety or sureties as shall be satisfactory to the County. In such event no further payment to the Contractor shall be deemed to be due under this Agreement until such new or additional security for the faithful performance of the Work shall be furnished in manner and form satisfactory to the County.

The Contractor hereby assumes the entire responsibility and liability for any and all injury to or death of any and all persons, including the Contractor's agents, servants, and employees, and in addition thereto, for any and all damages to property caused by or resulting from or arising out of any act or omission in connection with this contract or the prosecution of work hereunder, whether caused by the Contractor or the Contractor's agents, Servants, or employees, or by any of the Contractor's subcontractors or suppliers, and the Contractor shall indemnify and hold harmless the County, the Construction Manager, or any of their subcontractors from and against any and all loss and/or expense which they or any of them may suffer or pay as a result of claims or suits due to, because of, or arising out of any and all such injuries, deaths and/or damage, irrespective of County or Construction Manager negligence (except that no party shall be indemnified for their own sole negligence). The Contractor, if requested, shall assume and defend at the Contractor's own expense, any suit, action or other legal proceedings arising there from, and the Contractor hereby agrees to satisfy, pay, and cause to be discharged of record any judgment which may be rendered against the County and the Construction Manager arising there from.

In the event of any such loss, expense, damage, or injury, or if any claim or demand for damages as heretofore set forth is made against the County or the Construction Manager, the County may withhold from any payment due or thereafter to become due to the Contractor under the terms of this Contract, an amount sufficient in its judgment to protect and indemnify it and the Construction Manager from any and all claims, expense, loss, damages, or injury; and the County, in its discretion, may require the Contractor to furnish a surety bond satisfactory to the County providing for such protection and indemnity, which bond shall be furnished by the Contractor within five (5) days after written demand has been made therefore. The expense of said Bond shall be borne by the Contractor. **[See General Conditions for similar provisions]**

This Contract constitutes the full agreement between the parties, and the Contractor shall not sublet, assign, transfer, pledge, convey, sell or otherwise dispose of the whole or any part of this Contract or his right, title, or interest therein to any person, firm or corporation without the previous consent of the County in writing. Subject to applicable provisions of law, this Contract shall be in full force and effect as a Contract, from the date on which a fully executed and approved counterpart hereof is delivered to the Contractor and shall remain and continue in full force and effect until after the expiration of any guarantee period and the Contractor and his sureties are finally released by the County.

This agreement was approved by the Fulton County Board of Commissioner on [Insert approval date and item number].

[SIGNATURES NEXT PAGE]

IN WITNESS THEREOF, the Parties hereto have caused this Contract to be executed by their duly authorized representatives as attested and witnessed and their corporate seals to be hereunto affixed as of the day and year date first above written.

OWNER:

FULTON COUNTY, GEORGIA

John H. Eaves, Commission Chair
Board of Commissioners

ATTEST:

Mark Massey
Clerk to the Commission (Seal)

APPROVED AS TO FORM:

Office of the County Attorney

APPROVED AS TO CONTENT:

Angela Parker, Director
Department of Public Works

CONTRACTOR:

Company name

Name & Title of person authorized to sign contract

ATTEST:

Secretary/
Assistant Secretary

(Affix Corporate Seal)

END OF SECTION

PERFORMANCE BOND

No contract with Fulton County for work to be done shall be valid for any purpose unless the Contractor provides a Performance Bond with good and sufficient surety payable to, in favor of, and for the protection of Fulton County. The Performance Bond shall be in the amount of 100% of the total contract amount, payable by the terms of the Contract, and shall be written on the following form.

Surety companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business as a surety in Georgia.

Attestation for the corporation must be by the corporate officer; for a partnership by another partner; for an individual by a notary with the corporate seal.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS that _____
(Insert name of Contractor)
(hereinafter called the "Principal") and _____(hereinafter called the
(Insert name of Surety)
"Surety"), are held and firmly bound unto **FULTON COUNTY**, a political subdivision of the State of Georgia (hereinafter called the "Owner"), its successors and assigns, in the penal sum of _____*[100% of Contract amount]*, lawful money of the United States of America, for the payment of which the Principal and the Surety bind themselves, their administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered, or is about to enter, into a certain written contract with the Owner, dated _____, which is incorporated herein by reference in its entirety (hereinafter called the "Contract"), for construction-type services of a project known as **W037 HACKETT ROAD ELEVATED WATER TANKS**, as more particularly described in the Contract (hereinafter called the "Project");

NOW, THEREFORE, the conditions of this obligation are as follows, that if the Principal shall fully and completely perform all the undertakings, covenants, terms, conditions, warranties, and guarantees contained in the Contract, including all modifications, amendments, changes, deletions, additions, and alterations thereto that may hereafter be made, then this obligation shall be void; otherwise it shall remain in full force and effect.

Whenever the Principal shall be, and declared by the Owner to be, in default under the Construction-Type Contract, the Surety shall promptly remedy the default as follows:

1. Complete the Contract in accordance with its terms and conditions; or, at the sole option of the Owner,

2. Obtain a bid or bids for completing the Contract in accordance with its terms and conditions, and upon determination by the Surety and the Owner of the lowest responsible bidder, arrange for a contract between such bidder and Owner and make available as the work progresses (even though there should be a default or succession of defaults under the Contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the penal sum set forth in the first paragraph hereof, as may be adjusted, and the Surety shall make available and pay to the Owner the funds required by this Paragraph prior to the payment of the Owner of the balance of the contract price, or any portion thereof. The term "balance of the contract price," as used in this paragraph, shall mean the total amount payable by the Owner to the Contractor under the Contract, and any amendments thereto, less the amount paid by the Owner to the Contractor; or, at the sole option of the Owner,

3. Allow Owner to complete the work and reimburse the Owner for all reasonable costs incurred in completing the work.

In addition to performing as required in the above paragraphs, the Surety shall indemnify and hold harmless the Owner from any and all losses, liability and damages, claims, judgments, liens, costs and fees of every description, including reasonable attorney's fees, litigation costs and expert witness fees, which the Owner may incur, sustain or suffer by reason of the failure or default on the part of the Principal in the performance of any or all of the terms, provisions, and requirements of the Contract, including any and all amendments and modifications thereto, or

incurred by the Owner in making good any such failure of performance on the part of the Principal.

The Surety shall commence performance of its obligations and undertakings under this Bond promptly and without delay, after written notice from the Owner to the Surety.

The Surety hereby waives notice of any and all modifications, omissions, additions, changes, alterations, extensions of time, changes in payment terms, and any other amendments in or about the Contract, and agrees that the obligations undertaken by this Bond shall not be impaired in any manner by reason of any such modifications, omissions, additions, changes, alterations, extensions of time, change in payment terms, and amendments.

The Surety hereby agrees that this Bond shall be deemed amended automatically and immediately, without formal or separate amendments hereto, upon any amendment to the Contract, so as to bind the Principal and the Surety to the full and faithful performance of the Contract as so amended or modified, and so as to increase the penal sum to the adjusted Contract Price of the Contract.

No right of action shall accrue on this Bond to or for the use of any person, entity or corporation other than the Owner and any other obligee named herein, or their executors, administrators, successors or assigns.

This Bond is intended to comply with O.C.G.A. Section 36-91-1 et seq., and shall be interpreted so; as to comply with; the minimum requirements thereof. However, in the event the express language of this Bond extends protection to; the Owner beyond that contemplated by O.C.G.A. Section 36-91-1 et seq. and O.C.G.A. Section 13-10-1, as amended, or any other statutory law applicable to this Project, then the additional protection shall be enforced in favor of the Owner, whether or not such protection is found in the applicable statutes.

IN WITNESS WHEREOF the undersigned have caused this instrument to be executed and their respective corporate seals to be affixed and attested by their duly authorized representatives this _____ day of _____, _____.

_____(SEAL)
(Principal)

By:_____

Attest:

_____
Secretary

_____(SEAL)
(Surety)

By:_____

Attest:

_____
Secretary

_____

(Address of Surety's Home Office)

_____
(Resident Agent of Surety)

END OF SECTION

PAYMENT BOND

No Contract with Fulton County for work to be done shall be valid for any purpose unless the Contractor provides a Payment Bond with good and sufficient surety payable to Fulton County for the use and protection of all sub-contractors and all persons supplying labor, materials, machinery, and equipment in the prosecution of the work provided for in the Contract. The Payment Bond shall be in the amount of 100% of the total contract amount, payable by the terms of the Contract, and shall be written on the following form.

Surety companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State of Georgia.

Attestation for the corporation must be by the corporate officer; for a partnership by another partner; for an individual by a notary with the corporate seal.

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS that _____
(Insert name of Contractor)
(hereinafter called the "Principal") and _____(hereinafter called the
(Insert name of Surety)
"Surety"), are held and firmly bound unto **FULTON COUNTY**, a political subdivision of the State of Georgia (hereinafter called the "Owner"), its successors and assigns as obligee, in the penal sum of _____*[100% of Contract amount]*, lawful money of the United States of America, for the payment of which the Principal and the Surety bind themselves, their administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered, or is about to enter, into a certain written contract with the Owner, dated _____, which is incorporated herein by reference in its entirety (hereinafter called the "Contract"), for construction-type services of a project known as **W037 HACKETT ROAD ELEVATED WATER TANKS**, as more particularly described in the Contract (hereinafter called the "Project");

NOW, THEREFORE, the condition of this obligation is such that if the Principal shall promptly make payment to all persons working on or supplying labor or materials under the Contract, and any amendments thereto, with regard to labor or materials furnished and used in the Project, and with regard to labor or materials furnished but not so used, then this obligation shall be void; but otherwise it shall remain in full force and effect.

1. A "Claimant' shall be defined herein as any subcontractor, person, party, partnership, corporation or the entity furnishing labor, services or materials used, or reasonably required for use, in the performance of the Contract, without regard to whether such labor, services or materials were sold, leased or rented, and without regard to whether such Claimant is or is not in privity of contract with the Principal or any subcontractor performing work on the Project, including, but not limited to, the following labor, services, or materials: water, gas, power, light, heat, oil, gasoline, telephone service or rental of equipment directly applicable to the Contract.

2. In the event a Claimant files a lien against the property of the Owner, and the Principal fails or refuses to satisfy or remove it promptly, the Surety shall satisfy or remove the lien promptly upon written notice from the Owner, either by bond or as otherwise provided in the Contract.

3. The Surety hereby waives notice of any and all modifications, omissions, additions, changes, alterations, extensions of time, changes in the payment terms, and any other amendments in or about the Contract and agrees that the obligations undertaken by this Bond shall not be impaired in any manner by reason of any such modifications, omissions, additions, changes, alterations, extensions of time, changes in payment terms, and amendments.

4. The Surety hereby agrees that this Bond shall be deemed amended automatically and immediately, without formal or separate amendments hereto, upon any amendment or modifications to the Contract, so as to bind the Principal and Surety, jointly and severally, to the full payment of any Claimant under the Contract, as amended or modified, provided only that the Surety shall not be liable for more than the penal sum of the Bond, as specified in the first paragraph hereof.

5. This Bond is made for the use and benefit of all persons, firms, and corporations who or which may furnish any materials or perform any labor for or on account of the

construction-type services to be performed or supplied under the Contract, and any amendments thereto, and they and each of them may sue hereon.

6. No action may be maintained on this Bond after one (1) year from the date the last services, labor, or materials were provided under the Contract by the Claimant prosecuting said action.

7. This Bond is intended to comply with O.C.G.A. Section 13-10-1, and shall be interpreted so as to comply with the minimum requirements thereof. However, in the event the express language of this Bond extends protection to the Owner beyond that contemplated by O.C.G.A. Section 13-10-1, or any other statutory law applicable to this Project, then the additional protection shall be enforced in favor of the Owner, whether or not such protection is found in the applicable statutes.

IN WITNESS WHEREOF the undersigned have caused this instrument to be executed and their respective corporate seals to be affixed and attested by their duly authorized representatives this _____ day of _____, _____.

_____(SEAL)
(Principal)

By:_____

Attest:

_____
Secretary

_____(SEAL)
(Surety)

By:_____

Attest:

_____
Secretary

_____

(Address of Surety's Home Office)

_____
(Resident Agent of Surety)

END OF SECTION

GENERAL CONDITIONS:

00700-1 FAMILIARITY WITH SITE

Execution of this agreement by the Contractor is a representation that the Contractor has visited the site, has become familiar with the local conditions under which the work is to be performed, and has correlated personal observations with the requirements of this agreement.

00700-2 CONTRACT DOCUMENTS

This agreement consists of Owner's invitation for bid, instructions to bidders, bid form, performance bond, payment bond, acknowledgments, the contract, general conditions, special conditions, specifications, plans, drawings, exhibits, addenda, and written change orders.

A. Notice of Award of Contract:

B. Execution of Contract Documents

Upon notification of Award of Contract, the Owner shall furnish the Contractor the conformed copies of Contract Documents for execution by the Contractor and the Contractor's surety.

Within ten (10) days after receipt the Contractor shall return all the documents properly executed by the Contractor and the Contractor's surety. Attached to each document shall be an original power-of-attorney for the person executing the bonds for the surety and certificates of insurance for the required insurance coverage.

After receipt of the documents executed by the Contractor and his surety with the power-of-attorney and certificates of insurance, the Owner shall complete the execution of the documents. Distribution of the completed documents will be made upon completion.

Should the Contractor and/or Surety fail to execute the documents within the time specified; the Owner shall have the right to proceed on the Bid Bond accompanying the bid.

If the Owner fails to execute the documents within the time limit specified, the Contractor shall have the right to withdraw the Contractor's bid without penalty.

Drawings and Specifications:

The Drawings, Specifications, Contract Documents, and all supplemental documents, are considered essential parts of the Contract, and requirements occurring in one are as binding as though occurring in all. They are intended to define, describe and provide for all Work necessary to complete the Project in an acceptable manner, ready for use, occupancy, or operation by the Owner.

In case of conflict between the Drawings and Specifications, the Specifications shall govern. Figure dimensions on Drawings shall govern over scale dimensions, and detailed Drawings shall govern over general Drawings.

In cases where products or quantities are omitted from the Specifications, the description and quantities shown on the Drawings shall govern.

Any ambiguities or need for clarification of the Drawings or Specifications shall be immediately reported to the Construction Manager in writing. Any such ambiguity or need for clarification shall be handled by the Construction Manager in writing. No clarification of the Drawings and Specifications hereunder by the Construction Manager shall entitle the Contractor to any additional monies unless a Change Order has been processed as provided by "Changes in the Contract" hereof.

Any work done by the Contractor following a discovery of such differing site condition or ambiguity or need for clarification in the Contract Drawings and Specifications prior to a written report to the Construction Manager shall not entitle the Contractor to additional monies and shall be done at the Contractor's risk.

The Construction Manager will furnish the Contractor five (5) copies of the Contract Drawings and the Specifications, one copy of which the Contractor shall have available at all times on the Project site.

00700-3 DEFINITIONS

The following terms as used in this agreement are defined as follows to the extent the definitions herein differ or conflict with those in the Instructions for Bidders, Section 00100, the definitions herein shall control.

Change Order - A written order to the Contractor issued by the County pursuant to Fulton County Policy and Procedures 800-6 for changes in the work within the general scope of the contract documents, adjustment of the contract price, extension of the contract time, or reservation of determination of a time extension.

Construction Manager or Engineer shall mean Fulton Construction Management Partners, or the County authorized representative for this project.

Contractor shall mean the party of the second part to the Contract Agreement or the authorized and legal representative of such party.

Contract Documents include the Contract Agreement, Contractor's Bid (including all documentation accompanying the Bid and any post-Bid documentation required by the County prior to the Notice of Award), Bonds, all Special Conditions, General Conditions, Supplementary Conditions, Specifications, Drawings and addenda, together with written amendments, change orders, field orders and the Construction Manager's written interpretations and clarifications issued in accordance with the General Conditions on or after the date of the Contract Agreement.

Shop drawing submittals reviewed in accordance with the General Conditions, geotechnical investigations and soils report and drawings of physical conditions in or relating to existing surface structures at or contiguous to the site are not Contract Documents.

Contract Price - The sum specified in the Agreement to be paid to the Contractor in consideration of the Work.

Contract Time shall mean the number of consecutive calendar days as provided in the Contract Agreement for completion of the Work, to be computed from the date of Notice to Proceed.

Owner or County shall mean Fulton County Government, party of the first part to the Contract Agreement, or its authorized and legal representatives.

Day - A calendar day of twenty-four hours lasting from midnight of one day to midnight the next day.

Design Consultant shall mean the firm or corporation responsible for the detailed design drawings and specifications.

Director - Director of the Department of Public Works of Fulton County, Georgia or the designee thereof.

Final Completion shall mean the completion of all work as required in accordance with the terms and conditions of the contract documents.

Liquidated Damages shall mean the amount, stated in the Contract Agreement, which the Contractor agrees to pay to the Owner for each consecutive calendar day beyond the Contract time required to complete the Project or for failing to comply with associated milestones. Liquidated Damages will end upon written notification from the Owner of Final Acceptance of the Project or upon written notification of from the Owner of completion of the milestone.

Notice to Proceed - A written communication issued by the County to the Contractor authorizing it to proceed with the work, establishing the date of commencement and completion of the work, and providing other direction to the Contractor.

Products shall mean materials or equipment permanently incorporated into the work.

Program Manager - Not used in this contract. Delete all references.

Project Manual - The Contract Documents.

Provide shall mean to furnish and install.

Substantial Completion - The date certified by the Construction Manager when all or a part of the work, as established pursuant to General Condition 0700-81, is sufficiently completed in accordance with the requirements of the contract documents so that the identified portion of the work can be utilized for the purposes for which it is intended.

Work or Project - All of the services specified, indicated, shown or contemplated by the contract documents, and furnishing by the Contractor of all materials, equipment, labor, methods, processes, construction and manufacturing materials and equipment, tools, plans, supplies, power, water, transportation and other things necessary to complete such services in accordance with the contract documents to insure a functional and complete facility.

00700-4 CODES

All codes, specifications, and standards referenced in the contract documents shall be the latest editions, amendments and revisions of such referenced standards in effect as of the date of the request for proposals for this contract.

00700-5 REVIEW OF CONTRACT DOCUMENTS

Before making its proposal to the County, and continuously after the execution of the agreement, the Contractor shall carefully study and compare the contract documents and shall at once report to the Construction Manager any error, ambiguity, inconsistency or omission that may be discovered, including any requirement which may be contrary to any law, ordinance, rule, or regulation of any public authority bearing on the performance of the work. By submitting its proposal, the Contractor agrees that the contract documents, along with any supplementary written instructions issued by or through the Construction Manager that have become a part of the contract documents, appear accurate, consistent and complete insofar as can be reasonably determined. If the Contractor has timely reported in writing any error, inconsistency, or omission to the Construction Manager, has properly stopped the affected work until instructed to proceed, and has otherwise followed the instructions of the Construction Manager, the Contractor shall not be liable to the County for any damage resulting from any such error, inconsistency, or omission in the contract documents. The Contractor shall not perform any portion of the work without the contract documents, approved plans, specifications, products and data, or samples for such portion of the work. For purposes of this section “timely” is defined as the time period in which the contractor discovers, or should have discovered, the error, inconsistency, or omission, with the exercise of reasonable diligence.

00700-6 STRICT COMPLIANCE

No observation, inspection, test or approval of the County or Construction Manager shall relieve the Contractor from its obligation to perform the work in strict conformity with the contract documents except as provided in General Condition 00700-48.

00700-7 APPLICABLE LAW

All applicable State laws, County ordinances, codes, and rules and regulations of all authorities having jurisdiction over the construction of the project shall apply to this agreement. The Contractor shall comply with the requirements of any Fulton County program concerning non-discrimination in contracting.. All work performed within the right of way of the Georgia Department of Transportation and any railroad crossing shall be in accordance with Georgia Department of Transportation regulations, policies and procedures and, where applicable, those of any affected railroad. The Contractor shall comply with all laws, ordinances, codes, rules and regulations bearing on the conduct of the work as specified and the Contractor agrees to indemnify and hold harmless the County, its officers, agents and employees, as well as the Construction Manager and the Program Manager against any claim or liability arising from or

based on the violation of any law, ordinance, regulation, order or decree affecting the conduct of the work, whether occasioned by the Contractor, his agents or employees.

00700-8 PERMITS, LICENSES AND BONDS

All permits and licenses necessary for the work shall be secured and paid for by the Contractor. If any permit, license or certificate expires or is revoked, terminated, or suspended as a result of any action on the part of the Contractor, the Contractor shall not be entitled to additional compensation or time. The Contractor shall obtain and keep in force at all times performance and payment bonds payable to Fulton County in penal amounts equal to 100% of the Contract price.

00700-9 TAXES

A. The Contractor shall pay all sales, retail, occupational, service, excise, old age benefit and unemployment compensation taxes, consumer, use and other similar taxes, as well as any other taxes or duties on the materials, equipment, and labor for the work provided by the Contractor which are legally enacted by any municipal, county, state or federal authority, department or agency at the time bids are received, whether or not yet effective. The Contractor shall maintain records pertaining to such taxes and levies as well as payment thereof and shall make the same available to the County at all reasonable times for inspection and copying. The Contractor shall apply for any and all tax exemptions which may be applicable and shall timely request from the County such documents and information as may be necessary to obtain such tax exemptions. The County shall have no liability to the Contractor for payment of any tax from which it is exempt.

B. The Contractor is obligated to comply with all local and State Sales and Use Tax laws. The Contractor shall provide the Owner with documentation to assist the Owner in obtaining sales and/or use tax refunds for eligible machinery and equipment used for the primary purpose of reducing or eliminating air or water pollution as provided for in Chapter 48-8-3 (36) and (37) of the Official Code of Georgia. All taxes shall be paid by the Contractor. All refunds will accrue to the Owner.

Acceptance of the project as complete and final payment will not be made by the Owner until the Contractor has fully complied with this requirement.

00700-10 DELINQUENT CONTRACTORS

The County shall not pay any claim, debt, demand or account whatsoever to any person firm or corporation who is in arrears to the County for taxes. The County shall be entitled to a counterclaim, backcharge, and offset for any such debt in the amount of taxes in arrears, and no assignment or transfer of such debt after the taxes become due shall affect the right of the County to offset any taxes owed against said debt.

00700-11 LIEN WAIVERS

The Contractor shall furnish the County with evidence that all persons who have performed work or furnished materials pursuant to this agreement have been paid in full prior to submitting its demand for final payment pursuant to this agreement. A final affidavit, Exhibit A, must be completed, and submitted to comply with requirements of 00700-11. In the event that such evidence is not furnished, the County may retain sufficient sums necessary to meet all lawful claims of such laborers and materialmen. The County assumes no obligation nor in any way undertakes to pay such lawful claims from any funds due or that may become due to the Contractor.

00700-12 MEASUREMENT

All items of work to be paid for per unit of measurement shall be subject to inspection, measurement, and confirmation by the Construction Manager.

00700-13 ASSIGNMENT

The Contractor shall not assign any portion of this agreement or moneys due there from (include factoring of receivables) without the prior written consent of the County. The Contractor shall retain personal control and shall provide personal attention to the fulfillment of its obligations pursuant to this agreement. Any assignment without the express written consent of the County shall render this contract voidable at the sole option of the County.

00700-14 FOREIGN CONTRACTORS

In the event that the Contractor is a foreign corporation, partnership, or sole proprietorship, the Contractor hereby irrevocably appoints the Secretary of State of Georgia as its agent for service of all legal process for the purpose of this contract only.

00700-15 INDEMNIFICATION [there are two indemnification clauses, the other is in the Contract Cover Sheet]

The Contractor hereby assumes the entire responsibility and liability for any and all injury to or death of any and all persons, including the Contractor's agents, servants, and employees, and in addition thereto, for any and all damages to property caused by or resulting from or arising out of any act or omission in connection with this contract or the prosecution of work hereunder, whether caused by the Contractor or the Contractor's agents, servants, or employees, or by any of the Contractor's subcontractors or suppliers, and the Contractor shall indemnify and hold harmless the County, the Construction Manager and the Program Manager, or any of their subcontractors from and against any and all loss and/or expense which they or any of them may suffer or pay as a result of claims or suits due to, because of, or arising out of any and all such injuries, deaths and/or damage, irrespective of County or Construction Manager or Program Manager negligence (except that no party shall be indemnified for their own sole negligence). The Contractor, if requested, shall assume and defend at the Contractor's own expense, any suit, action or other legal proceedings arising there from, and the Contractor hereby agrees to satisfy, pay, and cause to be discharged of record any judgment which may be rendered against the County, the Construction Manager and the Program Manager arising there from.

In the event of any such loss, expense, damage, or injury, or if any claim or demand for damages as heretofore set forth is made against the County or the Construction Manager or the Program Manager, the County may withhold from any payment due or thereafter to become due to the Contractor under the terms of this Contract, an amount sufficient in its judgment to protect and indemnify it and the Construction Manager and the Program Manager from any and all claims, expense, loss, damages, or injury; and the County, in its discretion, may require the Contractor to furnish a surety bond satisfactory to the County providing for such protection and indemnity, which bond shall be furnished by the Contractor within five (5) days after written demand has been made therefore. The expense of said Bond shall be borne by the Contractor.

00700-16 SUPERVISION OF WORK AND COORDINATION WITH OTHERS

The Contractor shall supervise and direct the work using the Contractor's best skill and attention. The Contractor shall be solely responsible for all construction methods and procedures and shall coordinate all portions of the work pursuant to the contract subject to the overall coordination of the Construction Manager. All work pursuant to this agreement shall be performed in a skillful and workmanlike manner.

The County reserves the right to perform work related to the Project with the County's own forces and to award separate contracts in connection with other portions of the project, other work on the site under these or similar conditions of the contract, or work which has been extracted from the Contractor's work by the County.

When separate contracts are awarded for different portions of the project or other work on the site, the term "separate contractor" in the Contract Documents in each case shall mean the contractor who executes each separate County Agreement.

The Contractor shall cooperate with the County and separate contractors in arranging the introduction and storage of materials and equipment and execution of their work, and shall cooperate in coordinating connection of its work with theirs as required by the Contract Documents.

If any part of the Contractor's Work depends for proper execution or results upon the work of the County or any separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Construction Manager any apparent discrepancies or defects in such other work that render it unsuitable for such proper execution and results **within fourteen (14) days** of discovery of such discrepancy or defect. Failure of the Contractor to so report in writing shall constitute an acceptance of the County's or separate contractor's work as fit and proper to receive the Work, except as to any defects which may subsequently become apparent in such work by others.

Any costs caused by defective or untimely work shall be borne by the party responsible therefore.

Should the Contractor wrongfully cause damage to the work or property of the County or to other work or property on the site, including the work of separate contractors, the Contractor shall promptly remedy such damage at the Contractor's expense.

Should the Contractor be caused damage by any other contractor on the Project, by reason of such other contractor's failure to perform properly his contract with the County, no action shall lie against the County or the Construction Manager inasmuch as the parties to this agreement are the only beneficiaries hereof and there are no third party beneficiaries and neither the County nor the Construction Manager shall have liabilities therefore, but the Contractor may assert his claim for damages solely against such other contractor. The Contractor shall not be excused from performance of the contract by reason of any dispute as to damages with any other contractor or third party.

Where the Work of this Contract shall be performed concurrently in the same areas as other construction work, the Contractor shall coordinate with the Construction Manager and the separate contractors in establishing mutually acceptable schedules and procedures that shall permit all jobs to proceed with minimum interference.

If a dispute arises between the Contractor and separate contractors as to their responsibility for cleaning up, the County may clean up and charge the cost thereof to the Contractor or contractors responsible therefore as the County shall determine to be just.

00700-17 ADMINISTRATION OF CONTRACT

The Construction Manager shall provide administration services as hereinafter described.

For the administration of this Contract, the Construction Manager shall serve as the County's primary representative during design and construction and until final payment to the Contractor is due. The Construction Manager shall advise and consult with the County and the Program Manager. The primary point of contact for the Contractor shall be the Construction Manager. All correspondence from the Contractor to the County shall be forwarded through the Construction Manager. Likewise, all correspondence and instructions to the Contractor shall be forwarded through the Construction Manager.

The Construction Manager will determine in general that the construction is being performed in accordance with design and engineering requirements, and will endeavor to guard the County against defects and deficiencies in the Work.

The Construction Manager will not be responsible for or have control or charge of construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the Work, nor will it be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. The Construction Manager will not be responsible for or have control or charge over the acts or omissions of the Contractor, its engineers, consultants, subcontractors, or any of their agents or employees, or any other persons performing the Work.

Based on the Construction Manager's observations regarding the Contractor's Applications for Payment, the Construction Manager shall determine the amounts owing to the Contractor, in accordance with the payment terms of the Contract, and shall issue Certificates for Payment in such amount to the County.

The Construction Manager shall render interpretations necessary for the proper execution or progress of the Work. Either party to the Contract may make written requests to the Construction Manager for such interpretations.

Claims, disputes and other matters in question between the Contractor and the County relating to the progress of the Work or the interpretation of the Contract Documents shall be referred to the Construction Manager for interpretation.

All interpretations of the Construction Manager shall be consistent with the intent of and reasonably inferable from the Contract Documents and shall be in writing or in graphic form.

Except as otherwise provided in this Contract, the Construction Manager shall issue a decision on any disagreement concerning a question of fact arising under this Contract. The Construction Manager shall reduce the decision to writing and mail or otherwise furnish a copy thereof to the Contractor. The decision of the Construction Manager shall be final and conclusive unless, within thirty (30) days from the date of receipt of such copy, the Contractor files a written appeal with the Director of Public Works and mails or otherwise furnishes the Construction Manager a copy of such appeal. The decision of the Director of Public Works or the Director's duly authorized representative for the determination of such appeals shall be final and conclusive. Such final decision shall not be pleaded in any suit involving a question of fact arising under this Contract, provided such is not fraudulent, capricious, arbitrary, so grossly erroneous as necessarily implying bad faith, or is not supported by substantial evidence. In connection with any appeal proceeding under this Article, the Contractor shall be afforded an opportunity to be heard and to offer evidence in support of Contractor's appeal. Pending any final decision of a dispute hereunder, the Contractor shall proceed diligently with the performance of the Contract as directed by the Construction Manager.

The Construction Manager shall have authority to reject Work which does not conform to the Contract Documents. Whenever, in the Construction Manager's opinion, it is considered necessary or advisable for the implementation of the intent of the Contract Documents, the County shall have authority to require special inspection or testing of the Work whether or not such Work be then fabricated, installed or completed. The Contractor shall pay for such special inspection or testing if the Work so inspected or tested is found not to comply with the requirements of the contract; the County shall pay for special inspection and testing if the Work is found to comply with the contract. Neither the Construction Manager's authority to act under this Subparagraph, nor any decision made by the Construction Manager in good faith either to exercise or not to exercise such authority, shall give rise to any duty or responsibility of the Construction Manager to the Contractor, any subcontractor, any of their agents or employees, or any other person performing any of the Work.

The Contractor shall provide such shop drawings, product data, and samples as may be required by the Construction Manager and/or as required by these Contract Documents.

The Construction Manager shall conduct inspections to determine Substantial Completion and Final Completion, and shall receive and forward to the County for review written warranties and related documents required by the Contract Documents and assembled by the Contractor. The Construction Manager shall approve and issue Certificates for Payment upon compliance with Substantial and Final Completion requirements indicated in General Conditions 00700-81, 00700-82, 00700-84 and 00700-85 of this Agreement.

Except as provided in General Condition 00700-48*,* the Contractor shall not be relieved from the Contractor's obligations to perform the work in accordance with the contract documents by the activities or duties of the County or any of its officers, employees, or agents, including inspections, tests or approvals, required or performed pursuant to this agreement.

00700-18 RESPONSIBILITY FOR ACTS OF EMPLOYEES

The Contractor shall employ only competent and skilled personnel. The Contractor shall, upon demand from the Construction Manager, immediately remove any superintendent, foreman or workman whom the Construction Manager may consider incompetent or undesirable.

The Contractor shall be responsible to the County for the acts and omissions of the Contractor's employees, subcontractors, and agents as well as any other persons performing work pursuant to this agreement for the Contractor.

00700-19 LABOR, MATERIALS, SUPPLIES, AND EQUIPMENT

Unless otherwise provided in this agreement, the Contractor shall make all arrangements with necessary support agencies and utility companies, provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the execution and completion of the work.

00700-20 DISCIPLINE ON WORK SITE

The Contractor shall enforce strict discipline and good order among its employees and subcontractors at all times during the performance of the work, to include compliance with the Fulton County Drug Free Work Place Policy. The Contractor shall not employ any subcontractor who is not skilled in the task assigned to it. The Construction Manager may, by written notice, require the Contractor to remove from the work any subcontractor or employee deemed by the Construction Manager to be incompetent.

00700-21 HOURS OF OPERATION

All work at the construction site shall be performed during regular business hours of the Fulton County government, except upon the Construction Manager's prior written consent to other work hours. It is further understood that the Contractor's construction schedule is based on a normal 40 hours, five day work week, less Fulton County-recognized holidays. Contractors work schedule shall not violate Fulton County Noise Ordinance by working hours inconsistent with the Fulton County Noise Ordinance. The County's current noise ordinance or other applicable ordinance shall govern. If the Contractor desires to work in excess of this limit, the Contractor shall submit a written request to the Construction Manager, a minimum of five days prior to the desired work date. The Contractor shall be responsible for any additional expenses incurred by the Owner as a result of the extended work hours, including resident inspection overtime. The cost associated with resident inspector overtime shall be deducted form the Contractor monthly payment request.

00700-22 FAMILIARITY WITH WORK CONDITIONS

The Contractor shall take all steps necessary to ascertain the nature and location of the work and the general and local conditions which may affect the work or the cost thereof. The Contractor's failure to fully acquaint itself with the conditions which may affect the work, including, but not limited to conditions relating to transportation, handling, storage of materials, availability of utilities, labor, water, roads, weather, topographic and subsurface conditions, other separate contracts to be entered into by the County relating to the project which may affect the work of the Contractor, applicable provisions of law, and the character and availability of equipment and facilities necessary prior to and during the performance of the work shall not relieve the Contractor of its responsibilities pursuant to this agreement and shall not constitute a basis for an equitable adjustment of the contract terms. The County reserves the right to perform with its own forces or to contract with other entities for other portions of the project work, in which case the Contractor's responsibility to assure its familiarity with work conditions hereunder shall include all coordination with such other contractors and the County necessary to insure that there is no interference between contractors as will delay or hinder any contractor in its prosecution of work on the project. The County assumes no responsibility for any understandings or representations concerning conditions of the work made by any of its officers, agents, or employees prior to the execution of this agreement.

00700-23 RIGHT OF ENTRY

The County reserves the right to enter the site of the work by such agent, including the Construction Manager, as it may elect for the purpose of inspecting the work or installing such collateral work as the County may desire. The Contractor shall provide safe facilities for such access so that the County and its agents may perform their functions.

00700-24 NOTICES

Any notice, order, instruction, claim or other written communication required pursuant to this agreement shall be deemed to have been delivered or received as follows:

Upon personal delivery to the Contractor, its authorized representative, or the Construction Manager on behalf of the County. Personal delivery may be accomplished by in-person hand delivery or bona fide overnight express service.

Three days after depositing in the United States mail a certified letter addressed to the Contractor or the Construction Manager for the County. For purposes of mailed notices, the County's mailing address shall be 141 Pryor Street, 6th Floor, Atlanta, Georgia 30303, or as the County shall have otherwise notified the Contractor. The Contractor's mailing address shall be the address stated in its proposal or as it shall have most recently notified the Construction Manager in writing.

00700-25 SAFETY

A. SAFETY, HEALTH AND LOSS PREVENTION

The Contractor shall be responsible for implementing a comprehensive project-specific safety, health and loss prevention program and employee substance abuse program for this project. All Sub-Contractors must either implement their own program or follow the Contractor’s safety, health and loss prevention program and employee substance abuse program.

The Contractor’s safety, health and loss prevention program and employee substance abuse program must meet or exceed all governmental regulations (OSHA, EPA, DOT, State, local), and any other specific Fulton County requirements

B. COUNTY’S SAFETY, HEALTH, AND LOSS PREVENTION PROCESS GUIDELINES AND REQUIREMENTS

The County and its agents reserve the right, but assume no duty, to establish and enforce safety, health, and loss prevention guidelines and to make the appropriate changes in the guidelines, for the protection of persons and property and to review the efficiency of all protective measures taken by the Contractor. The Contractor shall comply with all safety, health, and loss prevention process guidelines and requirements and changes made by the County or its agent(s). The issuance of any such guidelines or changes by the County or its agent(s) shall not relieve the Contractor of its duties and responsibilities under this Agreement, and the County or its agent(s) shall not thereby assume, nor be deemed to have assumed, any such duties or responsibilities of the Contractor.

C. COMPLIANCE OF WORK, EQUIPMENT, AND PROCEDURES WITH ALL APPLICABLE LAWS and REGULATIONS

All Work, whether performed by the Contractor or its Sub-Contractors of any tier, or anyone directly or indirectly employed by any of them, and all equipment, appliances, machinery, materials, tools and like items incorporated or used in the Work, shall be in compliance with and conform to:

1. All applicable laws, ordinances, rules, regulations and orders of any public, quasi-public or other governmental authority relating to the safety of persons and their protection against injury, specifically including, but in no event limited to, the

Federal Occupational Safety and Health Act of 1970, as amended, and all rules and regulations now or hereafter in effect pursuant to said Act.

2. All rules, regulations, and requirements of the County or its agent(s) and its insurance carriers relating there to. In the event of a conflict or differing requirements the more stringent shall govern.

D. PROTECTION OF THE WORK

1. The Contractor shall, throughout the performance of the Work, maintain adequate and continuous protection of all Work and temporary facilities against loss or damage from whatever cause, shall protect the property of the County and third parties from loss or damage from whatever cause arising out of the performance of the Work, and shall comply with the requirements of the County or its agent(s) and its insurance carriers, and with all applicable laws, codes, rules and regulations, (as same may be amended) with respect to the prevention of loss or damage to property as a result of fire or other hazards.

2. The County or its agent(s) may, but shall not be required to, make periodic inspections of the Project work area. In such event, however, the Contractor shall not be relieved of its aforesaid responsibilities and the County or its agent(s) shall not assume, nor shall it be deemed to have assumed, any responsibility otherwise imposed upon the assurance of Contractor by this Agreement.

E. SAFETY EQUIPMENT

1. The Contractor shall provide to each worker on the Project work area the proper safety equipment for the duties being performed by that worker and will not permit any worker on the Project work area who fails or refuses to use the same. The County or its agent shall have the right, but not the obligation, to order the removal of a worker from the Project work site for his/her failure to comply with safe practices or substance abuse policies.

F. EMERGENCIES

1. In any emergency affecting the safety of persons or property, or in the event of a claimed violation of any federal or state safety or health law or regulation, arising out of or in any way connected with the Work or its performance, the Contractor shall act immediately to prevent threatened damage, injury or loss and to remedy said violation. Failing such action the County or its agent(s) may immediately take whatever steps it deems necessary including, but not limited to, suspending the Work as provided in this Agreement.

2. The County or its agent(s) may offset any and all costs or expenses of whatever nature, including attorneys' fees, paid or incurred by the County or its agent(s) (whether such fees are for in-house counsel or counsel retained by the County or its agent), in taking the steps authorized by Section 00700-25(G) (1) above against any sums then or thereafter due to the Contractor. The Contractor shall defend, indemnify and hold the County, its officers, agents, and employees harmless against any and all costs or expenses caused by or arising from the exercise by the County of its authority to act in an emergency as set out herein. If the Contractor shall be entitled to any additional compensation or extension of time change order on account of emergency work not due to the fault or neglect of the Contractor or its Sub-Contractors, such additional compensation or extension of time shall be determined in accordance with General Condition 00700-52 and General Condition 00700-87 of this Agreement.

G. SUSPENSION OF THE WORK

1. Should, in the judgment of the County or its agent(s), the Contractor or any Sub-Contractor fail to provide a safe and healthy work place, the County or its agent

shall have the right, but not the obligation, to suspend work in the unsafe areas until deficiencies are corrected. All costs of any nature (including, without limitation, overtime pay, liquidated damages or other costs arising out of delays) resulting from the suspension, by whomsoever incurred, shall be borne by the Contractor.

2. Should the Contractor or any Sub-Contractor fail to provide a safe and healthy work place after being formally notified in writing by the County or its agents of such non-compliance, the contract may be terminated following the termination provision of the contract.

H. CONTRACTOR'S INDEMNITY OF THE COUNTY FOR CONTRACTOR'S NON-COMPLIANCE WITH SAFETY PROGRAM

1. The Contractor recognizes that it has sole responsibility to assure its Safety Program is implemented and to assure its construction services are safely provided. The Contractor shall indemnify, defend and hold the County and its agents harmless, from and against any and all liability (whether public or private), penalties (contractual or otherwise), losses, damages, costs, attorneys' fees, expenses, causes of action, claims or judgments resulting, either in whole or in part, from any failure of the Contractor, its Sub-Contractors of any tier or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, to comply with the safety requirements of the contract. The Contractor shall not be relieved of its responsibilities under the safety requirements of the Contract should the County or its agent(s) act or fail to act pursuant to its rights hereunder.

2. The Contractor shall not raise as a defense to its obligation to indemnify under this Subparagraph I any failure of those indemnified hereunder to assure Contractor operates safely, it being understood and agreed that no such failure shall relieve the Contractor from its obligation to assure safe operations or from its obligation to so indemnify. The Contractor also hereby waives any rights it may have to seek contribution, either directly or indirectly, from those indemnified hereunder.

3. In any and all claims against those indemnified hereunder by any employee of the Contractor, any Sub-Contractor of any tier or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this Subparagraph I shall not be limited in any way as to the amount or type of damages, compensation or benefits payable by or for the Contractor or any Sub-Contractor of any tier under any workers' compensation act, disability benefit or other employee benefit acts.

00700-26 BLASTING AND EXCAVATION

The Contractor acknowledges that it is fully aware of the contents and requirements of O.C.G.A. § 25-9-1 through 25-9-12 concerning blasting and excavation near underground gas pipes and facilities and shall fully comply therewith.

00700-27 HIGH VOLTAGE LINES

The Contractor acknowledges that it is fully aware of the contents and requirements O.C.G.A. § 46-3-30 through 46-3-39 concerning safeguards against contact with high voltage lines, and the Contractor shall fully comply with said provisions.

00700-28 SCAFFOLDING AND STAGING

The Contractor acknowledges that it is the person responsible for employing and directing others to perform labor within the meaning of O.C.G.A. § 34-1-1 and agrees to comply with said provisions.

00700-29 CLEAN-UP

The Contractor shall clean up all refuse, rubbish, scrap materials, and debris caused by its operations to the end that the site of the work shall present a neat, orderly and workmanlike appearance at all times.

00700-30 PROTECTION OF WORK

The Contractor shall be responsible for maintenance and protection of the work, which shall include any County-furnished supplies, material, equipment, until final completion of this agreement and acceptance of the work as defined herein. Any portion of the work suffering injury, damage or loss shall be considered defective and shall be corrected or replaced by the Contractor without additional cost to the County.

00700-31 REJECTED WORK

The Contractor shall promptly remove from the project all work rejected by the Construction Manager for failure to comply with the contract documents and the Contractor shall promptly replace and re-execute the work in accordance with the contract documents and without expense to the County. The Contractor shall also bear the expense of making good all work of other Contractors destroyed or damaged by such removal or replacement.

00700-32 DEFECTIVE WORK

If the Contractor defaults or neglects to carry out any portion of the work in accordance with the contract documents, and fails within three days after receipt of written notice from the Construction Manager to commence and continue correction of such default or neglect with diligence and promptness, the County may, after three days following receipt by the Contractor of an additional written notice and without prejudice to any other remedy the County may have, make good such deficiencies and complete all or any portion of any work through such means as the County may select, including the use of a separate Contractor. In such case, an appropriate change order shall be issued deducting from the payments then or thereafter due the Contractor the cost of correcting such deficiencies. In the event the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the County on demand.

The County may, at its option, accept defective or nonconforming work instead of requiring its removal or correction. In such case, a change order shall be issued reducing the price due the contractor to the extent appropriate and equitable. Such contract price adjustment shall be effected whether or not final payment has been made.

00700-33 WARRANTY OF NEW MATERIALS

The Contractor warrants to the County that all materials and equipment furnished under this contract will be new unless otherwise specified, and the Contractor further warrants that all work will be of good quality, free from faults and defects, and in conformance with the contract documents. The warranty set forth in this paragraph shall survive final acceptance of the work.

00700-34 CONTRACTOR'S WARRANTY OF THE WORK

If within one year after the date of issuance of the certificate of final payment pursuant to General Condition 84, or within such longer period of time as may be prescribed by law or by the term of any applicable special warranty required by the contract documents, any of the work is found to be defective or not in accordance with the contract documents, the Contractor shall correct such work promptly after receipt of written notice from the Construction Manager to do so. This obligation shall survive both final payment for the work and termination of the contract.

00700-35 ASSIGNMENT OF MANUFACTURERS' WARRANTIES

Without limiting the responsibility or liability of the Contractor pursuant to this agreement, all warranties given by manufacturers on materials or equipment incorporated in the work are hereby assigned by the Contractor to the County. If requested, the Contractor shall execute formal

assignments of said manufacturer's warranties to the County. All such warranties shall be directly enforceable by the County.

00700-36 WARRANTIES IMPLIED BY LAW

The warranties contained in this agreement, as well as those warranties implied by law, shall be deemed cumulative and shall not be deemed alternative or exclusive. No one or more of the warranties contained herein shall be deemed to alter or limit any other.

00700-37 STOP WORK ORDERS

In the event that the Contractor fails to correct defective work as required by the contract documents or fails to carry out the work in accordance with contract documents, the Construction Manager, in writing, may order the Contractor to stop work until the cause for such order has been eliminated. This right of the County to stop work shall not give rise to any duty on the part of the County or the Construction Manager to execute this right for the benefit of the Contractor or for any other person or entity.

00700-38 TERMINATION FOR CAUSE

If the Contractor is adjudged bankrupt, makes a general assignment for the benefit of creditors, suffers the appointment of a receiver on account of its insolvency, fails to supply sufficient properly skilled workers or materials, fails to make prompt payment to subcontractors or materialmen, disregards laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction, fails to diligently prosecute the work, or is otherwise guilty of a material violation of this agreement and fails within seven days after receipt of written notice to commence and continue correction of such default, neglect, or violation with diligence and promptness, the County may, after seven days following receipt by the Contractor of an additional written notice and without prejudice to any other remedy the County may have, terminate the employment of the Contractor and take possession of the site as well as all materials, equipment, tools, construction equipment and machinery thereon. The County may finish the work by whatever methods the County deems expedient. In such case, the Contractor shall not be entitled to receive any further payment until the work is completed. If the unpaid balance of the contract price exceeds the cost of completing the work, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor shall pay the difference to the County on demand. This obligation for payment shall survive the termination of the contract. Termination of this agreement pursuant to this paragraph may result in disqualification of the Contractor from bidding on future County contracts.

00700-39 TERMINATION FOR CONVENIENCE

The County may, at any time upon written notice to the Contractor, terminate the whole or any portion of the work for the convenience of the County. The effective data of the terminations shall be provided in the written notice. Said termination shall be without prejudice to any right or remedy of the County provided herein. In addition, in the event this agreement has been terminated due to the default of the Contractor, and if it is later determined that the Contractor was not in default pursuant to the provisions of this agreement at the time of termination, then such termination shall be considered a termination for convenience pursuant to this paragraph.

00700-40 TERMINATION FOR CONVENIENCE - PAYMENT

If the Contract is terminated for convenience by the Owner as provided in this article, Contractor will be paid compensation for those services actually performed as approved by the Owner or his representative. Partially completed tasks will be compensated for based on a signed statement of completion prepared by the Project Manager and submitted to the Contractor which shall itemize each task element and briefly state what work has been completed and what work remains to be done. Contractor shall also be paid for reasonable costs for the orderly filing and closing of the project.

00700-41 TERMINATION FOR CONVENIENCE - PAYMENT LIMITATIONS

Except for normal spoilage, and except to the extent that the County shall have otherwise expressly assumed the risk of loss, there shall be excluded from the amounts payable to the Contractor the fair value, as determined by the Construction Manager, of property which is destroyed, lost, stolen or damaged so as to become undeliverable to the County or to another buyer.

00700-42 COST TO CURE

If the County terminates for cause the whole or any part of the work pursuant to this agreement, then the County may procure upon such terms and in such manner as the Construction Manager may deem appropriate, supplies or services similar to those so terminated, and the Contractor shall be liable to the County for any excess costs for such similar supplies or services. The Contractor shall continue the performance of this agreement to the extent not terminated hereunder.

00700-43 ATTORNEY'S FEES

Should the Contractor default pursuant to any of the provisions of this agreement, the Contractor and its surety shall pay to the County such reasonable attorney's fees as the County may expend as a result thereof and all costs, expenses, and filing fees incidental thereto.

00700-44 CONTRACTOR'S RESPONSIBILITIES UPON TERMINATION

After receipt of a notice of termination from the County, and except as otherwise directed by the Construction Manager, the Contractor shall:

1. Stop work under the contract on the date and to the extent specified in the notice of termination;
2. Place no further orders or subcontracts for materials, services or facilities, except as may be necessary for completion of such portion of the work under the agreement as is not terminated;
3. Terminate all orders and subcontracts to the extent that they relate to the performance of work terminated by the notice of termination;
4. Assign to the County in the manner, at the times, and to the extent directed by the Construction Manager, all of the rights, title and interest of the Contractor under the orders and subcontracts so terminated, in which case the County shall have the right, at its discretion, to settle or pay any and all claims arising out of the termination of such orders or subcontracts;
5. Settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts with the approval or ratification of the Construction Manager, to the extent the Construction Manager may require, which approval or ratification shall be final for all purposes;
6. Transfer title and deliver to the entity or entities designated by the Construction Manager, in the manner, at the times, and to the extent, if any, directed by the Construction Manager, and to the extent specifically produced or specifically acquired by the Contractor for the performance of such portion of the work as has been terminated:
    a. The fabricated or un-fabricated parts, work, and progress, partially completed supplies, and equipment, materials, parts, tools, dyes, jigs, and other fixtures, completed work, supplies, and other material produced as a part of or acquired in connection with the performance of the work terminated by the notice of termination; and
    b. The completed or partially completed plans, drawings, information, and other property to the work.

7. Use its best efforts to sell in the manner, at the times, to the extent, and at the prices directed or authorized by the Construction Manager, any property described in Section 6 of this paragraph, provided, however, that the Contractor shall not be required to extend credit to any buyer and further provided that the proceeds of any such transfer or disposition shall be applied in reduction of any payments to be made by the County to the Contractor pursuant to this agreement.

8. Complete performance of such part of the work as shall not have been terminated by the notice of termination; and

9. Take such action as may be necessary, or as the Construction Manager may direct, for the protection and preservation of the property related to the agreement which is in the possession of the Contractor and in which the County has or may acquire an interest.

00700-45 RECORDS

The Contractor shall preserve and make available to the County all of its records, books, documents and other evidence bearing on the costs and expenses of the Contractor and any subcontractor pursuant to this agreement upon three days advance notice to the Contractor.

00700-46 DEDUCTIONS

In arriving at any amount due the Contractor pursuant to the terms of this agreement, there shall be deducted all liquidated damages, advance payments made to the Contractor applicable to the termination portion of the contract, the amount of any claim which the County may have against the Contractor, the amount determined

By the Construction Manager to be necessary to protect the County against loss due to outstanding potential liens or claims, and the agreed price of any materials acquired or sold by the Contractor and not otherwise recovered by or credited to the County.

00700-47 REIMBURSEMENT OF THE COUNTY

In the event of termination, the Contractor shall refund to the County any amount paid by the County to the Contractor in excess of the costs properly reimbursable to the Contractor.

00700-48 SUSPENSION, INTERRUPTION, DELAY, DAMAGES

The Contractor shall be entitled to only those damages and that relief from termination by the County as specifically set forth in this agreement. The Construction Manager may issue a written order requiring the Contractor to suspend, delay or interrupt all or any part of the work for such period of time as the County may determine to be appropriate for the convenience of the County. If the performance of the work is interrupted for an unreasonable period of time by an act of the County or any of its officers, agents, employees, contractors, or consultants in the administration of this agreement, an equitable adjustment shall be made for any increase in the Contractor's costs of performance and any increase in the time required for performance of the work necessarily caused by the unreasonable suspension, delay, or interruption. Any equitable adjustment shall be reduced to writing and shall constitute a modification to this agreement. In no event, however, shall an equitable adjustment be made to the extent that performance of this agreement would have been suspended, delayed or interrupted by any other cause, including the fault or negligence of the Contractor. No claim for an equitable adjustment pursuant to this paragraph shall be permitted before the Contractor shall have notified the Construction Manager in writing of the act or failure to act involved, and no claim shall be allowed unless asserted in writing to the Construction Manager within ten days after the termination of such suspension, delay or interruption.

00700-49 COMMENCEMENT AND DURATION OF WORK

The County may issue a Notice to Proceed at any time within 120 days following execution of the contract by the County. The Contractor shall commence work pursuant to this agreement within

ten days of mailing or delivery of written notice to proceed. The Contractor shall diligently prosecute the work to completion within the time specified therefore in the Agreement. The capacity of the Contractor's construction and manufacturing equipment and plan, sequence and method of operation and forces employed, including management and supervisory personnel, shall be such as to insure completion of the work within the time specified in the Agreement. The Contractor and County hereby agree that the contract time for completion of the work is reasonable taking into consideration the average climatic conditions prevailing in the locality of the work and anticipated work schedules of other contractors whose activities are in conjunction with or may affect the work under this contract.

00700-50 TIME OF THE ESSENCE

All time limits stated in this agreement are of the essence of this contract.

00700-51 IMPACT DAMAGES

Except as specifically provided pursuant to a stop work order or change order, the Contractor shall not be entitled to payment or compensation of any kind from the County for direct or indirect or impact damages including, but not limited to, costs of acceleration arising because of delay, disruption, interference or hindrance from any cause whatsoever whether such delay, disruption, interference or hindrance is reasonable or unreasonable, foreseeable or unforeseeable, or avoidable, provided, however, that this provision shall not preclude the recovery of damages by the Contractor for hindrances or delays due solely to fraud or bad faith on the part of the County, its agents, or employees. The Contractor shall be entitled only to extensions in the time required for performance of the work as specifically provided in the contract.

00700-52 DELAY

The Contractor may be entitled to an extension of the contract time, but not an increase in the contract price or damages, for delays arising from unforeseeable causes beyond the control and without the fault or negligence of the Contractor or its subcontractors for labor strikes, acts of God, acts of the public enemy, acts of the state, federal or local government in its sovereign capacity, by acts of another separate contractor, or by an act or neglect of the County.

00700-53 INCLEMENT WEATHER

The Contractor shall not be entitled to an extension of the contract time due to normal inclement weather. Unless the Contractor can substantiate to the satisfaction of the Construction Manager that there was greater than normal inclement weather and that such greater than normal inclement weather actually delayed the work, the Contractor shall not be entitled to an extension of time therefore. The following shall be considered the normal inclement weather days for each month listed, and extensions of time shall be granted in increments of not less than one half day only for inclement weather in excess of the days set out.

January	10 days
February	10 days
March	7 days
April	6 days
May	4 days
June	3 days
July	4 days
August	2 days
September	2 days
October	3 days
November	6 days
December	9 days

00700-54 DELAY - NOTICE AND CLAIM

The Contractor shall not receive an extension of time unless a Notice of Delay is filed with the Construction Manager within ten days of the first instance of such delay, disruption, interference or hindrance and a written Statement of the Claim is filed with the Construction Manager within 20 days of the first such instance. In the event that the Contractor fails to comply with this provision, it waives any claim which it may have for an extension of time pursuant to this agreement.

00700-55 STATEMENT OF CLAIM - CONTENTS

The Statement of Claim referenced in Article 00700-54 shall include specific information concerning the nature of the delay, the date of commencement of the delay, the construction activities affected by the delay, the person or organization responsible for the delay, the anticipated extent of the delay, and any recommended action to avoid or minimize the delay.

00700-56 WORK BEHIND SCHEDULE, REMEDY BY CONTRACTOR

If the work actually in place falls behind the currently updated and approved schedule, and it becomes apparent from the current schedule that work will not be completed within the contract time, the Contractor agrees that it will, as necessary, or as directed by the Construction Manager, take action at no additional cost to the County to improve the progress of the work, including increasing manpower, increasing the number of working hours per shift or shifts per working day, increasing the amount of equipment at the site, and any other measure reasonably required to complete the work in a timely fashion.

00700-57 DILIGENCE

The Contractor's failure to substantially comply with the requirements of the preceding paragraph may be grounds for determination by the County that the Contractor is failing to prosecute the work with such diligence as will insure its completion within the time specified. In such event, the County shall have the right to furnish, from its own forces or by contract, such additional labor and materials as may be required to comply with the schedule after 48 hours written notice to the Contractor, and the Contractor shall be liable for such costs incurred by the County.

00700-58 SET-OFFS

Any monies due to the Contractor pursuant to the preceding paragraph of this agreement may be deducted by the County against monies due from the County to the Contractor.

00700-59 REMEDIES CUMULATIVE

The remedies of the County under Articles 00700-56, 00700-57, and 00700-58 are in addition to and without prejudice to all of the rights and remedies of the County at law, in equity, or contained in this agreement.

00700-60 TITLE TO MATERIALS

No materials or supplies shall be purchased by the Contractor or by any Subcontractor subject to any chattel mortgage or under a conditional sales contract or other agreement by which any interest is retained by the seller. The Contractor hereby warrants that it has good and marketable title to all materials and supplies used by it in the work, and the Contractor further warrants that all materials and supplies shall be free from all liens, claims, or encumbrances at the time of incorporation in the work.

00700-61 INSPECTION OF MATERIALS

All materials and equipment used in the construction of the project shall be subject to adequate inspection and testing in accordance with accepted standards and in accordance with the requirements of the contract documents. Additional tests performed after the rejection of materials or equipment shall be at the Contractor's expense.

00700-62 CONSTRUCTION MANAGER'S PRESENCE DURING TESTING

All tests performed by the Contractor shall be witnessed by the Construction Manager unless the requirement therefore is waived in writing. The Construction Manager may perform additional tests on materials previously tested by the Contractor, and the Contractor shall furnish samples for this purpose as requested.

00700-63 MATERIALS INCORPORATED IN WORK

The Contractor shall furnish all materials and equipment to be incorporated in the work. All such materials or equipment shall be new and of the highest quality available. Manufactured materials and equipment shall be obtained from sources which are currently manufacturing such materials, except as otherwise specifically approved by the Construction Manager.

00700-64 STORAGE OF MATERIALS

Materials and equipment to be incorporated in the work shall be stored in such a manner as to preserve their quality and fitness for the work and to facilitate inspection.

00700-65 PAYROLL REPORTS

The Contractor may be required to furnish payroll reports to the Construction Manager as required by the Owner Controlled Insurance Program.

00700-66 CONTRACTORS' REPRESENTATIVE

Before beginning work, the Contractor shall notify the Construction Manager in writing of one person within its organization who shall have complete authority to supervise the work, receive orders from the Construction Manager, and represent the Contractor in all matters arising pursuant to this agreement. The Contractor shall not remove its representative without first designating in writing a new representative. The Contractor's representative shall normally be present at or about the site of work while the work is in progress. When neither the Contractor nor its representative is present at the work site, the superintendent, foreman, or other of the Contractor' employee in charge of the work shall be an authorized representative of the Contractor.

00700-67 SPECIALTY SUB-CONTRACTORS

The Contractor may utilize the services of specialty subcontractors on those parts of the project which, under normal contracting practices, are performed by specialty subcontractors. The Contractor shall not award more than seventy-five percent of the work to subcontractors.

00700-68 INSPECTION BY THE CONSTRUCTION MANAGER

All work pursuant to this agreement shall be subject to inspection by the Construction Manager for conformity with contract drawings and specifications. The Contractor shall give the Construction Manager reasonable advance notice of operations requiring special inspection of a portion of the work.

00700-69 WORK COVERED PRIOR TO CONSTRUCTION MANAGER'S INSPECTION

In the event that work is covered or completed without the approval of the Construction Manager, and such approval is required by the specifications or required in advance by the Construction Manager, the Contractor shall bear all costs involved in inspection notwithstanding conformance of such portion of the work to the contract drawings and specifications.

00700-70 SCHEDULING OF THE WORK

The work of this contract shall be planned, scheduled, executed, and reported as required by the Contract Documents.

00700-71 PROGRESS ESTIMATES

The Contractor shall prepare a written report for the Construction Manager's approval, on County forms, of the total value of work performed and materials and equipment obtained to the date of

submission. Such a report must accompany each request for a progress payment and is subject to review and approval by the Construction Manager. Approval of a progress estimate or tendering of a progress payment shall not be considered an approval or acceptance of any work performed, and all estimates and payments shall be subject to correction in subsequent estimates. Progress payments shall be made for all completed activities and for materials suitably stored on-site.

00700-72 PROGRESS PAYMENTS

Upon approval of each monthly estimate of work performed and materials furnished, the Construction Manager shall approve payment to the Contractor for the estimated value of such work, materials, and equipment, less the amount of all prior payments and any liquidated damages. The Contractor will be paid 100 percent, less retainage, of the cost of materials received and properly stored on-site but not incorporated into the work. Payments for materials or equipment stored on the site shall be conditioned upon submission by the Contractor of bills of sale to establish the County's title to such materials or equipment. The Contractor's request for payment shall provide sufficient detail as to the work completed or materials purchased for which payment is requested to permit meaningful review by the Construction Manager.

00700-73 TIME OF PAYMENT

The Contractor will be paid within 45 days following receipt of an approved Progress Estimate. The Contractor expressly agrees that the payment provisions within this Contract shall supersede the rates of interest, payment periods, and contract and subcontract terms provided for under the Georgia Prompt Pay Act, O.C.G.A. §13-11-1 et seq., and that the rates of interest, payment periods, and contract and subcontract terms provided for under the Prompt Pay Act shall have no application to this Contract. The County shall not be liable for any late payment interest or penalty.

00700-74 RETAINAGE

The County shall retain from each progress payment ten percent of the estimated value of the work performed until the progress payments, including retainage, total 50 percent of the contract price. If a contract includes two or more projects or assignments that have been separately priced and have separate budgets, and the performances of such projects or assignments are not related to or dependent upon the performance of any other, the 50 per cent limit shall be based upon the price for each individual project or assignment. Thereafter, no further retainage shall be withheld so long as the Contractor is making satisfactory progress to insure completion of the work within the time specified therefore. The County may reinstate the ten percent retainage in the event the Construction Manager determines that the Contractor is not making satisfactory progress to complete the work within the time specified in this agreement or in the event that the Construction Manager provides a specific cause for such withholding. The County may also withhold retainage upon substantial completion of the work as provided in O.C.G.A. §13-10-81(c). Interest may be paid upon the retainage in accordance with Georgia law.

00700-75 PAYMENT OF SUBCONTRACTORS

The Contractor shall promptly pay each subcontractor upon the receipt of payment from the County. Such payment shall be made from the amount paid to the Contractor pursuant to the subcontractor's work. The Contractor shall also maintain the records of the percentage retained from payments to the Contractor pursuant to such subcontractor's work. The Contractor shall procure agreements from each subcontractor requiring each subcontractor to pay their subcontractors, agents and employees in a similar manner. The County reserves the right to inquire of any subcontractor, supplier, materialmen, or subconsultant, the status of any indebtedness of the Contractor. The County further reserves the right to require the Contractor to designate on each instrument of payment exceeding $400.00 to subcontractors, suppliers, materialmen, and subconsultants that such payment is on account of the work under this Contract.

00700-76 COUNTY'S RESPONSIBILITIES TO SUBCONTRACTORS

Neither the County nor the Construction Manager shall have any obligation to pay any subcontractor except as otherwise required by law.

00700-77 PROGRESS PAYMENTS - ACCEPTANCE OF WORK

Certification of progress payments, as well as the actual payment thereof, shall not constitute the County's acceptance of work performed pursuant to this agreement.

00700-78 PAYMENTS IN TRUST

All sums paid to the Contractor pursuant to this agreement are hereby declared to constitute trust funds in the hands of the contractor to be applied first to the payment of claims of subcontractors, laborers, and suppliers arising out of the work, to claims for utilities furnished and taxes imposed, and to the payment of premiums on surety and other bonds and on insurance for any other application.

00700-79 JOINT PAYMENTS

The County reserves the right to issue any progress payment or final payment by check jointly to the Contractor and any subcontractor or supplier.

00700-80 RIGHT TO WITHHOLD PAYMENT

The Construction Manager may decline to approve payment and may withhold payment in whole or in part to the extent reasonable and necessary to protect the County against loss due to defective work, probable or actual third party claims, the Contractor's failure to pay subcontractors or materialmen, reasonable evidence that the work will not be completed within the contract time or contract price or damage to the County or any other contractor on the project.

00700-81 CERTIFICATE OF SUBSTANTIAL COMPLETION

Upon the Contractor's submission of a request for a certificate of Substantial Completion, the Construction Manager shall inspect the work and determine whether the work is Substantially Complete. If the work is Substantially Complete, the Construction Manager shall issue a certificate of Substantial Completion of the work which shall establish the date of Substantial Completion, shall state the responsibilities of the County and the Contractor for security, maintenance, heat, utilities, damage to the work and insurance, and shall fix the time within which the Contractor shall complete the items submitted by the Contractor as requiring correction or further work. The certificate of substantial completion of the work shall be submitted to the County and the Contractor for their written acceptance of the responsibilities assigned to them pursuant to such certificate.

If in the sole opinion of the Construction Manager, the work is not substantially complete, the Construction Manager shall notify the Contractor of such, in writing, and outline requirements to be met to achieve Substantial Completion.

00700-82 PAYMENT UPON SUBSTANTIAL COMPLETION

Upon Substantial Completion of the work and upon application by the Contractor and approval by the Construction Manager, the County shall make payment reflecting 100% work completed, less value of work remaining as determined by Construction Manager and any authorized retainage.

00700-83 COMMENCEMENT OF WARRANTIES

Warranties required by this agreement shall commence on the date of final completion of the project as determined under Article 00700-84 unless otherwise provided in the certificate of Substantial Completion.

00700-84 FINAL PAYMENT - WAIVER OF CLAIMS, DISPUTE OF FINAL PAYMENT

The acceptance of the Substantial Completion 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 application for payment at Substantial Completion and except for the retainage sums due at final acceptance. Following the Construction Manager's issuance of the certificate of Substantial Completion and the Contractor's completion of the work pursuant to this agreement, the Contractor shall forward to the Construction Manager a written notice that the work is ready for final inspection and acceptance. If after inspection the Construction Manager certifies that the work is complete and issues written notification of such to the Contractor, the Contractor shall forward to the Construction Manager a final application for payment. The Construction Manager shall issue a certificate for payment, which shall approve final payment to the Contractor and shall establish the date of final completion.

In the event the Contractor timely disputes the amount of the final payment, the amount due the Contractor shall be deemed by the Contractor and the County to be an unliquidated sum and no interest shall accrue or be payable on the sum finally determined to be due to the Contractor for any period prior to final determination of such sum, whether such determination be by agreement of the Contractor and the County or by final judgment of the proper court in the event of litigation between the County and the Contractor. The Contractor specifically waives and renounces any and all rights it may have under O.C.G.A. §13-6-13 and agrees that in the event suit is brought by the Contractor against the County for any sum claimed by the Contractor under the Contract or for any extra or additional work, no interest shall be awarded on any sum found to be due from the County to the Contractor in the final judgment entered in such suit. All final judgments shall draw interest at the legal rate, as specified by law.

00700-85 DOCUMENTATION OF COMPLETION OF WORK

Neither the final payment nor the remaining retainage shall become due until the Contractor submits the following documents to the Construction Manager:

a. An affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the work have been paid other otherwise satisfied;

b. The surety's consent to final payment; and

c. Any other data reasonably required by the County or Construction Manager establishing payment or satisfaction of all such obligations, including releases, waivers of liens, and documents of satisfaction of debts.

In the event that a subcontractor refuses to furnish a release or waiver as required by the County or Construction Manager, the Contractor may furnish a bond satisfactory to the County to indemnify the County against such loss. In the event that any lien or indebtedness remains unsatisfied after all payments are made, the contractor shall refund to the County all moneys that the County may become compelled to pay in discharging such lien or other indebtedness, including all costs and reasonable attorney's fees.

00700-86 GOVERNING LAW

Each and every provision of this agreement shall be construed in accordance with and governed by Georgia law. The parties acknowledge that this contract is executed in Fulton County, Georgia and that the contract is to be performed in Fulton County, Georgia. Each party hereby consents to the Fulton Superior Court's sole jurisdiction over any dispute which arises as a result of the execution or performance of this agreement, and each party hereby waives any and all objections to venue in the Fulton Superior Court.

00700-87 CHANGES IN THE WORK

A. CHANGE ORDERS

1. A Change Order is a written order to the Contractor signed to show the approval and the authorization of the County, issued after execution of the Contract, authorizing a change in the Work and/or an adjustment in the Contract Sum or the Contract Time. Change Orders shall be written using forms designated by the County with Contractor providing supporting documentation as required by the Construction Manager. The Contract Sum and the Contract Time may be

changed only by approved Change Order pursuant to Fulton County Procedure 800-6. The amount payable by the Change Order is payment in full for all direct and indirect costs incurred and related to the work under said Change Order, including but not limited to delays, imports, acceleration, disruption and extended overhead. A Change Order signed by the Contractor indicates the Contractor's agreement therewith, including the adjustment in either or both of the Contract Sum or the Contract Time.

2. The County, without invalidating the Contract, may order changes in the Work within the general scope of the Contract as defined herein. The time allowed for performance of the work and the contract price to be paid to the Contractor may be adjusted accordingly.

3. The cost or credit to the County resulting from a change in the Work shall be determined in one or more of the following ways:

   a. By mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

   b. By unit prices stated in the Contract Documents or subsequently agreed upon;

   c. By cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

   d. By the method provided in Subparagraph A4 below.

4. If none of the methods set forth in Subparagraphs 3a, 3b, or 3c above is agreed upon, the Contractor, provided a written order signed by the Construction Manager is received, shall promptly proceed with the Work involved. The cost of such Work shall then be determined by the Construction Manager on basis of the reasonable expenditures and savings of those performing the Work attributable to the change. The cost of the change shall include only the items listed in Subparagraph 5a below, and in the case of either a decrease or an increase in the Contract Sum, an allowance for overhead and profit in accordance with the schedules set forth in Subparagraphs 5b and 6 below shall be applied to the cost or credit.

   a. In such case, and also under Subparagraph 3a above, the Contractor shall keep and present, in such form as the Construction Manager may prescribe, an itemized accounting of all actual costs expended, together with appropriate supporting data for inclusion in a Change Order.

   b. All hourly rate charges shall b submitted to the Construction Manager for prior review and approval. All hourly rate charges shall be properly supported as required by the Construction Manager with certified payrolls, or their acceptable equivalent. When authorized to proceed for a given change and actual expenditures have been made prior to execution of a Change Order for the entire change, such actual expenditures may be summarized monthly, and if approved, incorporated into a Change Order. When both additions and credits covering related Work or substitutions are involved in any one change, the allowance for overhead and profit shall be figured on the basis of the net increase or decrease, if any, with respect to that change.

5. In Subparagraphs 3 and 4 above, the items included in "Cost and "Overhead" shall be based on the following schedule:

   a. Unless otherwise provided in the Contract Documents, "Cost" shall be limited to the following: cost of materials incorporated into the Work, including sales tax and cost of delivery; cost of direct labor (labor cost

may include a pro rata share of foreman's account of the change) including social security, old age and unemployment insurance, and fringe benefits required by agreement or custom; workers' or workmen's compensation insurance; rental value of equipment and machinery; costs for preparing Shop Drawings.

b. Unless otherwise provided in the Contract Documents, "Overhead" shall include the following: bond and insurance premiums including increase and decreases from change in the Work, supervision, superintendence, construction parking, wages of timekeepers, watchmen and clerks, small tools, consumable supplies, expendables, incidentals, general office expense, the cost of additional reproduction for the Contractor's subcontractors beyond that agreed upon in the Contract Documents, construction parking, any additional costs of craft supervision by the Contractor's or subcontractors' superintendents, and overhead charges which would be customary and expended regardless of the change in the Work due to other overlapping activities which are included as part of the original Contract, and all other expenses not included in "Cost" above.

c. In the event that a change is issued by the County which would require the expenditure of substantial amounts of special supervision (beyond the foreman level) by the Contractor, the Contractor may, at the sole direction of the Construction Manager, be allowed to incorporate these charges into the agreement cost for the change.

6. In Subparagraphs 3 and 4 above, the allowance for overhead and profit combined, included in the total cost or credit to the County, shall be based on the following schedule:

a. For the Contractor, for any work performed by the Contractor's own forces, ten (10) percent of the cost.

b. For the Contractor, for any work performed by a Contractor's subcontractor, five (5) percent of the amount due the subcontractor.

c. For each subcontractor or sub-subcontractor involved, for any work performed by that subcontractor's or sub-subcontractor's own forces, ten (10) percent of the cost.

d. For each subcontractor, for work performed by a sub-subcontractor, five (5) percent of the amount due to the sub-subcontractor.

e. Cost to which overhead and profit is to be applied shall be determined in accordance with Subparagraph 5 above unless modified otherwise.

7. In order to facilitate checking of quotations for extras or credits, all proposals or bids, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs, including labor cost, materials and subcontracts. Labor and materials shall be itemized in the manner defined in Subparagraph 4 above. Where major cost items are subcontracts, they shall be itemized also. In no case shall a change be approved without such itemization.

8. No payment shall be made for any changes to the contract that are not included in a fully executed Change Order.

B. CONCEALED, UNKNOWN AND DIFFERING CONDITIONS

1. Should concealed conditions be encountered in the performance of the Work below the surface of the ground, or should concealed or unknown conditions in an existing structure be at variance with the conditions indicated by the Contract Documents, or should unknown physical conditions below the surface of the

ground or concealed or unknown conditions in an existing structure of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Contract, be encountered, the Contract Sum and Contract Time shall be equitably adjusted by Change Order upon request by either party made **within twenty (20) days after the first observance** of the conditions. No such request for equitable adjustment shall be valid unless the Contractor complies with this (20) days notice and Subparagraph C.1. below.

2. The Contractor shall promptly, and before such conditions are disturbed, notify the Construction Manager in writing of any claim of concealed, unknown or differing conditions pursuant to this paragraph. The Construction Manager shall authorize the Engineer to investigate the conditions, and if it is found that such conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performance of any part of the Work under this Contract, whether or not changed as a result of such conditions, an equitable adjustment shall be recommended to the Construction Manager.

3. No claim of the Contractor under this clause shall be allowed unless the Contractor has given the notice required in (a) above, prior to disturbing the condition.

4. No claim by the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this Contract.

5. Any materially differing site condition as between what is shown on the Drawings and Specifications and actually found on site shall be immediately reported to the Construction Manager in writing prior to the commencement of Work at the site. Failure of the Contractor to notify the Construction Manager in writing of the differing site condition prior to performance of Work at the site shall constitute a waiver of any claim for additional monies. Any Change Order necessitated by the differing site condition shall be processed as provided under "Changes in the Contract".

C. REQUESTS FOR ADDITIONAL COST

1. If the Contractor wishes to request an increase in the Contract Sum, the Contractor shall give the Construction Manager written notice thereof within twenty (20) days after the occurrence of the event, or identification of the conditions, giving rise to such request. This notice shall be give by the Contractor before proceeding to execute the Work, except in an emergency endangering life or property in which case the Contractor shall proceed in accordance with Article 00700-25 and Subparagraph A.4 above. No such request shall be valid unless so made within the twenty (20) days specified above. If the County and the Contractor cannot agree on the amount of the adjustment in the Contract Sum, it shall be determined by the Construction Manager. Any change in the Contract Sum resulting from such claim shall be documented by Change Order.

2. If the Contractor claims that addition cost is involved because of, but not limited to (1) any written interpretation pursuant to General Condition 00700-17 of this Agreement, (2) any order by the County to stop the Work pursuant to Articles 00700-25 and 00700-37 of this Agreement where the Contractor was not at fault, or any such order by the Construction Manager as the County's agent, or (3) any written order for a minor change in the Work issued pursuant to Paragraph D below, the Contractor shall submit a request for an increase in the Contract Sum as provided in Subparagraph C.1 above. No such claim shall be valid unless the Contractor complies with Subparagraph C.1 above and approved by the County pursuant to Change Order Policy 800-6.

D. MINOR CHANGES IN THE WORK

The Construction Manager may order minor changes in the Work not involving an adjustment in the Contract Price, extension of the time allowed for performance of the work and not inconsistent with the intent of the Contract Documents. Such changes shall be effected by a written Change Directive issued by the Construction Manager, and shall be binding on the County and the Contractor. The Contractor shall carry out such written orders promptly.

E. BONDS

If any change order results in an increase in the contract price, the contractor shall increase the penal sum of the performance and payment bonds to equal the increased price.

00700-88 DISAGREEMENT WITH ORDERS FOR CHANGE

Contractor's written acceptance of a Change Order or other order for changes shall constitute his final and binding agreement to the provisions thereof and a waiver of all claims in connection therewith, whether direct or consequential in nature. Should Contractor disagree with any order for changes, he may submit a notice of potential claim to the Construction Manager, at such time as the order is set forth in the form of a Change Order. Disagreement with the provisions of an order for changes shall not relieve Contractor of his obligation under Article 00700-87 of this Agreement.

00700-89 NO WAIVER OF REMEDIES

Exercise by the County of any remedy is not exclusive of any other remedy available to County and shall not constitute a waiver of any such other remedies. Failure of the County to exercise any remedy, including breach of contract remedies, shall not preclude the County from exercising such remedies in similar circumstances in the future.

00700-90 LAND AND RIGHTS-OF-WAY

The owner will provide, as indicated in the Contract Documents and prior to Notice to Proceed, the lands upon which the work is to be done, right-of-way for access thereto, and such other lands which are designated for the use of the Contractor. The Contractor shall confine the Contractor’s work and all associated activities to the easements and other areas designated for the Contractor’s use. The Contractor shall comply with any limits on construction methods and practices which may be required by easement agreements. If, due to some unforeseen reason, the necessary easements are not obtained, the Contractor shall receive an equitable extension of contract time dependent upon the effect on the critical path of the project schedule or the County may terminate the Contract for its convenience.

00700-91 COORDINATION WITH STATE DEPARTMENT OF TRANSPORTATION

No clearing or grading shall be completed by Contractor within the State Department of Transportation (DOT) area under construction. The Contractor must coordinate his construction scheduling with DOT.

If the Contractor begins work before DOT’s completion date, he must obtain the approval of DOT before starting work in the area. The state DOT has the right to stop the Contractor’s work the DOT area.

The Contractor shall receive no additional compensation or damages resulting from delay or work stoppage from DOT actions or scheduling.

Contractor shall obtain DOT drawings of the DOT, project area for verification of road geometry, storm drains, etc. from Georgia Department of Transportation or Fulton County. The Contractor is responsible for obtaining any pertinent DOT revisions.

I N D E X

EXHIBIT A

FINAL AFFIDAVIT

TO FULTON COUNTY, GEORGIA

I, _____, hereby certify that all suppliers of materials, equipment and service, subcontractors, mechanic, and laborers employed by _____ or any of his subcontractors in connection with the design and/or construction of _____ at Fulton County have been paid and satisfied in full as of _____, 200___, and that there are no outstanding obligations or claims of any kind for the payment of which Fulton County on the above-named project might be liable, or subject to, in any lawful proceeding at law or in equity.

_____
Signature

_____
Title

Personally appeared before me this _____ day of _____, 200_____. _____, who under Oath deposes and says that he is _____of the firm of _____, that he has read the above statement and that to the best of his knowledge and belief same is an exact true statement.

_____
Notary Public

_____
My Commission expires

END OF SECTION

Part 1 Scope of Services

1.01 General

A. Introduction: The North Fulton County Water System requires an additional 4,000,000 gallons of storage. Two elevated tanks with a capacity of 2,000,000 gallons each will be constructed. The project site is a 2± acre parcel of property located in Roswell, Georgia.

B. Project Description: Services to be provided under this contract include the complete design, permitting, construction and initial operation of the Hackett Road Elevated Water Storage Tanks indicated on the attached drawings and described below.

1. Two elevated tanks of 2,000,000 gallon capacity contained within a vertical distance between overflow level and bottom of tank of not more than 40 feet shall be constructed. Tank shall be constructed complete with accessories as shown and specified.

2. A new twenty-four inch ductile iron water main shall connect the tank to the existing 12-inch water main stub at the booster pump station. The 24 inch line shall serve as the inlet/outlet line for the tank.

3. Twelve-inch drain/emergency overflow line shall be installed for the tank.

4. Construction shall include all conduits, brackets, power supply, etc. necessary for the installation of instrumentation to measure and monitor tank levels.

5. Electrical service shall be provided for lighting the interior space of the tank pier. Power shall be provided for instrumentation, cathodic protection and convenience outlets as required.

6. Site grading and drainage shall be completed as designated on drawings.

7. The County will secure the land disturbance permit from the City of Roswell. The County shall also secure a Utility Encroachment Permit from the Georgia DOT. The Contractor is responsible for all other permits required, including City of Roswell building permit.

8. Geotechnical investigations in addition to the soils investigation completed by the Owner shall be completed as deemed necessary by the Contractor.

C. Schedule: Design, permitting, construction, testing and startup of these improvements must be accomplished within the time allotted for each of the bid items as listed on the bid form.

D. The Contractor's services shall include all design and engineering services, construction, equipment and equipment installation required to complete the work. The Contractor shall provide or cause to be provided and shall pay for all design and engineering services, testing services, labor, materials, equipment, tools, construction equipment and machinery, temporary utilities, transportation and all other facilities and services including permits and fees necessary for proper

execution and completion of the work, whether temporary or permanent, and whether or not incorporated or to be incorporated in the work. The above shall be provided such that the facility is turned over to the county in a complete, finished, and fully functional and operating manner.

1.02 Scope of Work

A. Project Schedule: Time is of the essence on this project. The Contractor shall provide a project schedule within 10 days of Notice to Proceed.

B. Preliminary Design: The Contractor shall provide a preliminary design package demonstrating scope and detail of the system to be provided.

1. Preliminary Design Documents shall include layout, ventilation and mechanical requirements and structural design and engineering.

2. Preliminary Design Documents shall describe the components of the project and shall include, but not be limited to, site plans, foundation plan, typical elevation, typical sections and accessories locations, as well as may be appropriate.

3. The Contractor shall provide the County with a minimum of six sets of Preliminary design documents for review. The review period by the County shall include a meeting between the County and the Contractor. The drawings and related information submitted to the County shall become the property of the County upon submission by the Contractor.

4. The Contractor shall review comments provided from the County and attend a coordination meeting with the County. The Contractor shall incorporate the County's final review comments into the drawings and respond to County document review comments in writing following the coordination meeting indicating the final resolution of each comment.

5. If the County accepts the Preliminary Design, the County shall issue the Notice of Acceptance in writing to the Contractor.

6. The Contractor shall develop and recommend a plan for final design and construction activities. The schedule shall reflect this approach.

7. The Contractor shall not commence with the work described below without written approval from the County.

C. Final Design and As-Built Documents

1. Final design drawings and specifications shall be prepared for work to be performed by the Contractor to a level of detail sufficient for permitting and construction to proceed. Documents shall set forth, in detail, the requirements for construction of the work and shall:

a. Develop the intent of the Contractor's preliminary design documents in greater detail.

b. Provide information necessary for the use of those in the building trades who shall be constructing the work.

c. Include documents required for regulatory agency approvals.

2. The Contractor shall submit (6) six sets of final Construction Documents to the County. Each drawing and cover page of the specifications shall be stamped by professional engineers and/or architects registered in the State of Georgia. The Contractor may commence construction after submittal of the approved final design plans and specifications.

3. The Contractor shall submit six sets of final set of as-built drawings and specifications used to design and construct this Project. The drawings and specifications shall be complete with stamps and signatures of the Architects and Engineers of Record affixed to each drawing and the specification cover page. Architects and Engineers of the Contractor shall monitor construction of the project in order to stamp and seal as-built drawings as may be required.

D. Construction and Final Completion: The Contractor shall provide or cause to be provided and shall pay for all design and engineering services, testing services, labor, materials, equipment, tools, construction equipment and machinery, temporary utilities, transportation, and other facilities and services necessary for proper execution and completion of the work, whether temporary or permanent and whether or not incorporated or to be incorporated in the work.

E. Special Construction Requirements

1. Notify, in writing, the Construction Manager and the Fulton County Water System Water Superintendent at least 48 hours prior to initiating activities relating to tapping or relocating piping.

2. Trade names and manufactures for all products, materials and systems provided for the project shall be of industrial quality and performance from nationally recognized companies.

3. Manufacturers, products and systems manufacturers other than those listed that can provide materials and systems equal in material, performance, quality and characteristics of listed manufacturers may be considered by the County. Final decision regarding equals are reserved by the County.

F. Special Conditions

1. Where existing facilities are on site, the operation of these facilities shall not be interrupted without the County's written permission. Secure written permission for demolition, utility cut off, etc. County's permission will be required for workmen to occupy or be present in or on existing facilities.

2. Confine equipment, tools, materials, and the operation of workmen to limits required by law, ordinances, rules, regulations and/or direction of the Contractor, and shall not unreasonably occupy the job site with equipment, tools or materials. The subContractors shall abide by and enforce the Contractor’s instructions regarding signs, advertisements, fires, and smoking at the job site. Parking of vehicles shall be coordinated with the County.

3. Contractor shall not store materials or equipment outside the limits of the property without written permission of adjacent property owners. If said areas are damaged during construction the Contractor shall be responsible for returning same to their pre-construction condition.

4. The Contractor and SubContractors shall abide by and enforce County's instructions regarding signs, advertisements, fires and smoking at the job site.

G. Permitting Requirements

1. The Contractor shall, without additional expense to the Owner, be responsible for obtaining all necessary approvals, permits, and licenses, including building permits, and complying with any applicable federal, state, county, and municipal laws, codes, and regulations in connection with the prosecution of work associated with this project. County shall secure land disturbance and Georgia DOT Utility Encroachment permit.

2. It is anticipated that approval of construction drawings will be required by, but not necessarily limited to, the Fulton County Department of Public Works, and The City of Roswell.

END OF SECTION

Part 1 General

1.01 Scope

The scope of this Section is to convey to the Contractor unique and unusual stipulations and requirements which have been established for this Project. Some of the stipulations and requirements are a result of negotiations with various entities and organizations which have an interest in this Project. Some requirements are based on technical aspects of the Project which are not otherwise conveyed to the Contractor. The provisions of this Section shall supersede the provisions of the Division 1 through 17 Specifications but shall not supersede the Bidding Requirements, Contract Forms or Conditions of the Contract.

1.02 Submittals

A. Sequence Submittal

1. Submit a proposed sequence in accordance with Section 01340 with appropriate times of starting and completion of tasks to Engineer for review.

1.03 Existing Facility Operations

A. The Contractor shall coordinate the work with the Owner so that the construction will not restrain or hinder the operation of the existing facilities. If, at any time, any portion of the facilities are out of service, the Contractor must obtain approval from the Owner as to the date, time and length of time that portion of the facilities are out of service.

B. Connections to the existing facilities or alteration of existing facilities will be made at times when the facility involved is not in use or at times, established by the Owner, when the use of the facility can be conveniently interrupted for the period of time needed to make the connection or alteration.

C. After having coordinated the work with the Owner, the Contractor shall prepare a submittal in accordance with Section 01340 to include the time, time limits and methods of each connection or alteration and have the approval of the Engineer before any work is undertaken on the connections or alterations.

D. Before any roadway or facilities are blocked off, the Owner's approval shall be obtained to coordinate operations for the plant.

1.04 Sequencing

A. General

1. The Contractor shall be solely responsible for all construction sequencing.

2. The completion of specific preliminary sequencing tasks indicated will be required prior to any significant site demolition.

B. Notify the Owner at least ten days prior to starting to relocate piping or taking existing components out of service.

1.05 Administration Period

A. During the Administration Period the Contractor shall be limited in site access to only the following:

1. Nondestructive field verification of existing conditions.

2. Construction of Engineer's and Contractor's temporary field offices.

B. During the Administration Period the Contractor shall complete, as a minimum, the following:

1. Issuance of contracts, subcontracts, and purchase orders for all major products and systems.

2. Complete all submittals, release for manufacture, and schedule delivery for the products or systems referenced above.

3. Prepare and submit approvable documents required by Section 01310, including OPS and the Schedule of Values.

4. Install Engineer's and Contractor's temporary field offices complete with all required utilities, internet, network, supplies, and furnishings required.

5. Complete and submit all preconstruction photos, videos, and initial aerial photographs.

B. The duration of the Administration Period is 60 consecutive calendar days, after which time the Construction Period shall automatically begin. Construction Period may begin prior to the 60 days, provided all requirements of the Administration Period have been completed, submitted, and approved by the Engineer.

END OF SECTION

Part 1 General

1.01 Partial Occupancy By Owner

Whenever, in the opinion of the Engineer, any section or portion of the Work or any structure is in suitable condition, it may be put into use upon the written order of the Engineer and such usage will not be held in any way as an acceptance of said Work or structure, or any part thereof, or as a waiver of any of the provisions of these Specifications and the Contract. Pending final completion and acceptance of the Work, all necessary repairs and replacements, due to defective materials or workmanship or operations of the Contractor, for any section of the Work so put into use shall be performed by the Contractor at Contractor's own expense.

END OF SECTION

Part 1 General

1.01 Scope

A. The Bid lists each item of the Project for which payment will be made. No payment will be made for any items other than those listed in the Bid.

B. Required items of work and incidentals necessary for the satisfactory completion of the work which are not specifically listed in the Bid, and which are not specified in this Section to be measured or to be included in one of the items listed in the Bid, shall be considered as incidental to the work. All costs thereof, including Contractor's overhead costs and profit, shall be considered as included in the lump sum or unit prices bid for the various Bid items. The Contractor shall prepare the Bid accordingly.

C. Work includes furnishing all plant, labor, equipment, tools and materials, which are not furnished by the Owner and performing all operations required to complete the work satisfactorily, in place, as specified and as indicated on the Drawings.

1.02 Descriptions

A. Measurement of an item of work will be by the unit indicated in the Bid.

C. Payment will include all necessary and incidental related work not specified to be included in any other item of work listed in the Bid.

D. Unless otherwise stated in individual sections of the Specifications or in the Bid, no separate payment will be made for any item of work, materials, parts, equipment, supplies or related items required to perform and complete the work. The costs for all such items required shall be included in the price bid for item of which it is a part.

E. Payment will be made by extending unit prices multiplied by quantities provided and then summing the extended prices to reflect actual work. Such price and payment shall constitute full compensation to the Contractor for furnishing all plant, labor, equipment, tools and materials not furnished by the Owner and for performing all operations required to provide to the Owner the entire Project, complete in place, as specified and as indicated on the Drawings.

F. “Products” shall mean materials or equipment permanently incorporated into the work.

1.02 Elevated Water Storage Tank

Payment for construction of the elevated water storage tank shall be made on a lump sum basis and shall include payment for all work required to construct the new tank and make all site improvements as shown on the plans and described in the specifications.

1.03 Erosion and Sedimentation Control

A. No separate payment shall be made for temporary and/or permanent erosion and sedimentation controls. All temporary and/or permanent erosion and sedimentation control costs shall be included in the unit price bid for the item to which it pertains.

B. No payment will be made for any portion of the Project for which temporary erosion and sedimentation controls are not properly maintained.

1.04 Cash Allowances

A. General

1. The Contractor shall include in the Bid Total all allowances stated in the Contract Documents. These allowances shall cover the net cost of the services provided by a firm selected by the Owner. The Contractor's handling costs, labor, overhead, profit and other expenses contemplated for the original allowance shall be included in the items to which they pertain and not in allowances.

2. No payment will be made for nonproductive time on the part of testing personnel due to the Contractor's failure to properly coordinate testing activities with the work schedule or the Contractor's problems with maintaining equipment in good working condition. The Contractor shall make all necessary excavations and shall supply any samples of materials necessary for conducting compaction and density tests.

3. No payment shall be provided for services that fail to verify required results.

B. Should the net cost be more or less than the specified amount of the allowance, the Contract will be adjusted accordingly by change order. The amount of change order will not recognize any changes in handling costs at the site, labor, overhead, profit and other expenses caused by the adjustment to the allowance.

C. Documentation

1. Submit copies of the invoices with each periodic payment request from the firm providing the services.

2. Submit results of services provided which verify required results.

D. Schedule of Cash Allowances

1. Soils and Concrete Testing: Allow the amount provided in the Bid for the services of a geotechnical engineering firm and testing laboratory to verify soils conditions including trench excavation and backfill, bearing resistance and similar issues and for the testing of concrete cylinders for poured in place concrete.

2. Additional Landscaping Not Shown on the Drawings: Allow the amount specified in the Bid for the provision of landscaping in addition to that shown on the Drawings, when directed by the Engineer.

3. Instrumentation Interface: Allow the amount specified in the Bid for the provision of connecting the new tank instrumentation to the existing County SCADA system.

4. Unforeseen Utility Conflicts: Allow the amount specified in the Bid for the work as may be required due to unforeseen conflicts with existing underground utilities as approved by the Engineer.

END OF SECTION

Part 1 General

1.01 Scope

A. Construction staking shall include all of the surveying work required to layout the Work and control the location of the finished Project. The Contractor shall have the full responsibility for constructing the Project to the correct horizontal and vertical alignment, as shown on the Drawings, as specified, or as ordered by the Engineer. The Contractor shall assume all costs associated with rectifying work constructed in the wrong location.

B. From the information shown on the Drawings and the information to be provided as indicated under Project Conditions below, the Contractor shall:

1. Be responsible for setting reference points and/or offsets, establishment of baselines, and all other layout, staking, and all other surveying required for the construction of the Project.

2. Safeguard all reference points, stakes, grade marks, horizontal and vertical control points, and shall bear the cost of re establishing same if disturbed.

3. Stake out the permanent and temporary easements or the limits of construction to ensure that the Work is not deviating from the indicated limits.

4. Be responsible for all damage done to reference points, baselines, center lines and temporary bench marks, and shall be responsible for the cost of re establishment of reference points, baselines, center lines and temporary bench marks as a result of the operations.

C. Baselines shall be defined as the line to which the location of the Work is referenced, i.e., edge of pavement, road centerline, property line, right of way or survey line.

D. Record Drawing surveys shall be performed in accordance with Section 01720 of these Specifications.

1.02 Project Conditions

A. The Drawings provide the location and/or coordinates of principal components of the Project. The alignment of some components of the Project may be indicated in the Specifications. The Engineer may order changes to the location of some of the components of the Project or provide clarification to questions regarding the correct alignment.

B. The survey points, control points, and baseline to be provided to the Contractor shall be limited to only that information which can be found on the Project site by the Contractor.

1.03 Water Mains and Accessories

A. Staking Precision: The precision of construction staking required shall be that which the correct location of the water main can be established for construction and verified by the Engineer. Where the location of components of the water main, e.g. fittings, valves, road crossings and are not dimensioned, the

establishment of the location of these components shall be based upon scaling these locations from the Drawings with relation to readily identifiable land marks, e.g., survey reference points, power poles, manholes, etc.

B. Reference Points

1. Reference points shall be placed, at or no more than three feet, from the outside of the construction easement or right of way. The location of the reference points shall be recorded in a log with a copy provided to the Engineer for use, prior to verifying reference point locations. Distances shall be accurately measured to 0.01 foot.

2. The Contractor shall give the Engineer reasonable notice that reference points are set. The reference point locations must be verified by the Engineer prior to commencing clearing and grubbing operations.

END OF SECTION

Part 1 General

1.01 Scope

A. Permits and Responsibilities: The Contractor shall, without additional expense to the Owner, be responsible for obtaining all necessary licenses and permits, including building permits, and for complying with any applicable federal, state, county and municipal laws, codes and regulations, in connection with the prosecution of the Work.

B. The Contractor shall take proper safety and health precautions to protect the Work, the workers, the public and the property of others.

C. The Contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the Work, except for any completed unit of construction thereof which may heretofore have been accepted.

END OF SECTION

Part 1 General

1.01 Description

A. Whenever reference is made to conforming to the standards of any technical society, organization, body, code or standard, it shall be construed to mean the latest standard, code, specification or tentative specification adopted and published at the time of advertisement for Bids. This shall include the furnishing of materials, testing of materials, fabrication and installation practices. In those cases where the Contractor's quality standards establish more stringent quality requirements, the more stringent requirement shall prevail. Such standards are made a part hereof to the extent which is indicated or intended.

B. The inclusion of an organization under one category does not preclude that organizations' standards from applying to another category.

C. In addition, all work shall comply with the applicable requirements of local codes, utilities and other authorities having jurisdiction.

D. All material and equipment, for which a UL Standard, an AGA or NSF approval or an ASME requirement is established, shall be so approved and labeled or stamped. The label or stamp shall be conspicuous and not covered, painted, or otherwise obscured from visual inspection.

E. The standards which apply to this Project are not necessarily restricted to those organizations which are listed in Article 1.02.

1.02 Standard Organizations

A. Piping and Valves

ACPA	American Concrete Pipe Association
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
AWWA	American Water Works Association
CISPI	Cast Iron Soil Pipe Institute
DIPRA	Ductile Iron Pipe Research Association
FCI	Fluid Controls Institute
MSS	Manufacturers Standardization Society
NCPI	National Clay Pipe Institute
NSF	National Sanitation Foundation
PPI	Plastic Pipe Institute
Uni Bell	PVC Pipe Association

B. Materials

AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials

C. Painting and Surface Preparation

NACE	National Association of Corrosion Engineers
SSPC	Steel Structures Painting Council

D. Electrical and Instrumentation

AEIC	Association of Edison Illuminating Companies
AIEE	American Institute of Electrical Engineers
EIA	Electronic Industries Association
ICEA	Insulated Cable Engineers Association
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
IPC	Institute of Printed Circuits
IPCEA	Insulated Power Cable Engineers Association
ISA	ISA – The Instrumentation, Systems, and Automation Society
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
REA	Rural Electrification Administration
TIA	Telecommunications Industries Association
UL	Underwriter's Laboratories
VRCI	Variable Resistive Components Institute

E. Aluminum

AA	Aluminum Association
AAMA	American Architectural Manufacturers Association

F. Steel and Concrete

ACI	American Concrete Institute
AISC	American Institute of Steel Construction, Inc.
AISI	American Iron and Steel Institute
CRSI	Concrete Reinforcing Steel Institute
NRMA	National Ready Mix Association
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute

G. Welding

ASME	American Society of Mechanical Engineers
AWS	American Welding Society

H. Government and Technical Organizations

AIA	American Institute of Architects
APHA	American Public Health Association
APWA	American Public Works Association
ASA	American Standards Association
ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASQC	American Society of Quality Control
ASSE	American Society of Sanitary Engineers
CFR	Code of Federal Regulations
CSI	Construction Specifications Institute
EDA	Economic Development Administration
EPA	Environmental Protection Agency
FCC	Federal Communications Commission
FmHA	Farmers Home Administration

FS	Federal Specifications
IAI	International Association of Identification
ISEA	Industrial Safety Equipment Association
ISO	International Organization for Standardization
ITE	Institute of Traffic Engineers
NBFU	National Board of Fire Underwriters
(NFPA)	National Fluid Power Association
NBS	National Bureau of Standards
NISO	National Information Standards Organization
OSHA	Occupational Safety and Health Administration
SI	Salt Institute
SPI	The Society of the Plastics Industry, Inc.
USDC	United States Department of Commerce
WEF	Water Environment Federation

I. General Building Construction

AHA	American Hardboard Association
AHAM	Association of Home Appliance Manufacturers
AITC	American Institute of Timber Construction
APA	American Parquet Association, Inc.
APA	American Plywood Association
BHMA	Builders Hardware Manufacturers Association
BIFMA	Business and Institutional Furniture Manufacturers Association
DHI	Door and Hardware Institute
FM	Factory Mutual Fire Insurance Company
HPMA	Hardwood Plywood Manufacturers Association
HTI	Hand Tools Institute
IME	Institute of Makers of Explosives
ISANTA	International Staple, Nail and Tool Association
ISDSI	Insulated Steel Door Systems Institute
IWS	Insect Screening Weavers Association
MBMA	Metal Building Manufacturers Association
NAAMM	National Association of Architectural Metal Manufacturers
NAGDM	National Association of Garage Door Manufacturers
NCCLS	National Committee for Clinical Laboratory Standards
NFPA	National Fire Protection Association
NFSA	National Fertilizer Solutions Association
NKCA	National Kitchen Cabinet Association
NWMA	National Woodwork Manufacturers Association
NWWDA	National Wood Window and Door Association
RMA	Rubber Manufacturers Association
SBC	SBCC Standard Building Code
SDI	Steel Door Institute
SIA	Scaffold Industry Association
SMA	Screen Manufacturers Association
SPRI	Single Ply Roofing Institute
TCA	Tile Council of America
UBC	Uniform Building Code

J. Roadways

AREA	American Railway Engineering Association
DOT	Department of Transportation
SSRBC	Standard Specifications for Construction of Transportation Systems, Georgia Department of Transportation

K. Plumbing

AGA	American Gas Association
NSF	National Sanitation Foundation
PDI	Plumbing Drainage Institute
SPC	SBCC Standard Plumbing Code

L. Refrigeration, Heating, and Air Conditioning

AMCA	Air Movement and Control Association
ARI	American Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
CGA	Compressed Gas Association
CTI	Cooling Tower Institute
HEI	Heat Exchange Institute
IIAR	International Institute of Ammonia Refrigeration
NB	National Board of Boilers and Pressure Vessel Inspectors
PFMA	Power Fan Manufacturers Association
SAE	Society of Automotive Engineers
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SMC	SBCC Standard Mechanical Code
TEMA	Tubular Exchangers Manufacturers Association

M. Equipment

AFBMA	Anti Friction Bearing Manufacturers Association, Inc.
AGMA	American Gear Manufacturers Association
ALI	Automotive Lift Institute
CEMA	Conveyor Equipment Manufacturers Association
CMAA	Crane Manufacturers Association of America
DEMA	Diesel Engine Manufacturers Association
MMA	Monorail Manufacturers Association
OPEI	Outdoor Power Equipment Institute, Inc.
PTI	Power Tool Institute, Inc.
RIA	Robotic Industries Association
SAMA	Scientific Apparatus Makers Association

1.03 Symbols

Symbols and material legends shall be as scheduled on the Drawings.

END OF SECTION

Part 1 General

1.01 Scope

A. Work under this Section includes all scheduling and administering of pre construction and progress meetings as herein specified and necessary for the proper and complete performance of this Work.

B. Scheduling and Administration by Engineer:

1. Prepare agenda.

2. Make physical arrangements for the meetings.

3. Preside at meetings.

4. Record minutes and include significant proceedings and decisions.

5. Distribute copies of the minutes to participants.

1.02 Preconstruction Conference

A. The Engineer shall schedule the preconstruction conference prior to the issuance of the Notice to Proceed.

B. Representatives of the following parties are to be in attendance at the meeting:

1. Owner.

2. Engineer.

3. Contractor and superintendent.

4. Major subcontractors.

5. Representatives of governmental or regulatory agencies when appropriate.

C. The agenda for the preconstruction conference shall consist of the following as a minimum:

1. Distribute and discuss a list of major subcontractors and a tentative construction schedule.

2. Critical work sequencing.

3. Designation of responsible personnel and emergency telephone numbers.

4. Processing of field decisions and change orders.

5. Adequacy of distribution of Contract Documents.

6. Schedule and submittal of shop drawings, product data and samples.

7. Pay request format, submittal cutoff date, pay date and retain age.

8. Procedures for maintaining record documents.

9. Use of premises, including office and storage areas and Owner's requirements.

10. Major equipment deliveries and priorities.

11. Safety and first aid procedures.

12. Security procedures.

13. Housekeeping procedures.

14. Work hours.

?1.03 Project Coordination Meetings

Project Coordination Meetings may be requested at any time at the discretion of the Owner, Engineer or Contractor. The party requesting a meeting shall provide the other two parties with as much notice as possible, as well as a written agenda for such meeting.

?1.03 Project Coordination Meetings

A. Schedule regular monthly meetings as directed by the Engineer.

B. Hold called meetings as the progress of the Work dictates.

C. The meetings shall be held at the location indicated by the Engineer.

D. Representatives of the following parties are to be in attendance at the meetings:

1. Engineer.

2. Contractor and superintendent.

3. Major subcontractors as pertinent to the agenda.

4. Owner's representative as appropriate.

5. Representatives of governmental or other regulatory agencies as appropriate.

E. The minimum agenda for progress meetings shall consist of the following:

1. Review and approve minutes of previous meetings.

2. Review work progress since last meeting.

3. Note field observations, problems and decisions.

4. Identify problems which impede planned progress.

5. Review off site fabrication problems.

6. Review Contractor's corrective measures and procedures to regain plan schedule.

7. Review Contractor's revision to the construction schedule as outlined in the Supplementary Conditions.

8. Review submittal schedule; expedite as required to maintain schedule.

9. Maintenance of quality and work standards.

10. Review changes proposed by Owner for their effect on the construction schedule and completion date.

11. Complete other current business.

END OF SECTION

Part 1 General

1.01 Scope

A. The work under this Section includes preparing, furnishing, distributing, and periodic updating of the construction schedules as specified herein.

B. The purpose of the schedule is to demonstrate that the Contractor can complete the overall Project within the Contract Time and meet all required interim milestones.

1.02 Submittals

A. Overall Project Schedule (OPS)

1. Submit the schedule within 10 days after date of the Notice to Proceed.

2. The Engineer will review the schedule and return it within 10 days after receipt.

3. If required, resubmit within 10 days after receipt of a returned copy.

B. Near Term Schedule (NTS)

1. Submit the first Near Term Schedule within 10 days of the Notice to Proceed.

2. The Engineer will review the schedule and return it within 10 days after receipt.

C. Submit an update of the OPS and NTS with each progress payment request.

D. Submit the number of copies required by the Contractor, plus four copies to be retained by the Engineer.

1.03 Approval

Approval of the Contractor's detailed construction program and revisions thereto shall in no way relieve the Contractor of any of Contractor's duties and obligations under the Contract. Approval is limited to the format of the schedule and does not in any way indicate approval of, or concurrence with, the Contractor's means, methods and ability to carry out the Work.

1.04 Overall Project Schedule (OPS)

A. The Contractor shall submit to the Owner for approval a detailed Overall Project Schedule of the Contractor's proposed operations for the duration of the Project. The OPS shall be in the form of a Gantt/bar chart.

B. Gantt/Bar Chart Schedule

1. Each activity with a duration of five or more days shall be identified by a separate bar. Activities with a duration of more than 20 days shall be sub divided into separate activities.

2. The schedule shall include activities for shop drawing preparation and review, fabrication, delivery, and installation of major or critical path materials and equipment items.

3. The schedule shall show the proposed start and completion date for each activity. A separate listing of activity start and stop dates and working day requirements shall be provided unless the information is shown in text form on the Gantt/bar chart.

4. The schedule shall identify the Notice to Proceed date, the Contract Completion date, major milestone dates, and a critical path.

5. The schedule shall be printed on a maximum 11 x 17 inch size paper. If the OPS needs to be shown on multiple sheets, a simplified, one page, summary bar chart showing the entire Project shall be provided.

6. The schedule shall have a horizontal time scale based on calendar days and shall identify the Monday of each week.

7. The schedule shall show the precedence relationship for each activity.

1.05 Near Term Schedule (NTS)

A. The Contractor shall develop and refine a detailed Near Term Schedule showing the day to day activities with committed completion dates which must be performed during the upcoming 30 day period. The detailed schedule shall represent the Contractor's best approach to the Work which must be accomplished to maintain progress consistent with the Overall Project Schedule.

B. The Near Term Schedule shall be in the form of Gantt/bar chart and shall include a written narrative description of all activities to be performed and describe corrective action to be taken for items that are behind schedule.

1.06 Updating

A. Show all changes occurring since previous submission of the updated schedule.

B. Indicate progress of each activity and show actual completion dates.

C. The Contractor shall be prepared to provide a narrative report at the Project Coordination Meetings. The report shall include the following:

1. A description of the overall Project status and comparison to the OPS.

2. Identify activities which are behind schedule and describe corrective action to be taken.

3. A description of changes or revisions to the Project and their effect on the OPS.

4. A description of the Near Term Schedule of the activities to be completed during the next 30 days. The report shall include a description of all activities requiring participation by the Engineer and/or Owner.

END OF SECTION

Part 1 General

1.01 Scope

A. The Contractor shall furnish all equipment and labor materials required to provide the Owner with digital construction photographs of the Project. Photographs shall be provided on a compact disk.

B. Photo files shall become the property of the Owner and none of the photographs herein shall be published without express permission of the Owner.

1.02 Pre and Post Construction Photographs

A. Prior to the beginning of any work, the Contractor shall take project photographs of the work area to record existing conditions.

B. Following completion of the work, [another recording and] photos shall be made showing the same areas and features as in the pre construction photographs.

C. All conditions which might later be subject to disagreement shall be shown in sufficient detail to provide a basis for decisions.

D. The pre construction photographs shall be submitted to the Engineer within 25 calendar days after the date of receipt by the Contractor of Notice to Proceed. Post construction photographs shall be provided prior to final acceptance of the project.

1.03 Progress Photographs and Submittals

A. Progress photograph files shall be provided on compact discs as well as hard copies.

B. The file name of each photograph shall at a minimum contain the date the photograph was taken. All photographs shall be labeled to indicate date, time taken, and description of work shown.

C. A minimum of 10 photographs shall be submitted with each request for payment. The view selection will be as agreed to with the Engineer. One copy of each photograph shall be submitted. Failure to include photographs may be cause for rejection of the payment request.

END OF SECTION

Part 1 General

1.01 Scope

A. The work under this Section includes submittal to the Engineer of shop drawings, product data and samples required by the various sections of these Specifications.

B. Submittal Contents: The submittal contents required are specified in each section.

C. Definitions: Submittals are categorized as follows:

1. Shop Drawings

a. Shop drawings shall include technical data, drawings, diagrams, procedure and methodology, performance curves, schedules, templates, patterns, test reports, calculations, instructions, measurements and similar information as applicable to the specific item for which the shop drawing is prepared.

b. Provide newly prepared information, on reproducible sheets, with graphic information at accurate scale (except as otherwise indicated) or appropriate number of prints hereof, with name or preparer (firm name) indicated. The Contract Drawings shall not be traced or reproduced by any method for use as or in lieu of detail shop drawings. Show dimensions and note dimensions that are based on field measurement. Identify materials and products in the work shown. Indicate compliance with standards and special coordination requirements. Do not allow shop drawings to be used in connection with the Work without appropriate final “Action” markings by the Engineer.

c. Drawings shall be presented in a clear and thorough manner. Details shall be identified by reference to sheet and detail, specification section, schedule or room numbers shown on the Contract Drawings.

d. Minimum assembly drawings sheet size shall be 24 x 36 inches.

e. Minimum detail sheet size shall be 8 1/2 x 11 inches.

f. Minimum Scale:

i. Assembly Drawings Sheet, Scale: 1 inch = 30 feet.

ii. Detail Sheet, Scale: 1/4 inch = 1 foot.

2. Product Data

a. Product data includes standard printed information on materials, products and systems, not specially prepared for this Project, other than the designation of selections from among available choices printed therein.

b. Collect required data into one submittal for each unit of work or system, and mark each copy to show which choices and options are applicable to the Project. Include manufacturer's standard printed recommendations for application and use, compliance with standards, application of labels and seals, notation of field measurements which have been checked and special coordination requirements.

3. Samples

a. Samples include both fabricated and un fabricated physical examples of materials, products and units of work, both as complete units and as smaller portions of units of work, either for limited visual inspection or, where indicated, for more detailed testing and analysis.

b. Provide units identical with final condition of proposed materials or products for the work. Include “range” samples, not less than three units, where unavoidable variations must be expected, and describe or identify variations between units of each set. Provide full set of optional samples where the Engineer's selection is required. Prepare samples to match the Engineer's sample where indicated. Include information with each sample to show generic description, source or product name and manufacturer, limitations and compliance with standards. Samples are submitted for review and confirmation of color, pattern, texture and “kind” by the Engineer. Engineer will note “test” samples, except as otherwise indicated, for other requirements, which are the exclusive responsibility of the Contractor.

4. Miscellaneous submittals related directly to the Work (non administrative) warranties, maintenance agreements, workmanship bonds, project photographs, survey data and reports, physical work records, statements of applicability, quality testing and certifying reports, copies of industry standards, record drawings, field measurement data, operating and maintenance materials, overrun stock, security/protection/safety keys and similar information, devices and materials applicable to the Work but not processed as shop drawings, product data or samples.

1.02 Specific Category Requirements

A. General: Except as otherwise indicated in the individual work sections, comply with general requirements specified herein for each indicated category of submittal. Submittals shall contain:

1. The date of submittal and the dates of any previous submittals.

2. The Project title.

3. Numerical submittal numbers, starting with 1.0, 2.0, etc. Revisions to be numbered 1.1, 1.2, etc.

4. The Names of:

a. Contractor

b. Supplier

c. Manufacturer

5. Identification of the product, with the Specification section number, permanent equipment tag numbers and applicable Drawing No.

6. Field dimensions, clearly identified as such.

7. Relation to adjacent or critical features of the Work or materials.

8. Applicable standards, such as ASTM or Federal Specification numbers.

9. Notification to the Engineer in writing, at time of submissions, of any deviations on the submittals from requirements of the Contract Documents.

10. Identification of revisions on resubmittals.

11. An 8 x 3 inch blank space for Contractor and Engineer stamps.

12. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of products, field measurements and field construction criteria and coordination of the information within the submittal with requirements of the Work and of Contract Documents.

13. Submittal sheets or drawings showing more than the particular item under consideration shall have all but the pertinent description of the item for which review is requested crossed out.

1.03 Routing of Submittals

A. Submittals and routine correspondence shall be routed as follows:

1. Supplier to Contractor (through representative if applicable)
2. Contractor to Engineer
3. Engineer to Contractor and Owner
4. Contractor to Supplier

Part 2 Products

2.01 Shop Drawings

A. Unless otherwise specifically directed by the Engineer, make all shop drawings accurately to a scale sufficiently large to show all pertinent features of the item and its method of connection to the Work.

B. Submit all shop drawings in the form of six hard copies and one pdf file.

C. One reproducible for all submittals larger than 11 x 17 inches and no more than three prints of other submittals will be returned to the Contractor.

2.02 Manufacturer's Literature

A. Where content of submitted literature from manufacturers includes data not pertinent to this submittal, clearly indicate which portion of the contents is being submitted for the Engineer's review.

B. Submit the number of copies which are required to be returned (not to exceed three) plus three copies which will be retained by the Engineer.

2.03 Samples

A. Samples shall illustrate materials, equipment or workmanship and established standards by which completed work is judged.

B. Unless otherwise specifically directed by the Engineer, all samples shall be of the precise article proposed to be furnished.

C. Submit all samples in the quantity which is required to be returned plus one sample which will be retained by the Engineer.

2.04 Colors

A. Unless the precise color and pattern is specifically described in the Contract Documents, wherever a choice of color or pattern is available in a specified product, submit accurate color charts and pattern charts to the Engineer for review and selection.

B. Unless all available colors and patterns have identical costs and identical wearing capabilities, and are identically suited to the installation, completely describe the relative costs and capabilities of each.

Part 3 Execution

3.01 Contractor's Coordination of Submittals

A. Prior to submittal for the Engineer's review, the Contractor shall use all means necessary to fully coordinate all material, including the following procedures:

1. Determine and verify all field dimensions and conditions, catalog numbers and similar data.

2. Coordinate as required with all trades and all public agencies involved.

3. Submit a written statement of review and compliance with the requirements of all applicable technical Specifications as well as the requirements of this Section.

4. Clearly indicate in a letter or memorandum on the manufacturer's or fabricator's letterhead, all deviations from the Contract Documents.

B. Each and every copy of the shop drawings and data shall bear the Contractor's stamp showing that they have been so checked. Shop drawings submitted to the Engineer without the Contractor's stamp will be returned to the Contractor for conformance with this requirement.

C. The Owner may back charge the Contractor for costs associated with having to review a particular shop drawing, product data or sample more than two times to receive a “No Exceptions Taken” mark.

D. Grouping of Submittals

1. Unless otherwise specifically permitted by the Engineer, make all submittals in groups containing all associated items.

2. No review will be given to partial submittals of shop drawings for items which interconnect and/or are interdependent. It is the Contractor's responsibility to assemble the shop drawings for all such interconnecting and/or interdependent items, check them and then make one submittal to the Engineer along with Contractor's comments as to compliance, non compliance or features requiring special attention.

E. Schedule of Submittals

1. Within 30 days of Contract award and prior to any shop drawing submittal, the Contractor shall submit a schedule showing the estimated date of submittal and the desired approval date for each shop drawing anticipated. A reasonable period shall be scheduled for review and comments. Time lost due to unacceptable submittals shall be the Contractor's responsibility and some time allowance for resubmittal shall be provided. The schedule shall provide for submittal of items which relate to one another to be submitted concurrently.

3.02 Timing of Submittals

A. Make all submittals far enough in advance of scheduled dates for installation to provide all required time for reviews, for securing necessary approvals, for possible revision and resubmittal, and for placing orders and securing delivery.

B. In scheduling, allow sufficient time for the Engineer's review following the receipt of the submittal.

3.03 Reviewed Shop Drawings

A. Engineer Review

1. Allow a minimum of 30 days for the Engineer's initial processing of each submittal requiring review and response, except allow longer periods where processing must be delayed for coordination with subsequent submittals. The Engineer will advise the Contractor promptly when it is determined that a submittal being processed must be delayed for coordination. Allow a minimum of two weeks for reprocessing each submittal. Advise the Engineer on each submittal as to whether processing time is critical to progress of the Work, and therefore the Work would be expedited if processing time could be foreshortened.

2. Acceptable submittals will be marked “No Exceptions Taken”. A minimum of three copies will be retained by the Engineer for Engineer's and the Owner's use and the remaining copies will be returned to the Contractor.

3. Submittals requiring minor corrections before the product is acceptable will be marked “Make Corrections Noted”. The Contractor may order, fabricate and ship the items included in the submittals, provided the

indicated corrections are made. Drawings must be resubmitted for review and marked "No Exceptions Taken" prior to installation or use of products.

4. Submittals marked "Amend and Resubmit" must be revised to reflect required changes and the initial review procedure repeated.

5. The "Rejected See Remarks" notation is used to indicate products which are not acceptable. Upon return of a submittal so marked, the Contractor shall repeat the initial review procedure utilizing acceptable products.

6. Only two copies of items marked "Amend and Resubmit" and "Rejected See Remarks" will be reviewed and marked. One copy will be retained by the Engineer and the other copy with all remaining unmarked copies will be returned to the Contractor for resubmittal.

B. No work or products shall be installed without a drawing or submittal bearing the "No Exceptions Taken" notation. The Contractor shall maintain at the job site a complete set of shop drawings bearing the Engineer's stamp.

C. Substitutions: In the event the Contractor obtains the Engineer's approval for the use of products other than those which are listed first in the Contract Documents, the Contractor shall, at the Contractor's own expense and using methods approved by the Engineer, make any changes to structures, piping and electrical work that may be necessary to accommodate these products.

D. Use of the "No Exceptions Taken" notation on shop drawings or other submittals is general and shall not relieve the Contractor of the responsibility of furnishing products of the proper dimension, size, quality, quantity, materials and all performance characteristics, to efficiently perform the requirements and intent of the Contract Documents. The Engineer's review shall not relieve the Contractor of responsibility for errors of any kind on the shop drawings. Review is intended only to assure conformance with the design concept of the Project and compliance with the information given in the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site. The Contractor is also responsible for information that pertains solely to the fabrication processes or to the technique of construction and for the coordination of the work of all trades.

3.04 Resubmission Requirements

A. Shop Drawings

1. Revise initial drawings as required and resubmit as specified for initial submittal, with the resubmittal number shown.

2. Indicate on drawings all changes which have been made other than those requested by the Engineer.

B. Project Data and Samples: Resubmit new data and samples as specified for initial submittal, with the resubmittal number shown.

END OF SECTION

Part 1 General

1.01 Scope

A. This Section includes testing which the Owner may require, beyond that testing required of the manufacturer, to determine if materials provided for the Project meet the requirements of these Specifications.

B. This work also includes all testing required by the Owner to verify work performed by the Contractor is in accordance with the requirements of these Specifications, i.e., concrete strength and slump testing, soil compaction, etc.

C. This work does not include materials testing required in various sections of these Specifications to be performed by the manufacturer, e.g., testing of pipe.

D. The testing laboratory or laboratories will be selected by the Owner. The testing laboratory or laboratories will work for the Owner.

1.02 Payment for Testing Services

A. The cost of testing services required by the Contract to be provided by the Contractor shall be paid for by the Owner through the CASH ALLOWANCE, i.e., concrete testing, soil compaction, and asphalt testing.

B. The cost of additional testing services not specifically required in the Specifications, but requested by the Owner or Engineer, shall be paid for by the Owner through the CASH ALLOWANCE.

C. The cost of material testing described in various sections of these Specifications or as required in referenced standards to be provided by a material manufacturer, shall be included in the price bid for that item and shall not be paid for by the Owner.

D. The cost of retesting any item that fails to meet the requirements of these Specifications shall be paid for by the Contractor. Retesting shall be performed by the testing laboratory working for the Owner.

1.03 Laboratory Duties

A. Cooperate with the Owner, Engineer and Contractor.

B. Provide qualified personnel promptly on notice.

C. Perform specified inspections, sampling and testing of materials.

1. Comply with specified standards, ASTM, other recognized authorities, and as specified.

2. Ascertain compliance with requirements of the Contract Documents.

D. Promptly notify the Engineer and Contractor of irregularity or deficiency of work which are observed during performance of services.

E. Promptly submit three copies (two copies to the Engineer and one copy to the Contractor) of report of inspections and tests in addition to those additional copies required by the Contractor with the following information included:

1. Date issued
2. Project title and number
3. Testing laboratory name and address
4. Name and signature of inspector
5. Date of inspection or sampling
6. Record of temperature and weather
7. Date of test
8. Identification of product and Specification section
9. Location of Project
10. Type of inspection or test
11. Results of test
12. Observations regarding compliance with the Contract Documents

F. Perform additional services as required.

G. The laboratory is not authorized to release, revoke, alter or enlarge on requirements of the Contract Documents, or approve or accept any portion of the Work.

1.04 Contractor Responsibilities

A. Cooperate with laboratory personnel, provide access to Work and/or manufacturer's requirements.

B. Provide to the laboratory, representative samples, in required quantities, of materials to be tested.

C. Furnish copies of mill test reports.

D. Furnish required labor and facilities to:

1. Provide access to Work to be tested;
2. Obtain and handle samples at the site;
3. Facilitate inspections and tests;
4. Build or furnish a holding box for concrete cylinders or other samples as required by the laboratory.

E. Notify the laboratory sufficiently in advance of operation to allow for the assignment of personnel and schedules of tests.

F. Laboratory Tests: Where such inspection and testing are to be conducted by an independent laboratory agency, the sample(s) shall be selected by such

laboratory or agency, or the Engineer, and shipped to the laboratory by the Contractor at Contractor's expense.

G. Copies of all correspondence between the Contractor and testing agencies shall be provided to the Engineer.

1.05 Quality Assurance

Testing shall be in accordance with all pertinent codes and regulations and with procedures and requirements of the American Society for Testing and Materials (ASTM).

1.06 Product Handling

Promptly process and distribute all required copies of test reports and related instructions to insure all necessary retesting or replacement of materials with the least possible delay in the progress of the Work.

1.07 Furnishing Materials

The Contractor shall be responsible for furnishing all materials necessary for testing.

1.08 Code Compliance Testing

Inspections and tests required by codes or ordinances or by a plan approval authority, and made by a legally constituted authority, shall be the responsibility of, and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

1.09 Contractor's Convenience Testing

Inspection or testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

1.10 Schedules for Testing

A. Establishing Schedule

1. The Contractor shall, by advance discussion with the testing laboratory selected by the Owner, determine the time required for the laboratory to perform its tests and to issue each of its findings, and make all arrangements for the testing laboratory to be on site to provide the required testing.

2. Provide all required time within the construction schedule.

B. When changes of construction schedule are necessary during construction, coordinate all such changes of schedule with the testing laboratory as required.

C. When the testing laboratory is ready to test according to the determined schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, all extra costs for testing attributable to the delay will be back charged to the Contractor and shall not be borne by the Owner.

1.11 Taking Specimens

Unless otherwise provided in the Contract Documents, all specimens and samples for tests will be taken by the testing laboratory or the Engineer.

1.12 Transporting Samples

The Contractor shall be responsible for transporting all samples, except those taken by testing laboratory personnel, to the testing laboratory.

END OF SECTION

Part 1 General

1.01 Scope

A. Temporary facilities required for this work include, but are not necessarily limited to:

1. Temporary utilities such as water and electricity.

2. First aid facilities.

3. Sanitary facilities.

4. Potable water.

5. Temporary enclosures and construction facilities.

B. Temporary utilities for field offices shall be as specified in Section 01590 of these Specifications.

1.02 General

A. First aid facilities, sanitary facilities and potable water shall be available on the Project site on the first day that any activities are conducted on site. The other facilities shall be provided as the schedule of the Project warrants.

B. Maintenance: Use all means necessary to maintain temporary facilities in proper and safe condition throughout progress of the Work. In the event of loss or damage, immediately make all repairs and replacements necessary, at no additional cost to the Owner.

C. Removal: Remove all such temporary facilities and controls as rapidly as progress of the Work will permit.

1.03 Temporary Utilities

A. General

1. Provide and pay all costs for all water, electricity and other utilities required for the performance of the Work.

2. Pay all costs for temporary utilities until Project completion.

3. Costs for temporary utilities shall include all power, water and the like necessary for testing equipment as required by the Contract Documents.

B. Temporary Water: Provide all necessary temporary piping, and upon completion of the Work, remove all such temporary piping. Provide and remove water meters.

C. Temporary Electricity

1. Provide all necessary wiring for the Contractor's use.

2. Furnish, locate and install area distribution boxes such that the individual trades may use, their own construction type extension cords to obtain

adequate power, and artificial lighting at all points where required by inspectors and for safety.

1.04 First Aid Facilities

The Contractor shall provide a suitable first aid station, equipped with all facilities and medical supplies necessary to administer emergency first aid treatment. The Contractor shall have standing arrangements for the removal and hospital treatment of any injured person. All first aid facilities and emergency ambulance service shall be made available by the Contractor to the Owner and the Engineer's personnel.

1.05 Sanitary Facilities

Prior to starting the Work, the Contractor shall furnish, for use of Contractor's personnel on the job, all necessary toilet facilities which shall be secluded from public observation. These facilities shall be either chemical toilets or shall be connected to the Owner's sanitary sewer system. All facilities, regardless of type, shall be kept in a clean and sanitary condition and shall comply with the requirements and regulations of the area in which the Work is performed. Adequacy of these facilities will be subject to the Engineer's review and maintenance of same must be satisfactory to the Engineer at all times.

1.06 Potable Water

The Contractor shall be responsible for furnishing a supply of potable drinking water for employees, subcontractors, inspectors, engineers and the Owner who are associated with the Work.

1.07 Enclosures and Construction Facilities

Furnish, install and maintain for the duration of construction, all required scaffolds, tarpaulins, canopies, steps, bridges, platforms and other temporary construction necessary for proper completion of the Work in compliance with all pertinent safety and other regulations.

1.08 Parking Facilities

Parking facilities for the Contractor's and Contractor's subcontractors' personnel shall be the Contractor's responsibility. The storage and work facilities provided by the Owner will not be used for parking by the Contractor's or subcontractor's personnel.

END OF SECTION

Part 1 General

1.01 Barricades, Lights and Signals

A. The Contractor shall furnish and erect such barricades, fences, lights and danger signals and shall provide such other precautionary measures for the protection of persons or property and of the Work as necessary. Barricades shall be painted in a color that will be visible at night. From sunset to sunrise, the Contractor shall furnish and maintain at least one light at each barricade and sufficient numbers of barricades shall be erected to keep vehicles from being driven on or into any Work under construction.

B. The Contractor will be held responsible for all damage to the Work due to failure of barricades, signs and lights and whenever evidence is found of such damage, the Contractor shall immediately remove the damaged portion and replace it at Contractor's cost and expense. The Contractor's responsibility for the maintenance of barricades, signs and lights shall not cease until the Project has been accepted by the Owner.

END OF SECTION

Part 1 General

1.01 Scope

Limit blowing dust caused by construction operations by applying water or employing other appropriate means or methods to maintain dust control, subject to the approval of the Owner. As a minimum, this may require the use of a water wagon twice a day to suppress dusty conditions.

1.02 Protection of Adjacent Property

A. The Contractor shall visit the site and note the buildings, landscaping, roads, parking areas and other facilities near the Work site that may be damaged by their operations. The Contractor shall make adequate provision to fully protect the surrounding area and will be held fully responsible for all damages resulting from Contractor's operations.

B. Protect all existing facilities (indoors or out) from damage by dust, fumes, spray or spills (indoors or out). Protect motors, bearings, electrical gear, instrumentation and building or other surfaces from dirt, dust, welding fumes, paint spray, spills or droppings causing wear, corrosion, malfunction, failure or defacement by enclosure, sprinkling or other dust palliatives, masking and covering, exhausting or containment.

END OF SECTION

Part 1 General

1.01 Scope

A. The work under this Section shall include the furnishing of a minimum of one painted sign of not less than 32 square feet in area, with painted graphic content that includes:

1. Project title
2. Owner's name
3. Names of governmental units participating in the Project
4. Engineer's name
5. Names and titles of other parties to be directed by the Engineer

1.02 Design

The Contractor shall provide a scale drawing showing the graphic design, style of lettering and colors to the Engineer for approval.

Part 2 Products

2.01 Materials

A. Structure and Framing: May be new or used, wood or metal, in sound condition structurally adequate to work and suitable for specified finish.

B. Sign Surfaces: Exterior soft wood plywood with medium density overlay, standard large sizes to minimize joints.

C. Thickness: As required by standards to span framing members, to provide even, smooth surface without waves or buckles.

D. Rough Hardware: Galvanized.

E. Paint: Exterior quality, as specified in Section 09900 of these Specifications.

Part 3 Execution

3.01 Erection

Erect the sign on the site in a high visibility location, adjacent to the Project as approved by the Engineer.

3.02 Maintenance

Contractor shall maintain the Project Sign in good condition during the Contract period.

Hackett Road Elevated Water Tanks
2 – 2,000,000 Gallon Tanks

CONTRACTOR: **(contractor name)**
(???) ???-????

CONSTRUCTION MGR: **Fulton Construction Management Partners**
(404) 612-0880

ZACHARY WILLIAMS, COUNTY MANAGER

BOARD OF COMMISIONERS
FULTON COUNTY, GEORGIA

JOHN H. EAVES, CHAIRMAN

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NANCY BOXILL

LYNNE RILEY
EMMA I. DARNELL
WILLIAM “BILL” EDWARDS

FULTON COUNTY

FULTON COUNTY

Part 1 General

1.01 Scope

A. The work under this Section shall include providing a field office for the Contractor's use and for Project Meetings. The site for the field office shall be located on or conveniently near the Project site.

B. Furnish, install and maintain storage and work sheds needed for construction.

1.02 Requirements

A. General

1. The materials, equipment, and furnishings provided under this Section may be new or used, but must be serviceable, adequate for the required purpose, and must not violate applicable codes or regulations.

2. The Contractor shall make all provisions, and pay all costs for installation, utilities, rent, permit fees, and sitework for field offices and facilities.

B. Construction

1. Structurally sound, weathertight with floors raised above ground.

2. Temperature transmission resistance shall be compatible with occupancy and storage requirements.

3. Portable or mobile buildings may be used. Mobile trailers, when used, shall be modified for office use. Mobile trailers may not be used for living quarters.

B. Contractor's Field Office and Facilities

1. Size: As required for general use and to provide space for Project Meetings.

2. Minimum Services

a. Lighting: 50 foot candles at desk top height.

b. Exterior lighting at entrance door.

c. Automatic heating and cooling equipment sufficient to maintain comfort conditions of 78 degrees F inside in winter with outside air temperature of 20 degrees F and 72 degrees F inside in summer with outside air temperature of 100 degrees F.

d. Minimum of four 110 volt duplex electric convenience outlets, at least one on each wall.

e. Convenient access to drinking water (water cooler) and toilet facilities with sink.

3. Telephone: As required for Contractor's operations.

4. Racks and files for Project Record Documents.

5. Minimum Furnishings

   a. One plan table (39 x 72 inches x 36 inches high)

   b. Four chairs

   c. One wastebasket

6. One 10 inch outdoor type thermometer.

7. Two rain gauges with one for the Project Inspector's use.

1.03 Parking Facilities

A. Parking facilities for the Contractor's field office shall be the Contractor's responsibility. Storage and work facilities provided by the Owner will not be used.

B. The Contractor shall provide a minimum of three additional gravel parking spaces for use by the Engineer and Owner.

1.04 Use of Permanent Facilities

Permanent facilities shall not be used for field offices or for storage.

Part 2 Products (Not Used)

Part 3 Execution

3.01 Preparation

Fill and grade sites for temporary structures to provide surface drainage.

3.02 Installation

A. Construct temporary field offices and storage facilities on proper foundations and provide connections for utility services.

1. Secure portable or mobile buildings when used.

2. Provide steps and landings at entrance doors.

3. Provide tie downs for 100 mile per hour gusts and winds.

B. Mount thermometer at convenient outside location, not in direct sunlight.

C. Mount rain gauges in accessible open area

D. Locate construction office facilities at locations within the Project area approved by the Engineer and Owner.

3.03 Maintenance and Cleaning

Provide periodic maintenance and cleaning for temporary structures, furnishings, equipment and services.

3.04 Removal

A. Remove temporary field offices, contents and services at a time when no longer needed. Offices and contents shall be the property of the Contractor.

B. Remove foundations and debris; grade site to required elevations and clean areas.

END OF SECTION

Part 1 General

1.01 Scope

This Section outlines the restrictions and requirements for substitutions, product and manufacturer options, and construction method options.

1.02 Definitions

A. For the purposes of these Contract Documents, a “substitute item” shall be defined as one of the following:

1. A product or manufacturer offered as a replacement to a specified product or manufacturer.

2. A product or manufacturer offered in addition to a specified product or manufacturer.

B. For the purposes of these Contract Documents, a “substitute construction method” shall be defined as one of the following:

1. A mean, method, technique, sequence or procedure of construction offered as a replacement for a specified mean, method, technique, sequence or procedure of construction.

2. A mean, method, technique, sequence or procedure of construction offered in addition to a specified mean, method, technique, sequence or procedure of construction.

1.03 General

A. An item or construction method, which is offered where no specific product, manufacturer, mean, method, technique, sequence or procedure of construction is specified or shown on the Drawings, shall not be considered a substitute and shall be at the option of the Contractor, subject to the provisions in the Contract Documents for that item or construction method.

B. For products specified only by a referenced standard, the Contractor may select any product by any manufacturer, which meets the requirements of the Specifications, unless indicated otherwise in the Contract Documents.

C. If the manufacturer is named on the Drawings or in the Specifications as an acceptable manufacturer, products of that manufacturer meeting all requirements of the Specifications and Drawings are acceptable.

D. Whenever the Engineer's design is based on a specific product of a particular manufacturer, that manufacturer will be shown on the Drawings and/or listed first in the list of approved manufacturers in the Specifications. Any Bidder intending to furnish products of other than the first listed manufacturer, or furnish substitute items, shall

1. Verify that the item being furnished will fit in the space allowed, perform the same functions and have the same capabilities as the item specified.

2. Include in its Bid the cost of all accessory items which may be required by the other listed substitute product,

3. Include the cost of any architectural, structural, mechanical, piping, electrical or other modifications required, and

4. Include the cost of required additional work by the Engineer, if any, to accommodate the item.

E. Whenever a product is identified on the Drawings or in the Specifications by reference to manufacturers or vendors names, trade names, catalog numbers, etc., it is intended only to denote the quality standard of product desired and that they do not restrict Bidders to a specific brand, make, manufacturer or specific name. These listings and citations are used only to set forth and convey to Bidders the general style, type, character and quality of product desired. Equivalent products will be acceptable, subject to the substitution provisions of this Section.

1.04 Approvals

Approval, of a substitution as an acceptable manufacturer, of the Engineer is dependent on determination that the product offered is essentially equal in function, performance, quality of manufacture, ease of maintenance, reliability, service life and other criteria to that on which the design is based; and will require no major modifications to structures, electrical systems, control systems or piping systems.

1.05 Substitutions and Options

A. No substitutions will be considered for the manufacturers listed in the Bid Form.

B. After Notice to Proceed

1. Substitute items will be considered only if the term “equal to” precedes the names of acceptable manufacturers in the Specification.

2. Where items are specified by referenced standard or specified as indicated in Article 1.03, Paragraph A. above, such items shall be submitted to the Engineer for review.

3. The Contractor shall submit shop drawings on the substitute item for the Engineer's review in accordance with the Section 01340.

C. Prior to Opening of Bids

1. No consideration or approvals will be made for products specified by a referenced standard, or specified as indicated in Article 1.02, Paragraph A. above. Such consideration may occur only after the Notice to Proceed.

2. No consideration or approvals will be made for products being offered where the term “equal to” precedes the name of an approved product. Such substitution consideration may occur only after the Notice to Proceed.

3. If the term “or equal” follows the names of acceptable manufacturers, then other manufacturers desiring approval as an acceptable manufacturer may submit the product information to the Engineer for

approval during the bidding phase, as indicated below. With the exception of where the phrase “no substitutions” is associated with a list of manufacturers, where a list of acceptable manufacturers is not preceded by the phrase “equal to”, the list of acceptable manufacturers shall be considered as having the phrase “or equal” following the list, and the list being subject to the “or equal” provisions of this section.

4. The manufacturer shall include the following items in its “or equal” submittal:

   a. Descriptive literature including information on materials used, minimum design standards, standard design features, manufacturing processes and facilities, and similar information which will indicate experience and expertise in the manufacture of the product being evaluated.

   b. Performance specifications applicable to the manufacturer's standard design which indicates the level of performance to be expected from the product.

   c. A complete set of submittal drawings of similar products which have been completed and placed into operation.

   d. A list of existing installations of products similar in type and size, information required to satisfy specified experience requirements, or a copy of the bond to be submitted in lieu of experience.

   e. Evidence of technical ability of the manufacturer to design and manufacture products meeting Project requirements.

   f. Evidence submitted shall include, as a minimum, descriptions of engineering and manufacturing staff capabilities.

   g. A copy of the manufacturer's most recent annual business report. Include a statement comparing the present net worth of the manufacturer in comparison to the total value of all products proposed to be furnished. Net worth must exceed the total value of all products proposed.

   h. A complete description of field service capabilities, including the location of field service facilities which would serve the proposed facility and the number and qualifications of personnel working from that location.

   i. A complete list of all requirements of the Drawings and Specifications with which the manufacturer cannot conform, including reasons why alternate features are considered equivalent.

   j. If descriptive literature or drawings illustrate standard products with design features or materials not in compliance with Project requirements then these exceptions must be specifically listed. Failure to do so will indicate intent by the manufacturer to modify design features and alter materials to meet Project requirements.

k. Where additional information is submitted to supplement the submittal, all changes to the list of exceptions shall be specifically noted.

l. All other information necessary to fully evaluate the product for consideration.

5. This “or equal” submittal shall reach the Engineer no later than 14 days prior to the Bid date. Submittals which do not include a complete list of exceptions to Project requirements, or the statement “No exceptions to the Specifications will be taken”, will automatically be rejected by the Engineer. Manufacturers will be advised of approval or rejection in writing no later than 10 days prior to the Bid date. Rejected submittals may be supplemented with additional information and resubmitted no later than five days prior to the Bid date. Manufacturers making supplementary submittals will be advised of approval or rejection in writing no later than one day prior to the Bid date.

6. Bids based on products which have not received the approval of the Engineer may be determined non-responsive by the Owner and rejected.

END OF SECTION

Part 1 General

1.01 Scope

This Section covers the general cleaning which the Contractor shall be required to perform both during construction and before final acceptance of the Project unless otherwise shown on the Drawings or specified elsewhere in these Specifications.

1.02 Quality Assurance

A. Daily, and more often if necessary, conduct inspections verifying that requirements of cleanliness are being met.

B. In addition to the standards described in this Section, comply with all pertinent requirements of governmental agencies having jurisdiction.

1.03 Hazardous Material and Waste

A. The Contractor shall handle hazardous waste and materials in accordance with applicable local, state, and federal regulations. Waste shall also be disposed of in approved landfills as applicable.

B. The Contractor shall prevent accumulation of wastes which create hazardous conditions.

C. Burning or burying rubbish and waste materials on the site shall not be allowed.

D. Disposal of hazardous wastes or materials into sanitary or storm sewers shall not be allowed.

1.04 Disposal of Surplus Materials

Unless otherwise shown on the Drawings, specified or directed, the Contractor shall legally dispose off the site all surplus materials and equipment from demolition and shall provide suitable off site disposal site, or utilize a site designated by the Owner.

Part 2 Products

2.01 Cleaning Materials and Equipment

Provide all required personnel, equipment and materials needed to maintain the specified standard of cleanliness.

2.02 Compatibility

Use only the cleaning materials, methods and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material or as approved by the Engineer.

Part 3 Execution

3.01 Progress Cleaning

A. General

1. Do not allow the accumulation of scrap, debris, waste material and other items not required for construction of this Work.

2. At least each week, and more often if necessary, completely remove all scrap, debris and waste material from the job site.

3. Provide adequate storage for all items awaiting removal from the job site, observing all requirements for fire protection and protection of the environment.

B. Site

1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris and waste material. Remove all such items to the place designated for their storage.

2. Restack materials stored on site weekly.

3. At all times maintain the site in a neat and orderly condition which meets the approval of the Engineer.

C. Structures

1. Weekly, and more often if necessary, inspect the structures and pick up all scrap, debris and waste material. Remove all such items to the place designated for their storage.

2. Weekly, and more often if necessary, sweep all interior spaces clean. “Clean”, for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by using a hand held broom.

3. As required preparatory to installation of successive materials, clean the structures or pertinent portions as recommended by the manufacturer of the successive material.

4. Following the installation of finish floor materials, clean the finish floor daily. “Clean”, for the purpose of this paragraph, shall be interpreted as meaning free from all foreign material which, in the opinion of the Engineer, may be injurious to the finish floor material.

5. Schedule cleaning operation so that dust and other contaminants resulting from cleaning operations will not fall on wet, recently painted surfaces.

3.02 Final Cleaning

A. Definitions: Unless otherwise specifically specified, “clean” for the purpose of this Article shall be interpreted as the level of cleanliness generally provided by

commercial building maintenance subcontractors using commercial quality building maintenance equipment and materials.

B. General: Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris and waste. Conduct final progress cleaning as described in 3.01 above.

C. Site: Unless otherwise specifically directed by the Engineer, hose down all paved areas on the site and all public sidewalks directly adjacent to the site; rake clean other surfaces of the grounds. Completely remove all resultant debris.

D. Structures

1. Remove all traces of soil, waste material, splashed material, and other foreign matter to provide a uniform degree of exterior cleanliness. Visually inspect all exterior surfaces and remove all traces of soil, waste material, and other foreign matter. Remove all traces of splashed materials from adjacent surfaces. If necessary to achieve a uniform degree of exterior cleanliness, hose down the exterior of the structure. In the event of stubborn stains not removable with water, the Engineer may require light sandblasting or other cleaning at no additional cost to the Owner.

2. Visually inspect all interior surfaces and remove all traces of soil, waste material, smudges and other foreign matter. Remove all paint droppings, spots, stains and dirt from finished surfaces.

3. Clean all glass inside and outside.

4. Polish all surfaces requiring the routine application of buffed polish. Provide and apply polish as recommended by the manufacturer of the material being polished.

E. Post Construction Cleanup: All evidence of temporary construction facilities, haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other evidence of construction, as directed by the Engineer.

F. Restoration of Landscape Damage: Any landscape feature damaged by the Contractor shall be restored as nearly as possible to its original condition at the Contractor's expense. The Engineer will decide what method of restoration shall be used.

G. Timing: Schedule final cleaning as approved by the Engineer to enable the Owner to accept the Project.

3.03 Cleaning During Owner's Occupancy

Should the Owner occupy the Work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning of the occupied spaces shall be as determined by the Engineer in accordance with the Supplementary Conditions of the Contract Documents.

END OF SECTION

Part 1 General

1.01 Scope

A. The work under this Section includes, but is not necessarily limited to, the compiling, maintaining, recording and submitting of project record documents as herein specified.

B. Record documents include, but are not limited to:

1. Drawings;

2. Specifications;

3. Change orders and other modifications to the Contract;

4. Engineer field orders or written instructions, including Requests for Information (RFI) and Clarification Memorandums;

5. Reviewed shop drawings, product data and samples;

6. Test records.

C. The Contractor shall maintain on the Project site throughout the Contract Time an up to date set of Record Drawings.

1.02 Maintenance of Documents and Samples

A. Storage

1. Store documents and samples in the Contractor's field office, apart from documents used for construction.

2. Provide files and racks for storage of documents.

3. Provide locked cabinet or secure storage space for storage of samples.

B. File documents and samples in accordance with format of these Specifications.

C. Maintenance

1. Maintain documents in a clean, dry, legible condition and in good order.

2. Do not use record documents for construction purposes.

3. Maintain at the site for the Owner one copy of all record documents.

D. Make documents and samples available at all times for inspection by Engineer.

E. Failure to maintain the Record Documents in a satisfactory manner may be cause for withholding of a certificate for payment.

1.03 Quality Assurance

A. Unless noted otherwise, Record Drawings shall provide dimensions, distances and coordinates to the nearest 0.1 foot.

B. Unless noted otherwise, Record Drawings shall provide elevations to the nearest 0.01 foot for all pertinent items constructed by the Contractor.

1.04 Recording

A. Label each document “Project Record” in neat, large printed letters.

B. Recording

1. Record information concurrently with construction progress.

2. Do not conceal any work until required information is recorded.

1.05 Record Drawings

A. The Contractor shall provide one set of the Contract drawings, with all changes recorded in that one set.

B. Legibly mark drawings to record actual construction, including:

1. All Construction

a. Changes of dimension and detail.

b. Changes made by Requests for Information (RFI), field order, clarification memorandums or by change order.

c. Details not on original Drawings.

? 2. Site Improvements, Including Underground Utilities

a. Horizontal and vertical locations of all exposed and underground utilities and appurtenances, both new facilities constructed and those utilities encountered, referenced to permanent surface improvements.

b. Location of and dimensions of roadways and parking areas, providing dimensions to back of curb when present.

c. The locations shall be referenced to at least two easily identifiable, permanent landmarks (e.g., power poles, valve markers, etc.) or benchmarks.

? d. The Record Drawings shall include the horizontal angle and distance between manhole covers.

? 3. Structures

a. Depths of various elements of foundation in relation to finish first floor datum or top of wall.

b. Location of internal and buried utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.

1.06 Specifications

A. Legibly mark each section to record:

1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.

2. Changes made by Requests for Information (RFI), field order, clarification memorandums, or by change order.

1.07 Submittal

A. At contract closeout, deliver Record Documents to the Engineer for the Owner.

B. Accompany submittal with transmittal letter, in duplicate, containing:

1. Date

2. Project title and number

3. Contractor's name and address

4. Title and number of each record document

5. Signature of Contractor or Contractor's authorized representative

END OF SECTION

Part 1 General

1.01 Project Maintenance and Warranty

A. Maintain and keep in good repair the Work covered by these Drawings and Specifications until acceptance by the Owner.

B. The Contractor shall warrant for a period of one year from the date of Owner's written acceptance of certain segments of the Work and/or Owner's written final acceptance of the Project, as defined in the Contract Documents, that the completed Work is free from all defects due to faulty products or workmanship and the Contractor shall promptly make such corrections as may be necessary by reason of such defects. The Owner will give notice of observed defects with reasonable promptness. In the event that the Contractor should fail to make such repairs, adjustments or other work that may be made necessary by such defects, the Owner may do so and charge the Contractor the cost thereby incurred. The Performance Bond shall remain in full force and effect throughout the warranty period.

C. The Contractor shall not be obligated to make replacements which become necessary because of ordinary wear and tear, or as a result of improper operation or maintenance, or as a result of improper work or damage by another Contractor or the Owner, or to perform any work which is normally performed by a maintenance crew during operation.

D. In the event of multiple failures of major consequences prior to the expiration of the one year warranty described above, the affected unit shall be disassembled, inspected and modified or replaced as necessary to prevent further occurrences. All related components which may have been damaged or rendered non serviceable as a consequence of the failure shall be replaced. A new 12 month warranty against defective or deficient design, workmanship, and materials shall commence on the day that the item is reassembled and placed back into operation. As used herein, multiple failure shall be interpreted to mean two or more successive failures of the same kind in the same item or failures of the same kind in two or more items. Major failures may include, but are not limited to, cracked or broken housings, piping, or vessels, excessive deflections, bent or broken shafts, broken or chipped gear teeth, premature bearing failure, excessive wear or excessive leakage around seals. Failures which are directly and clearly traceable to operator abuse, such as operations in conflict with published operating procedures or improper maintenance, such as substitution of unauthorized replacement parts, use of incorrect lubricants or chemicals, flagrant over or under lubrication and using maintenance procedures not conforming with published maintenance instructions, shall be exempted from the scope of the one year warranty. Should multiple failures occur in a given item, all products of the same size and type shall be disassembled, inspected, modified or replaced as necessary and rewarranted for one year.

E. The Contractor shall, at Contractor's own expense, furnish all labor, materials, tools and equipment required and shall make such repairs and removals and shall perform such work or reconstruction as may be made necessary by any structural or functional defect or failure resulting from neglect, faulty workmanship or faulty materials, in any part of the Work performed by the Contractor. Such repair shall also include refilling of trenches, excavations or embankments which show settlement or erosion after backfilling or placement.

F. Except as noted on the Drawings or as specified, all structures such as embankments and fences shall be returned to their original condition prior to the completion of the Contract. Any and all damage to any facility not designated for removal, resulting from the Contractor's operations, shall be promptly repaired by the Contractor at no cost to the Owner.

G. The Contractor shall be responsible for all road and entrance reconstruction and repairs and maintenance of same for a period of one year from the date of final acceptance. In the event the repairs and maintenance are not made immediately and it becomes necessary for the owner of the road to make such repairs, the Contractor shall reimburse the owner of the road for the cost of such repairs.

H. In the event the Contractor fails to proceed to remedy the defects upon notification within 15 days of the date of such notice, the Owner reserves the right to cause the required materials to be procured and the work to be done, as described in the Drawings and Specifications, and to hold the Contractor and the sureties on Contractor's bond liable for the cost and expense thereof.

I. Notice to Contractor for repairs and reconstruction will be made in the form of a registered letter addressed to the Contractor at Contractor's home office.

J. Neither the foregoing paragraphs nor any provision in the Contract Documents, nor any special guarantee time limit implies any limitation of the Contractor's liability within the law of the place of construction.

END OF SECTION

Part 1 General

1.01 Design Requirements

A. The purpose of this section is to define the design criteria, concepts and requirements for the work described herein.

B. The design of improvements shall conform to the following design criteria and requirements in addition to any and all applicable local, state, and federal building requirements.

1.02 Structural Design

A. Structural design shall consist of the following items:

1. Concrete foundation design for tanks

2. Concrete slab on grade for floor of storage area inside tank pillar.

3. Structural design of tank pillar and tank bowl and appurtenant components.

B. Foundations:

1. Work related to the design of tank foundation and structure shall conform with the requirements of Specification Section 13210 Elevated Water Tank.

2. The following report describes exploration and tests of subsurface conditions at the site: Report of Soils Investigation, Hackett Road Tanks, Roswell, Fulton County, Georgia (attached as Appendix A).

3. The Contractor may rely upon the accuracy of the technical data contained in the report and drawings; except for such physical dimensions that can be field verified; however, the interpretation of such technical data, including any interpolation or extrapolation thereof, and opinions contained in such reports and drawings are not to be relied upon.

1.03 Mechanical Design

A. Contractor shall furnish all labor, equipment, materials, tools, supplies, fittings, and appurtenances required for the detailed design and construction of two – 2,000,000 gallon elevated water storage tanks as specified in Section 13210 Composite Elevated Water Storage Tank.

B. Mechanical piping and valves shall be provided in accordance with Fulton County Standard Specifications for Water Mains Construction.

C. All shop drawings and product data shall be submitted to the Owner for review. A submittal schedule shall be given to the Owner prior to the start of construction. The Owner shall be allowed fourteen (14) calendar days after receipt of submittal data to return comments to the Contractor.

D. Contractor shall submit operation and maintenance data for approval by the Owner prior to completion of construction.

E. Provide temporary heating and ventilation as required during construction.

F. Ventilation design shall meet Fulton County ordinance for noise limitations.

1.04 Electrical Design

A. Applicable Codes\Standards

1. As a minimum all electrical work will comply with the latest edition of the National Electric Code (NFPA –70) and International Electrical Testing Agency (NETA).

2. All electrical equipment shall be listed by and shall bear the label of Underwriters Laboratories, Inc. (UL).

B. Electrical Service

1. Electrical service to the site shall be obtained from an existing pole. Contractor shall coordinate with the utility company's representative assigned to Fulton County to obtain permanent power for the facility. Contractor shall coordinate with the construction manager to obtain an account for the facility. The Contractor shall be responsible for any and all fees necessary for providing electrical service to the site.

2. Verify, furnish and install all service conduits, fittings, transformer pad (if required), grounding devices, and all other services not provided by the local utility company necessary for electrical service. Size feeder circuit breakers and conductors in accordance with the National Electric Code. Main service feeder into the facility shall be underground.

3. Contractor shall contact any necessary public utilities serving agencies and verify compliance with their requirements before beginning construction. Permits shall be obtained and inspection fees paid by the Contractor.

C. Basic Materials

1. Underground Ducts and Manholes.

a. Where and underground distribution system is required, it shall be comprised of multiple runs of single bore metallic and non-metallic ducts, concrete encased, with steel reinforcing bars, underground manholes and pullboxes. When non metallic ducts are required, they shall be rigid Schedule 40 PVC for concrete encasement.

b. Manholes and pullboxes shall be of precast concrete designed for traffic loading.

2. Raceway

a. Raceways, if required, shall be manufactured in accordance with UL and ANSI standards and shall bear UL label as applicable.

3. Wire and Cable

   a. All conductors shall be copper. Insulation shall bear UL label and manufacturers trademark, type, voltage, temperature rating and conductor size.

   b. Control cables: Copper, single conductor, UL-type, THWN/THNN; #14 AWG minimum, rated for 600 volts.

   c. Instrumentation cables: #16 AWG stranded, tinned copper, twisted pair or three conductor construction with 100 percent coverage aluminum polyester shield; #18 AWG shield drain wire.

4. Control Panels

   a. All control panels shall be NEMA 4X stainless steel. Panel section faces shall be No. 14 gauge min thickness. Panels shall be provided with adequate interior lighting, a 120 V, 15 amp duplex receptacle.

   b. Control panels shall be furnished and installed as required to accommodate lighting, instrumentation and equipment. Control panels shall be provided with a control transformer as needed.

D. Lighting

1. All switches and receptacles shall be corrosion resistant. All enclosures, disconnect switches, control stations, etc. shall be rated NEMA 1A, unless otherwise indicated.

2. Location of lighting shall be as described in Section 13210 of these Specifications.

1.05 Instrumentation Design

General

Furnish all taps, sensing lines, connections, supports, conduits, etc. necessary for instrumentation devices to monitor and control operations. Instrumentation devices not specifically called for in the specifications will be provided, installed and calibrated by a specialty subcontractor paid for under the allowance for instrumentation.

Equipment

It is the responsibility of the Contractor to provide appropriate conduits, power, antennae mast, mounting facilities, etc. suitable to accommodate the instrumentation system currently in use by Fulton County Water System.

1.06 Permitting

A. Contractor shall verify that all applicable permits have been obtained prior to beginning construction. Permits include but are not limited to:

1. Permit for New Construction from Georgia Environmental Protection Department (EPD)- (Obtained by County)

2. Land Disturbance Permit from City of Milton- (Obtained by County)

3. Building Permit from City of Milton- (Obtained by Contractor)

END OF SECTION

Part 1 General

1.01 Scope

A. This Section described materials and equipment to be utilized and requirements for their use in preparing the work site for construction. The Contractor shall furnish all materials, equipment and labor necessary to complete the work.

B. Comply with applicable codes, ordinances, rules, regulations and laws of local, municipal, state or federal authorities having jurisdiction.

1.02 Clearing and Grubbing

A. Within the limits shown on the Drawings, the site will be cleared and grubbed to prepare for construction.

B. Clearing

1. All vegetation such as trees, shrubs, brush, logs, upturned stumps and roots of downed trees, and other similar items shall be removed and disposed of properly by the Contractor as specified below. Cultivated growth shall be removed and trees felled as necessary within the construction work site and as indicated.

2. Where the tree limb structure interferes with utility wires, or where the trees to be felled are in close proximity to utility wires, the tree shall be taken down in sections to eliminate the possibility of damage to the appropriate utility.

3. All buildings, fences, lumber piles, trash and obstructions, except utility poles shall be removed and disposed of by the Contractor. Any work pertaining to utility poles shall comply with the requirements of the appropriate utility.

4. All fences adjoining any excavation or embankment that may be damaged or buried shall be carefully removed, stored and replaced.

C. All stumps, roots, foundations and planking embedded in the ground shall be removed and disposed of properly by the Contractor as specified below. Piling and butts of utility poles shall be removed to a minimum depth of two feet below the limits of excavation for structures, trenches and roadways or two feet below finish grade, whichever is lower.

1.03 Preliminary Grading

Before beginning construction, the Contractor shall grade the entire work site to conform, in general, to the finish elevations shown on the Drawings. The Drawings show both existing contour elevations and finished contour elevations.

1.04 Testing and Inspection Services

A. Soil testing will be performed by an independent testing laboratory selected by the Owner. Payment for soil testing shall be made by the Contractor from the “Soils And Concrete Testing” cash allowance.

B. The soils testing laboratory is responsible for the following:

1. Compaction tests in accordance with ASTM D 698.

2. Field density tests for each two feet of lift; one test for each 5,000 square feet of fill.

3. Inspecting and testing stripped site, subgrades and proposed fill materials.

C. The Contractor's duties relative to testing include:

1. Notifying the laboratory of conditions requiring testing.

2. Coordinating with the laboratory for field testing.

3. Providing representative fill soil samples to laboratory for test purposes. Provide 50 pound samples of each fill soil.

4. Paying costs for additional testing performed beyond the scope of that required and for retesting where initial tests reveals non-conformance with specified requirements.

D. Inspection:

1. Earthwork operations, suitability of excavated materials for fill and backfill, and placing the compaction of fill and backfill is subject to inspection. The Engineer will observe earthwork operations.

2. Foundations and shallow spread footing foundations are required to be inspected by a geotechnical engineer to verify suitable bearing and construction.

Part 2 Products (Not Used)

Part 3 Execution

3.01 Preparation

Maintain bench marks, monuments and other reference points. Re-establish, at no cost to the Owner, any such reference points if disturbed or destroyed.

3.02 Clearing

A. Clear areas required for access to site and execution of work.

B. Remove trees and shrubs within the area to be cleared.

C. Clear undergrowth and deadwood, without disturbing subsoil.

3.03 Disposal of Refuse

A. The refuse resulting from the clearing and grubbing operation shall be hauled to a disposal site secured by the Contractor and shall be disposed of in accordance with all requirements of federal, state, county and municipal regulations. No debris of any kind shall be deposited in any stream or body of water, or in any street or alley. No debris

shall be deposited upon any private property except with written consent of the property owner. In no case shall any material be left on the Project, shoved onto abutting private properties, or be buried in embankments or trenches on the Project.

B. When approved in writing by the Engineer and when authorized by the proper authorities, the Contractor may dispose of such refuse by burning on the site of the Project provided all requirements set forth by the authorities are met. The authorization to burn shall not relieve the Contractor in any way from damages which may result from Contractor's operations. On easements through private property, the Contractor shall not burn on the site.

END OF SECTION

Part 1 General

1.01 Scope

A. The Work specified in this Section consists of providing and maintaining temporary and permanent erosion and sedimentation controls as shown on the Drawings. This Section also specifies the subsequent removal of temporary erosion and sedimentation controls.

B. Temporary and permanent erosion and sedimentation controls include grassing and mulching of disturbed areas and structural barriers at those locations which will ensure that erosion during construction will be maintained within acceptable limits. Acceptable limits are as established by the Georgia Erosion and Sedimentation Control Act of 1975, as amended, Section 402 of the Federal Clean Water Act, and applicable codes, ordinances, rules, regulations, and laws of local, state, and municipal authorities having jurisdiction.

C. Land disturbance activity shall not commence until the Land Disturbance Permit has been issued.

1.02 Submittals

Submit product data in accordance with the requirements of Section 01340 of these Specifications.

1.03 Quality Assurance

A. The temporary and permanent erosion and sedimentation control measures shown on the Drawings are minimum suggested requirements. Any additional erosion and sedimentation control measures required by the Contractor's means, methods, techniques, and sequence of operation will be installed by the Contractor at no additional cost to the Owner.

B. Perform all Work under this Section in accordance with all pertinent rules and regulations including, but not necessarily limited to, those stated in these Specifications. Where provisions of pertinent rules and regulations conflict with these Specifications the more stringent provisions shall govern.

C. Provide all materials and promptly take all actions necessary to achieve effective erosion and sedimentation control in accordance with the Georgia Erosion and Sedimentation Control Act of 1975 as amended (OCGA §12-7-1, et. seq.), local ordinances, other permits, local enforcing agency guidelines, and these Specifications.

D. Basic Principles:

1. Coordinate the land disturbance activities to fit the topography, soil types, and conditions.

2. Minimize the disturbed area and the duration of exposure to erosive elements.

3. Provide temporary or permanent stabilization to disturbed areas immediately after rough grading is complete.

4. Safely convey run-off from the site to a stable outlet to prevent flooding and damage to downstream facilities resulting from increased runoff from the site.

5. Retain sediment on-site that was generated on-site.

6. Minimize encroachment upon watercourses.

E. Implementation:

1. The Contractor is solely responsible for the control of erosion within the Project site and the prevention of sedimentation from leaving the Project site or entering waterways.

2. The Contractor shall install temporary and permanent erosion and sedimentation controls which will ensure that runoff from the disturbed area of the Project site shall pass through a filter system before exiting the Project site.

3. The Contractor shall provide temporary and permanent erosion and sedimentation control measures to prevent silt and sediment from entering the waterways and designated wetland areas. The Contractor shall maintain an undisturbed vegetative buffer a minimum of 25 feet from the top of the bank.

4. The Contractor shall limit land disturbance activity to those areas shown on the Drawings.

5. The Contractor shall maintain erosion and sedimentation control measures within disturbed areas on the entire site at no additional cost to the Owner until the final acceptance of the Project. Maintenance shall include mulching, re-seeding, clean-out of sediment barriers and sediment ponds, replacement of washed-out or undermined rip rap and erosion control materials, to the satisfaction of the Owner and Engineer.

6. All fines imposed for improper erosion and sedimentation control shall be paid by the Contractor.

Part 2 Products

2.01 Sediment Barrier

A. Silt Fence:

1. Type A silt fence shall meet the requirements of Section 171 of the Georgia Department of Transportation Standard Specifications, latest edition.

2. Type C Silt Fence is a combination of Type A silt Fence with woven wire reinforcement. Type C Silt Fence reinforcement shall meet the requirements of Section 171 of Georgia D.O.T. Specifications.

3. Silt fence fabric shall be an approved product on the Georgia DOT Qualified Product List No. 36, latest edition.

B. Hay Bales: Hay bales shall be clean, seed-free cereal hay, rectangular in shape, and contain five cubic feet or more of material.

C. Concrete Blocks: Concrete blocks shall be hollow, non-load-bearing type.

2.02 Construction Exit Stone

Use sound, tough, durable stone resistant to the action of air and water. Slabby or shaley pieces will not be acceptable. Aggregate size shall be in accordance with the National Stone Association Size R-2 (1.5 to 3.5-inch stone) or Type 3 rip rap stone conforming to Section 805.01 of the Georgia Department of Transportation Standard Specifications.

2.03 Rip Rap

A. Stone Rip Rap: Use sound, tough, durable stones resistant to the action of air and unless noted otherwise, stone rip rap shall be Type 1.

1. Type 1 Rip Rap: Rip rap size and gradation shall conform to Section 805.01 of the Georgia Department of Transportation Standard Specification for Type 1 Stone Dumped Rip Rap.

2. Type 3 Rip Rap: Rip rap size and gradation shall conform to Section 805.01 of the Georgia Department of Transportation Standard Specifications for Type 3 Stone Dumped Rip Rap.

B. Sand Cement Bag Rip Rap: Sand cement bag rip rap shall conform to the Georgia Department of Transportation Standard Specifications, Section 603.

2.04 Plastic Filter Fabric

A. Plastic filter fabric shall conform to the Georgia Department of Transportation Standard Specifications, Section 881, for filter fabrics.

B. Plastic filter fabric shall be an approved product on the Georgia Department of Transportation Qualified Product List No. 28, latest edition.

2.05 Grassing

A. Grassing materials shall meet the requirements of the Georgia Department of Transportation Standard Specifications, latest edition; as shown in the table:

Material	Section No.
Topsoil	893.01
Seed and Sod	890
Fertilizer	891.01
Agricultural Lime	882.02
Mulch	893.02
Inoculants	893.04

B. Seed species shall be provided as shown on the Drawings.

C. Mulch Binder: Mulch on slopes exceeding 3 (horizontal) to 1 (vertical) shall be held in place by the use of a mulch binder, as approved by the Engineer. The mulch binder shall be non-toxic to plant and animal life and shall be approved by the Engineer.

D. Water: Water shall be free of excess and harmful chemicals, organisms, and substances which may be harmful to plant growth or obnoxious to traffic. Salt or brackish water shall not be used. Water shall be furnished by the Contractor.

Part 3 Execution

3.01 General

A. Temporary and permanent erosion and sedimentation control measures shall prevent erosion and prevent sediment from exiting the site. If, in the opinion of the Owner, Engineer, or state inspector, the Contractor's temporary erosion and sedimentation control measures are inadequate, the Contractor shall provide additional maintenance for existing measures or additional devices to control erosion and sedimentation on the site at no additional cost to the Owner.

B. All erosion and sedimentation control devices and structures shall be inspected by the Contractor at least once a week and immediately after each rainfall occurrence. Any device or structure found to be damaged shall be repaired or replaced by the end of the day.

C. All erosion and sedimentation control measures and devices shall be constructed and maintained as indicated on the Drawings or specified herein until adequate permanent disturbed area stabilization has been provided and accepted by the Engineer. Once adequate permanent stabilization has been provided and accepted by the Engineer, all temporary erosion and sedimentation control structures and devices shall be removed.

3.02 Sediment Control

A. Construction Exit:

1. Construction exit(s) shall be placed as shown on the Drawings and as directed by the Engineer. A construction exit shall be located at any point traffic will be leaving a disturbed area to a public right-of-way, street, alley, sidewalk, or parking area.

2. Placement of Construction Exit Material: The ground surface upon which the construction exit material is to be placed shall be prepared to a smooth condition free from obstructions, depressions or debris. The plastic filter fabric shall be placed to provide a minimum number of overlaps and a minimum width of one foot of overlap at each joint. The stone shall be placed with its top elevation conforming to the surrounding ground elevations. The stone shall be dropped from no more than a three feet height during construction.

3. Construction Exit Maintenance: The Contractor shall regularly maintain the exit with the top dressing of stone to prevent tracking or flow of soil onto public rights-of-way and paved surfaces as directed by the Engineer.

4. Construction Exit Removal: Construction exit(s) shall be removed and properly disposed of when the disturbed area has been properly stabilized, the tracking or flow of soil onto public rights-of-way or paved surfaces has ceased and as directed by the Engineer.

B. Sediment Barriers:

1. Sediment barriers shall include, but are not necessarily limited to, silt fences, hay bales, and any device which prevents sediment from exiting the disturbed area.

2. Silt fences and hay bales shall not be used in any flowing stream, creek, or river.

3. Sediment barriers shall be installed as shown on the Drawings and as directed by the Owner or Engineer.

4. Sediment barriers shall be maintained to ensure the depth of impounded sediment is no more than one-half of the original height of the barrier or as directed by the Engineer. Torn, damaged, destroyed, or washed-out barriers shall be repaired, reinforced, or replaced with new material and installed as shown on the Drawings and as directed by the Owner or Engineer.

5. Accumulated sediment shall be removed from the barrier and replaced and stabilized on-site as directed by the Owner or Engineer.

6. Sediment barrier shall be removed once the disturbed area has been stabilized with a permanent vegetative cover and the sediment barrier is no longer required as directed by the Engineer.

7. All non-biodegradable parts of the barrier shall be disposed of properly.

8. The disturbed area created by barrier removal shall be permanently stabilized.

C. Sediment Boxes: All inlet grates shall be covered with sediment boxes during grading operations and shall remain so covered until all open areas are permanently stabilized against erosion.

3.03 Erosion Control

A. Rip Rap

1. Rip rap shall be placed as shown on the Drawings and as directed by the Engineer. Rip rap shall be placed at all points where natural vegetation is disturbed on the banks of active streams. Compact backfill and place rip rap to prevent subsequent settlement and erosion. This requirement applies equally to construction alongside a stream as well as crossing a stream or drainage ditch.

2. When trenching across a stream or drainage ditch, place rip rap over the entire disturbed area upstream and downstream of the trench excavation. Place rip rap across creek bottom, across creek banks, and extend rip rap placement five feet beyond the top of each creek bank.

3. Preparation of Foundations: The ground surface upon which the rip rap is to be placed shall be brought to the correct lines and grades before placement is commenced. Where filling of depressions is required, the

new material shall be compacted with hand or mechanical tampers. Unless at creek banks or otherwise shown or specified, rip rap shall begin in a toe ditch constructed in original ground around the toe of the fill or the cut slope. The toe ditch shall be two feet deep in original ground, and the side next to the fill or cut shall have that same slope. After the rip rap is placed, the toe ditch shall be backfilled and the excess dirt spread neatly on the site.

4. Placement of Plastic Filter Fabric:

   a. Plastic filter fabric shall be placed under all rip rap unless shown or specified otherwise.

   b. Filter fabric shall not be placed under rip rap on stream or drainage ditch crossings.

   c. The surface to receive filter fabric shall be prepared to a smooth condition free from obstructions, depressions, and debris. The filter fabric shall be installed with the long dimension running up the slope and shall be placed to provide a minimum number of overlaps. The fabric shall be placed to provide a minimum width of one foot of overlap at each joint. The fabric shall be placed so that the upstream strip overlaps the downstream strip. The fabric shall be anchored in place with securing pins of the type recommended by the fabric manufacturer. Pins shall be placed on or within 3-inches of the centerline of the overlap. The fabric shall be placed loosely to avoid stretching and tearing during placement of the stone. The fabric shall be protected at all times during construction from clogging due to clay, silts, chemicals, or other contaminants. Contaminated fabric or fabric damaged during installation or during placement of rip rap shall be removed and replaced with uncontaminated and undamaged fabric at no additional cost to the Owner.

5. Placement of Rip Rap: Rip rap shall be placed on a 6-inch layer of soil, crushed stone or sand overlaying the filter fabric. Rip rap shall be placed with its top elevation conforming with the finished grade or the natural existing slope of the stream bank and stream bottom. The stone shall be dropped from no more than a three foot height during construction. Stone rip rap shall be placed to provide a uniform surface to the thickness shown on the Drawings. The thickness tolerance for the course shall be –3 inches and +6 inches.

B. Grassing:

1. Temporary Stabilization: Temporary stabilization shall be provided as shown on the Drawings and conforming to these Specifications to control erosion on the site. Temporary stabilization shall be provided to any area that will not receive permanent stabilization within the next 14 calendar days. Partial payment requests may be withheld for those portions of the Project not complying with this requirement.

2. Permanent Stabilization:

   a. Permanent stabilization shall be provided as shown on the Drawings and conforming to these Specifications to control erosion on the site. Permanent stabilization shall be provided to

all areas of land disturbance within seven calendar days of the completion of land disturbance for any area greater than 0.25 acre.

b. Where permanent stabilization cannot be immediately established because of an inappropriate season, the Contractor shall provide temporary stabilization. The Contractor shall return to the site at the appropriate season to provide permanent stabilization in areas that received only temporary stabilization.

3. Grassing shall meet the requirements of Section 700 of the Georgia Department of Transportation Standard Specifications, latest edition, unless specified otherwise.

4. Seed rate, fertilization and other requirements shall be provided as shown on the Drawings.

3.04 Clean-Up

A. Dispose of all excess erosion and sedimentation control materials in a manner satisfactory to the Owner and Engineer.

B. Final clean-up shall be performed in accordance with the requirements of these Specifications and to the satisfaction of the Owner and Engineer.

END OF SECTION

Part 1 General

1.01 Scope

A. This Section includes earthwork and related operations, including, but not limited to, clearing and grubbing the construction site, dewatering, excavating all classes of material encountered, pumping, draining and handling of water encountered in the excavations, handling, storage, transportation and disposal of all excavated and unsuitable material, construction of fills and embankments, backfilling around structures and pipe, backfilling all trenches and pits, compacting, all sheeting, shoring and bracing, preparation of subgrades, surfacing and grading, and any other similar, incidental, or appurtenant earthwork operation which may be necessary to properly complete the work.

B. The Contractor shall provide all services, labor, materials and equipment required for all earthwork and related operations necessary or convenient to the Contractor for furnishing complete Work as shown on the Drawings or specified in these Contract Documents.

1.02 General

A. The elevations shown on the Drawings as existing are taken from the best existing data and are intended to give reasonably accurate information about the existing elevations. They are not precise and the Contractor shall become satisfied as to the exact quantities of excavation and fill required.

B. Earthwork operations shall be performed in a safe and proper manner with appropriate precautions being taken against all hazards.

C. All excavated and filled areas for structures, trenches, fills, topsoil areas, embankments and channels shall be maintained by the Contractor in good condition at all times until final acceptance by the Owner. All damage caused by erosion or other construction operations shall be repaired by the Contractor using material of the same type as the damaged material.

D. Earthwork within the rights-of-way of the Department of Transportation, the County Road Department and the respective cities shall be done in accordance with requirements and provisions of the permits issued by those agencies for the construction within their respective rights-of-way. Such requirements and provisions, where applicable, shall take precedence and supersede the provisions of these Specifications.

E. The Contractor shall control grading in a manner to prevent surface water from running into excavations. Obstruction of surface drainage shall be avoided and means shall be provided whereby storm water can be uninterrupted in existing gutters, other surface drains or temporary drains. Free access must be provided to all fire hydrants, watergates and meters.

F. Excavation work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the work, regardless of the type, character, composition or condition thereof.

G. Tests for compaction and density shall be conducted by the Engineer or by an

independent testing laboratory selected by the Engineer. Costs of compaction tests performed by an independent testing laboratory shall be paid for directly by the Owner and not as a part of this Contract. The Contractor shall make all necessary excavations and shall supply any samples of materials necessary for conducting compaction and density tests. The cost of all retests made necessary by the failure of materials to conform to the requirements of these Contract Documents shall be paid by the Contractor.

H. All earthwork operations shall comply with the requirements of OSHA Construction Standards, Part 1926, Subpart P, Excavations, Trenching, and Shoring, and Subpart O, Motor Vehicles, Mechanized Equipment, and Marine Operations, and shall be conducted in a manner acceptable to the Engineer.

I. It is understood and agreed that the Contractor has made a thorough investigation of the surface and subsurface conditions of the site and any special construction problems which might arise as a result of nearby watercourses and floodplains, particularly in areas where construction activities may encounter water-bearing sands and gravels or limestone solution channels. The Contractor shall be responsible for providing all services, labor, equipment and materials necessary or convenient to the Contractor for completing the work within the time specified in these Contract Documents.

Part 2 Products

2.01 Materials and Construction

A. Earthwork Materials

1. Fill Material, General

   a. Approval Required: All fill material shall be subject to the approval of the Engineer.

   b. Notification: For approval of imported fill material, notify the Engineer at least one week in advance of intention to import material, designate the proposed borrow area and permit the Engineer to sample as necessary from the borrow area for the purpose of making acceptance tests to prove the quality of the material.

2. On-Site Fill Material: All on-site fill material shall be soil exclusive of organic matter, frozen lumps or other deleterious substances. On-site fill material shall contain no rocks or lumps over 3-inches maximum in dimension.

3. Imported Fill Materials: All imported fill material shall meet the requirements of on-site fill material.

4. Sand Cushions and Sand Fill: Sand cushions and sand fill shall consist of a sand-gravel fill of such gradation that 100 percent will pass a 3/8-inch sieve and not more than 10 percent by weight is lost by washing.

5. Coarse Aggregate: Coarse aggregate shall conform to the Georgia Department of Transportation Standard Specifications for Construction of Road and Bridges, 800.01 for No. 57 Stone, Group II and shall have the following gradation:

Sieve Size	Percent Passing
2-inch	-
1-1/2-inch	100
1-inch	95 - 100
1/2-inch	25 - 60
No. 4	0 - 10
No. 8	0 - 5

6. Fine Aggregate: All fine aggregate shall conform to the Georgia Department of Transportation Standard Specifications for Construction of Road and Bridges, 801.01 and shall have the following gradation:

Sieve Size	Percent Passing
No. 4	100
No. 16	25 - 75
No. 100	0 - 25

7. Pea Gravel: Pea gravel shall be clean, naturally rounded aggregate, 1/8 to 3/4-inch in diameter per ASTM C 33.

8. Top Soil: Dark organic weed free loam, free of muck.

B. Sheeting, Bracing and Timbering: The Contractor shall furnish, place and maintain all sheeting, bracing and timbering required to properly support trenches and other excavations in open cut and to prevent all movement of the soil, pavement, structures or utilities outside of the trench or pit.

1. General

a. Cofferdams and bracing design, including computations, shall be prepared before commencing construction operations. Drawings and design computations shall be signed and sealed by a professional engineer registered in the State of Georgia. The drawings and design computations shall not be submitted to the Engineer.

b. Sheeting, bracing and timbering shall be so placed as to allow the work to be constructed to the lines and grades shown on the Drawings and as ordered by the Engineer.

c. If at any time the method being used by the Contractor for supporting any material or structure in or adjacent to any excavation is not reasonably safe, the Contractor shall provide additional bracing and support necessary to furnish the added degree of safety.

d. All sheeting in contact with the concrete or masonry shall be cut off as directed by the Engineer and left in place.

2. Timber: Timber may be substituted for steel sheet piling when approved by the Engineer. Timber for shoring, sheeting or bracing shall be sound and free of large or loose knots and in good condition. Size and spacing shall be in accordance with OSHA regulations.

3. Steel Sheet Piling: Steel sheet piling shall be the continuous interlock type. The weight, depth and section modulus of the sheet piling shall be sufficient to restrain the loads of earth pressure and surcharge from existing foundations and/or live loads. Procedure for installation and bracing shall be so scheduled and coordinated with the removal of the earth that the ground under existing structures shall be protected against lateral movement at all times. The Contractor shall provide closure and sealing between sheet piling and existing facilities. Steel piling within three feet of an existing building, structure or pipeline shall remain in place, unless otherwise directed by the Engineer.

4. Remove bracing and sheeting in units when backfill reaches the point necessary to protect the structures and adjacent property. Leave sheeting in place when in the opinion of the Engineer it cannot be safely removed. Cut off sheeting left in place at least two feet below the surface.

C. Other Materials: All other materials, not specifically described but required for proper completion of the work of this Section, shall be as selected by the Contractor subject to the approval of the Engineer.

D. Stockpile Area: The stockpile area shown on the Drawings, or as directed by the Engineer, shall be used to stockpile soil material for backfilling around structures and to stockpile needed topsoil.

Part 3 Execution

3.01 General

A. Safety: Comply with local regulations and with the provisions of the “Manual of Accident Prevention in Construction” of the Associated General Contractors of America, Inc., Occupational Safety and Health Act and all other applicable safety regulations.

B. Topsoil

1. Remove all topsoil to a depth at which subsoil is encountered, from all areas under buildings, pavements, and from all areas which are to be cut to lower grades or filled.

2. With the Engineer's approval, topsoil to be used for finish grading may be stored on the site.

3. Other topsoil may be used for fill in non-critical areas with approval of the Engineer.

4. Properly dispose of all excess topsoil off site at no additional cost to the Owner.

C. Bracing and Sheeting

1. Furnish, put in place, and maintain all sheeting, bracing and shoring as may be required to properly support the sides of all excavations and to prevent all movement of earth which could in any way injure the work, adjacent property or workers.

2. Properly support all excavations in locations indicated on the Drawings and where necessary to conform to all pertinent rules and regulations and these Specifications, even though such locations are not indicated on the Drawings.

3. Exercise care in the removal of sheeting, shoring, bracing and timbering to prevent collapse or caving of the excavation faces being supported and damage to the work and adjacent property.

4. Do not leave any sheeting or bracing in the trench or excavation after completion of the work, unless approved by the Engineer.

D. Obstructions

1. Remove and dispose of all trees, stumps, roots, boulders, sidewalks, driveways, pavement, pipes and the like, as required for the performance of the work.

2. Exercise care in excavating around catch basins, inlets and manholes so as not to disturb or damage these structures.

3. Avoid removing or loosening castings or pushing dirt into catch basins, inlets and manholes.

4. Damaged or displaced structures or casting shall be repaired, replaced and dirt entering the structures during the performance of the work shall be removed at no additional cost to the Owner.

E. Utilities to be Abandoned

1. When pipes, conduits, sewers or other structures are removed from the trench leaving dead ends in the ground, such ends shall be fully plugged or sealed with brick and non-shrink grout.

2. Abandoned structures such as manholes or chambers shall be entirely removed unless otherwise specified or indicated on the Drawings.

3. All materials from abandoned utilities which can be readily salvaged shall be removed from the excavation and stored on the site at a location as directed by the Owner.

4. All salvageable materials will remain the property of the Owner unless otherwise indicated by the Owner.

F. Extra Earth Excavation

1. In case soft or excessively wet material which, in the opinion of the Engineer, is not suitable, is encountered below the final subgrade elevation of an excavation or underneath a structure, the Engineer may order the removal of this material and its replacement with crushed stone or other suitable material in order to make a suitable foundation for the construction of the structure.

G. Cutting Paved Surfaces and Similar Improvements

1. Remove existing pavement as necessary for installing pipe utilities and appurtenances or as otherwise shown on the Drawings.

2. Before removing any pavement, mark the pavement neatly, paralleling pipe lines and existing street lines. Space the marks the width of the trench.

3. Break asphalt pavement along the marks using jack hammers or other suitable tools. Break concrete pavement along the marks by use of jack hammers or by scoring with a rotary saw and breaking below the score by the use of jack hammers or other suitable tools.

4. Do not pull pavement with machines until completely broken and separated from pavement to remain.

5. Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement. No additional payment will be made for removing and replacing damaged adjacent pavement.

6. Remove and replace sidewalks disturbed by construction for their full width and to the nearest undisturbed joint.

7. The Contractor may tunnel under curbs that are encountered. Remove and replace any curb disturbed by construction to the nearest undisturbed joint.

3.02 Excavation

A. Method

1. All excavation shall be by open cut from the surface except as indicated on the Drawings.

2. All excavations for pipe appurtenances and structures shall be made in such manner and to such depth and width as will give ample room for building the structures and for bracing, sheeting and supporting the sides of the excavation, for pumping and draining groundwater and wastewater which may be encountered, and for the removal from the excavation of all materials excavated.

3. Take special care so that the soil below the bottom of the structure to be built is left undisturbed.

B. Grades

1. Excavate to grades indicated on the Drawings.

2. Where excavation grades are not indicated on the Drawings, excavate as required to accommodate installation.

C. Disposal of Excavated Material

1. Remove and properly dispose of all excavated material not needed to complete filling, backfilling and grading.

2. Dispose of excavated material off site at locations secured by the Contractor and in accordance with all requirements of federal, state, county and municipal regulations. No debris of any kind shall be deposited in any stream or body of water, or on any street or alley. No debris shall be deposited on any private property except by written consent of the property owner. In no case shall any material be left on the Project, shoved onto abutting private properties, or be buried in embankments or trenches on the Project.

3.03 Excavating for Structures

A. Earth Excavation

1. Earth excavation shall include all substances to be excavated other than rock. Earth excavation for structures shall be to limits not less than two feet outside wall lines, to allow for formwork and inspection, and further as necessary to permit the trades to install their work. All materials loosened or disturbed by excavation shall be removed from surfaces to receive concrete or crushed stone.

2. No separate payment will be made for earth excavation. The cost of such work and all costs incidental thereto shall be included in the price bid for the item to which the work pertains.

B. Rock Excavation

1. Definition of Rock: Any material which cannot be excavated with a single-tooth ripper drawn by a crawler tractor having a minimum draw bar pull rated at not less than 56,000 pounds (comparable to Caterpillar D 8K or comparable to Caterpillar 977 front-end loader, and occupying an original volume of at least one cubic yard). The Engineer shall be the sole determinant as to the limits to which the material is classified as rock.

2. Excavation: Where rock is encountered within excavation for structures, it shall be excavated to the lines and grades indicated on the Drawings or as otherwise directed by the Engineer. The Contractor shall be responsible for obtaining any blasting permits required.

3. Blasting: Blasting operations shall be conducted in accordance with all existing ordinances and regulations. All structures shall be protected from the effects of the blast. The blasting shall be done by licensed experienced workers. Dispose of excavated rock in accordance with applicable federal, state, county and local

regulations.

a. If, in the sole opinion of the Engineer, the Contractor persistently uses excessive blasting charges or blasts in an unsafe or improper manner, the Engineer will direct the Contractor to employ an independent, qualified blasting consultant, approved by the Engineer, to supervise the preparation for each blast and approve the quantity of each charge. The cost of the blasting consultant will be paid for by the Contractor and the Contractor shall not be reimbursed through the Contract allowance. The qualified blasting consultant when required to perform drilling and blasting will be paid for by the Contractor.

b. The Contractor will notify the Inspector before any charge is set and prior to blasting. Following review by the inspector regarding the proximity (normally within 300 linear feet) of permanent structures to the blasting site, the Engineer may direct the Contractor to employ an independent qualified specialty subcontractor, approved by the Engineer, to monitor the blasting by use of seismograph, identify areas where light charges must be used, conduct pre-event and post-event inspections of all structures, including photographs or videos, and maintain a detailed written log. The cost of this independent qualified specialty subcontractor will be paid for through the Contract allowance. The specialty subcontractor allowance will be used only to pay for a specialty subcontractor when directed by the Engineer to monitor blast, conduct pre-event and/or post-event inspections and maintain a log of these activities.

c. Any damage done shall be promptly repaired by the Contractor at the Contractor's own expense.

d. Rock excavation will be paid for as an extra in addition to payment for earth excavation provided for elsewhere in these Specifications. Payment will be made for measured quantity of rock excavated, at the unit price bid per cubic yard. The unit price for rock excavation shall include the cost of rock excavation, the cost of handling sufficient and suitable fill material and all costs incidental thereto. The allowable volume of rock excavation for payment, unless otherwise authorized by the Engineer, shall be based on the following measurements:

i. Horizontal measurement shall be to the actual dimension of the excavation, but not exceeding one foot in the clear outside the outer surface of the structure or a minimum of two feet from a wall.

ii. Depth measurement shall be made from the original top of rock to the bottom of the structure as constructed, or to the bottom of the rock, if above grade.

4. No allowance shall be made for overcutting or for excavation below the required elevations. The Engineer must be given reasonable notice to measure all rock.

5. If excess excavation is made or the material becomes disturbed so as to require removal below final subgrade elevations or beyond the prescribed limits, the resulting space shall be refilled with Class “C” concrete in accordance with Section 03300 of these Specifications.

C. Excavation for Foundations: Footings and slabs on grades shall rest on undisturbed earth, rock or compacted materials to ensure proper bearing.

1. Unsuitable Foundation Material

a. Any material in the opinion of the Engineer which is unsuitable for foundation shall be removed and replaced with compacted crushed stone, or with compacted fill material as directed by the Engineer. Crushed stone shall meet the requirements of the Georgia Department of Transportation Specification 800.01 for No. 57 stone.

b. No determination of unsuitability will be made until all requirements for dewatering are satisfactorily met.

2. Foundation in Rock

a. Foundations for a structure shall be on similar materials. Should excavation for a foundation be partially in rock, the Contractor shall undercut that portion of the rock 12-inches and bring the excavation to grade with compacted crushed stone.

b. Where ordered by the Engineer, undercutting of rock and replacement with crushed stone will be paid for at the unit price bid for rock excavation. The quantity shall equal one foot of depth over the horizontal dimensions authorized by the Engineer.

3. Pipe Trenches Beneath Structures

a. Where piping or conduit passes beneath footings or slabs resting on grade, trenches shall be excavated to provide a minimum of 6-inches clearance from all surfaces of the pipe or conduit. The trench shall be backfilled to the base of the structure with concrete.

b. No separate payment will be made for concrete backfill of trenches beneath structures. The cost of this work and all costs incidental to it shall be included in the price bid for the item to which the work pertains.

4. Unauthorized Excavation

a. Care shall be taken that excavation does not extend below bottom levels of footings or slabs on earth or rock. Should the excavation, through carelessness or neglect, be carried below such levels, the Contractor shall fill in the resulting excess excavation with concrete under footings and compacted crushed stone or other approved material under slabs. Crushed stone or gravel shall meet the Georgia Department of Transportation Specification 800.01 for No. 57 stone. Should excavation be carried beyond outside lines of footings such excess excavation shall be filled with concrete, or formwork shall be provided, as directed by the Engineer.

b. Additional costs of corrective work, made necessary by unauthorized excavation of earth or rock, shall be borne by the Contractor.

D. Unsuitable Bearing

1. If suitable bearings for foundations are not encountered at the elevations indicated on the Drawings, immediately notify the Engineer.

2. Do not proceed further until instructions are received and necessary measurements made for purposes of establishing additional volume of excavation.

3.04 Fill

A. Controlled Fill

1. The fill for roadways, parking areas, walks, structures, and building slabs on grade shall be controlled fill.

2. After the existing ground or excavated area has been proofrolled and examined by the Engineer, all holes and other irregularities shall be filled and compacted before the main fill is placed.

3. The fill shall be placed in even layers not exceeding 10-inches in depth and shall be thoroughly compacted as herein specified.

4. If an analysis of the soil being placed shows a marked difference from one location to another, the fill being placed shall not be made up of a mixture of these materials.

5. Each different type of material shall be handled continuously so that field control of moisture and density may be based upon a known type of material.

6. No fill shall be placed following a heavy rain without first making certain on isolated test areas that compaction can be obtained without damage to the already compacted fill.

B. Proofrolling

1. All areas where roadways, parking areas, sidewalks, structures, and buildings are to be constructed on cut areas, compacted fill, and other areas where indicated on the Drawings, shall be proofrolled to detect soft spots prior to the placement of fill material and after placement of fill, which shall be construction of foundations.

2. Proofrolling shall consist of moving a 20-30 ton loaded dump truck or other pneumatic tire roller over the subgrade before the subgrade is shaped. Proofrolling shall be witnessed by the Engineer.

3. Pneumatic-tired rollers shall have not fewer than four pneumatic tired wheels which shall be of such size and ply that tire pressures can be maintained between 80 and 100 pounds per square inch for 25,000 pound wheel load during rolling operations. Unless otherwise required, rolling shall be done with tires inflated to 90 psi. The roller wheels shall be located abreast in a rigid steel frame. Each wheel shall be loaded with an individual weight box so that each wheel will bear an equal load when traversing uneven ground. The weight boxes

shall be suitable for ballast loading such that the load per wheel shall be 25,000 pounds. The spacing of the wheels shall insure that the distance between the nearest edges of adjacent tires shall be not greater than one-half of the tire width of a single tire at the operating pressure for a 25,000 pound wheel load. The roller shall be operated no faster than 10 miles per hour.

4. Subgrade shall be proofrolled with six passes of the truck or roller. Depressions that develop during the proofrolling operation shall be filled with suitable material and those filled areas shall be proofrolled with six passes of the roller. If, after having been filled and proofrolled, the subgrade still contains depressions, the area shall be undercut to the full depth of the soft material or five feet whichever is less, backfilled, recompacted, and rolled to achieve a subgrade acceptable to the Engineer.

5. After the proofrolled subgrade has been accepted by the Engineer, the surface of the subgrade shall be finish rolled with a smooth steel wheel roller weighing not less than 10 tons. Finished surface of the subgrade shall be within a tolerance of 1/4-inch at every point.

6. Conduits, pipes, culverts and underdrains shall be neither disturbed nor damaged by proofrolling operations. Rollers shall neither pass over, nor approach closer than five feet to, conduits, pipes, culverts and underdrains unless the tops of those products are deeper than three feet.

C. Placement

1. Prior to placement of any material in embankments, the area within embankment limits shall be stripped of topsoil and all unsuitable materials removed as described under Article 3.02. The area shall then be scarified to a depth of at least 6-inches.

2. Fill materials shall be placed in continuous approximately horizontal layers extending the full width of the embankment cross-section and the full dimension of the excavation where practical and having a net compacted thickness of not over 6-inches.

3. Fill materials shall be placed at optimum moisture content within practicable limits (not less than one percent below optimum). Optimum moisture shall be maintained by sprinkling the layers as placed or by allowing materials to dry before placement.

D. Compaction

1. Fill materials shall be compacted to dry densities as determined by the Standard Proctor Compaction Test performed in accordance with ASTM D 698.

2. Fill materials supporting roadways, parking areas, sidewalks, structures, and buildings, and backfill around structures, buildings, and walls shall be compacted to 95 percent of the maximum dry density. The top 12-inches of fill material supporting roadways, parking areas, sidewalks, structures, and buildings shall be compacted to 98 percent of the maximum dry density. Fill placed for general site grading shall be compacted to 90 percent of the maximum dry density.

3. Compaction of embankments shall be by sheepsfoot rollers with staggered, uniformly spaced knobs and suitable cleaning devices. The projected area of each knob and the number and spacing of the knobs shall be such that the total weight of the roller and ballast when distributed over the area of one row of knobs shall be 250 psi. Placement and compaction of materials shall extend beyond the final contours sufficiently to insure compaction of the material at the resulting final surface. Final contours shall then be achieved by a tracked bulldozer shaping the face of the embankment.

4. Compaction of backfill around structures shall be accomplished by heavy power tamping equipment.

5. If tests indicate that density of fill is less than that specified, the area shall be either recompacted or undercut, filled, and compacted until specified density is achieved.

E. Final Grading: Upon completion of construction operations, the area shall be graded to finish contour elevations and grades shown on the Drawings. Graded areas shall be made to blend into conformation with remaining ground surfaces. All surfaces shall be left smooth and free to drain.

F. Excess Material

1. Any excess earth excavation and unsuitable materials shall be placed on the site as directed by the Engineer. Surfaces and slopes of waste fills shall be left smooth and free to drain.

2. No separate payment will be made for backfilling. The cost of all such work and all costs incidental thereto shall be included in the price bid for the item to which the work pertains.

G. Moisture

1. All fill shall be compacted with the moisture content as established by the 98 percent intercept on the moisture density curves or the moisture content at the shrinkage limit, whichever is less.

2. If fill material is too wet, provide and operate approved means to assist the drying of the fill until suitable for compaction.

3. If fill material is too dry, provide and operate approved means to add moisture to the fill layers.

3.05 Backfilling

A. Backfill carefully to restore the ground surface to its original condition. Dispose of surplus material.

B. Compact backfill underlying roadways, parking areas, sidewalks, structures, and buildings to 95 percent of the maximum dry density.

C. Backfill for Pipe

1. Initial: Place initial backfill material carefully around the pipe above bedding in uniform 6-inch layers to a depth of at least 18-inches above the pipe bell. Compact each layer thoroughly with suitable hand tools. Do not disturb or damage the pipe. Backfill on both sides of the pipe simultaneously to prevent side pressures. Initial backfill material is earth material excavated from the trench which is clean and free of rock, organics, and other unsuitable material. If materials excavated from the trench are not suitable for use as initial backfill material, obtain suitable materials elsewhere.

2. Final: After initial backfill material has been placed and compacted, backfill with general excavated material. Place backfill material in uniform layers and thoroughly compact with heavy power tamping tools of the “Wacker” type.

3. Settlement: If trenches settle, re-fill and grade the surface to conform to the adjacent surfaces.

4. Additional Material

   a. Where final grades above the pre-existing grades are required to maintain minimum cover, additional fill material will be shown on the Drawings.

   b. Utilize excess material excavated from the trench if the material is suitable. No additional payment will be made for additional material when excavated materials are used.

   c. If excess excavated materials are not suitable, or if the quantity available is not sufficient, provide suitable additional fill material. Payment for additional material imported to the job site will be made for the quantity of materials provided at the unit price bid.

D. Backfilling Around Structures

1. General

   a. Remove debris from excavations before backfilling.

   b. Do not backfill against foundation walls until so directed by the Engineer nor until all indicated perimeter insulation and/or waterproofing is in place.

   c. Protect such insulation and/or waterproofing during filling operations.

   d. Wherever possible, backfilling shall be simultaneous on both sides of walls to equalize lateral pressures.

   e. Do not backfill against walls until all permanent construction is in place to furnish lateral support on both top and bottom of wall.

   f. Backfilling against walls is to take place after all the concrete in the affected members has attained the specified strengths.

2. Materials: Backfill material placed against structures built or encountered during the work of this Section shall be suitable fill material. No broken concrete, bricks or similar materials will be permitted as backfill.

3.06 Grading

A. General: Perform all rough and finish grading required to attain the elevations indicated on the Drawings. Perform finish grading to an accuracy of + 0.10 foot.

B. Compact backfill underlying roadways, parking areas, sidewalks, structures and buildings to 95 percent of the maximum dry density. The top 12-inches of backfill shall be compacted to 98 percent of the maximum dry density.

C. Backfilling Around Structures

1. General

a. Remove debris from excavations before backfilling.

b. Do not backfill against foundation walls until so directed by the Engineer nor until all indicated perimeter insulation and/or waterproofing is in place.

c. Protect such insulation and/or waterproofing during filling operations.

d. Wherever possible, backfilling shall be simultaneous on both sides of walls to equalize lateral pressures.

e. Do not backfill against walls until all permanent construction is in place to furnish lateral support on both top and bottom of wall.

f. Backfilling against walls shall take place after all the concrete in the affected members has attained the specified strengths.

2. Materials: Backfill material placed against structures built or encountered during the work of this Section shall be suitable fill material. No broken concrete, bricks or similar materials will be permitted as backfill.

D. Treatment After Completion of Grading

1. After grading is completed, permit no further excavation, filling or grading, except with the approval of the Engineer.

2. Use all means necessary to prevent the erosion of freshly graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

3.07 Surface Water Control

A. Regulations and Permits: Obtain all necessary soil erosion control permits in accordance with the Georgia Soil Erosion and Sedimentation Control Act and all pertinent rules, laws, and regulations of all applicable federal, state, county and municipal regulatory agencies.

B. Unfavorable Weather

1. Do not place, spread or roll any fill material during unfavorable weather conditions.

2. Do not resume operations until moisture content and fill density are satisfactory to the Engineer.

C. Provide berms or channels to prevent flooding of subgrade. Promptly remove all water collected in depressions.

D. Pumping and Drainage

1. Provide, maintain and use at all times during construction adequate means and devices to promptly remove and dispose of all water from every source entering the excavations or other parts of the work.

2. Dewater by means which will insure dry excavations, preserve final lines and grades, do not disturb or displace adjacent soil.

3. All pumping and drainage shall be done with no damage to property or structures and without interference with the rights of the public, owners of private property, pedestrians, vehicular traffic or the work of other contractors, and in accordance with all pertinent laws, ordinances and regulations.

4. Do not overload or obstruct existing drainage facilities.

3.08 Settlement

A. The Contractor shall be responsible for all settlement of backfill, fills and embankments which may occur within one year after final acceptance of the Work by the Owner.

B. The Contractor shall make, or cause to be made, all repairs or replacements made necessary by settlement within 30 days after receipt of written notice from the Engineer or Owner.

3.09 Cleaning

Upon completion of the work of this Section, remove all rubbish, trash and debris resulting from construction operations. Remove surplus equipment and tools. Leave the site in a neat and orderly condition acceptable to the Engineer, and in conformance with Section 01710 of these Specifications.

END OF SECTION

Part 1 General

1.01 Scope

A. The work under this Section consists of furnishing all labor, equipment and materials and performing all operations in connection with the trench excavation and backfill required to install the sanitary sewer lines as shown on the Drawings and as specified.

B. Excavation shall include the removal of any trees, stumps, brush, debris or other obstacles which remain after the clearing and grubbing operations, which may obstruct the work, and the excavation and removal of all earth, rock or other materials to the extent necessary to install the sewer line and appurtenances in conformance with the lines and grades shown on the Drawings and as specified.

C. Backfill shall include the refilling and compaction of the fill in the trenches and excavations up to the surrounding ground surface or road grade at crossing.

D. The trench is divided into five specific areas:

1. Foundation: The area beneath the bedding, sometimes also referenced to as trench stabilization.

2. Bedding: The area above the trench bottom (or foundation) and below the bottom of the barrel of the pipe.

3. Haunching: The area above the bottom of the barrel of the pipe up to a specified height above the bottom of the barrel of the pipe.

4. Initial Backfill: The area above the haunching material and below a plane 18 inches above the top of the barrel of the pipe.

5. Final Backfill: The area above a plane 18-inches above the top of the barrel of the pipe.

E. The choice of method, means, techniques and equipment rests with the Contractor. The Contractor shall select the method and equipment for trench excavation and backfill depending upon the type of material to be excavated and backfilled, the depth of excavation, the amount of space available for operation of equipment, storage of excavated material, proximity of man-made improvements to be protected, available easement or right-of-way and prevailing practice in the area.

1.02 Quality Assurance

A. Density: All references to “maximum dry density” shall mean the maximum dry density defined by the “Maximum Density-Optimum Moisture Test”, ASTM D 698, except that for non-cohesive materials “maximum dry density” shall mean the maximum index density as determined by the “Maximum Index Density of Soils Using a Vibratory Table”, ASTM D 4253. Determination of the density of foundation, bedding, haunching, or backfill materials in place shall meet with the requirements of ASTM D 1556, “Density of Soil In Place by the Sand Cone Method”, ASTM D 2937, “Density of Soil In Place by the Drive-Cylinder Method”

or ASTM D 2922, "Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth)".

B. Sources and Evaluation Testing: Testing of materials to certify conformance with the Specifications shall be performed by an independent testing laboratory in accordance with Section 01410 of these Specifications. All imported fill materials shall meet the requirements of on-site fill materials.

1.03 Safety

Perform all trench excavation and backfilling activities in accordance with the Occupational Safety and Health Act of 1970 (PL 91-596), as amended. The Contractor shall pay particular attention to the Safety and Health Regulations Part 1926, Subpart P "Excavation, Trenching & Shoring" as described in OSHA publication 2226.

Part 2 Products

2.01 Trench Foundation Materials

A. Crushed stone shall be utilized for trench foundation (trench stabilization) and shall meet the requirements of the Georgia Department of Transportation Specification 800.2.01, Group I (limestone, marble or dolomite) or Group II (quartzite, granite or gneiss). Stone size shall be between No. 57 and No. 4, inclusive.

2.02 Bedding and Haunching Materials

A. Unless specified otherwise, bedding and haunching materials shall be crushed stone as specified below.

B. Crushed stone utilized for bedding and haunching shall meet the requirements of the Georgia Department of Transportation Specification 800.01, Group I (limestone, marble or dolomite) or Group II (quartzite, granite or gneiss). Stone size shall be between No. 57 and No. 4, inclusive.

C. Earth materials utilized for bedding and haunching shall be suitable materials selected from materials excavated from the trench. Suitable materials shall be clean and free of rock larger than 2-inches at its largest dimension, organics, cinders, stumps, limbs, frozen earth or mud, man-made wastes and other unsuitable materials. Should the material excavated from the trench be saturated, the saturated material may be used as earth material, provided it is allowed to dry properly and it is capable of meeting the specified compaction requirements. When necessary, earth bedding and haunching materials shall be moistened to facilitate compaction by tamping. If materials excavated from the trench are not suitable for use as bedding or haunching material, provide select material conforming to the requirements of this Section at no additional cost to the Owner.

D. Filter Fabric Woven Type

1. Filter fabric associated with bedding shall be a polypropylene woven fabric. The fabric shall be a high modulus type with good separation capabilities.

The fabric shall be inert to biological degradation and naturally occurring chemicals, alkalies and acids.

2. The fabric shall have an equivalent opening size EOS of 20 to 45. The fabric shall also conform to the minimum property values listed in the following table:

Fabric Property	Unit	Test Method	Minimum Value
Grab Tensile Strength	lbs.	ASTM D 4632	200
Grab Tensile Elongation	%	ASTM D 4632	30 (max.)
Mullen Burst Strength	psi	ASTM D 3786	400
Trapezoid Tear Strength	lbs.	ASTM D 4533	75
Puncture Strength	lbs.	ASTM D 3787	75

3. If ordered by the Engineer, the filter fabric manufacturer shall furnish the services of a competent factory representative to supervise and/or inspect the installation of pipe. This service will be furnished for a minimum of 10 days during initial pipe installation.

4. Filter fabric shall be Mirafi 500X, Amoco 2002 or Exxon GTF-200.

2.03 Initial Backfill

A. Initial backfill material shall be crushed stone or earth materials as specified for bedding and haunching materials.

B. When necessary, initial backfill materials shall be moistened to facilitate compaction by tamping. If materials excavated from the trench are not suitable for use as initial backfill material, provide select material conforming to the requirements of this Section at no additional cost to the owner.

2.04 Final Backfill

A. Final backfill material shall be general excavated earth materials, shall not contain rock larger than 2-inches at its greatest diameter, cinders, stumps, limbs, man-made wastes and other unsuitable materials. If materials excavated from the trench are not suitable for use as final backfill material, provide select material conforming to the requirements of this Section.

2.05 Select Backfill

Select backfill shall be materials which meet the requirements as specified for bedding, haunching or initial backfill materials, including compaction requirements.

2.06 Concrete

A. Concrete for bedding, haunching, initial backfill or encasement shall have a compressive strength of not less than 3,000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5-inches. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C 94. Reinforcing steel shall conform to the requirements of ASTM A 615, Grade 60.

Part 3 Execution

3.01 Trench Excavation

A. Topsoil and grass shall be stripped a minimum of 6-inches over the trench excavation site and stockpiled separately for replacement over the finished grading areas.

B. Trenches shall be excavated to the lines and grades shown on the Drawings with the centerlines of the trenches on the centerlines of the pipes and to the dimensions which provide the proper support and protection of the pipe and other structures and accessories.

C. Trench Width for Pipelines

1. The sides of all trenches shall be vertical to a minimum of one foot above the top of the pipe. Unless otherwise indicated on the Drawings, the maximum trench width shall be equal to the sum of the outside diameter of the pipe plus two feet. The minimum trench width shall be that which allows the proper consolidation of the haunching and initial backfill material.

2. Excavate the top portion of the trench to any width within the construction easement or right-of-way which will not cause unnecessary damage to adjoining structures, roadways, pavement, utilities, trees or private property. Where necessary to accomplish this, provide sheeting and shoring.

3. Where rock is encountered in trenches, excavate to remove boulders and stones to provide a minimum of 9-inches clearance between the rock and any part of the pipe barrel or manhole.

4. Wherever the prescribed maximum trench width is exceeded, the Contractor shall use the next higher Class or Type of bedding and haunching as shown on the Drawings for the full trench width as actually cut. The excessive trench width may be due to unstable trench walls, inadequate or improperly placed bracing and sheeting which caused sloughing, accidental over-excavation, intentional over-excavation necessitated by the size of the Contractor's tamping and compaction equipment, intentional over-excavation due to the size of the Contractor's excavation equipment, or other reasons beyond the control of the Engineer or Owner.

D. Depth

1. The trenches shall be excavated to the required depth or elevation which allow for the placement of the pipe and bedding to the dimensions shown on the Drawings.

2. Where rock is encountered in trenches for pipelines, excavate to the minimum depth which will provide clearance below the pipe barrel of 8-inches for pipe 21-inches in diameter and smaller and 12-inches for larger pipe, valves and manholes.

E. Excavated Materials

1. Excavated materials shall be placed adjacent to the work to be used for backfilling as required. Top soil shall be carefully separated and lastly placed in its original location.

2. Excavated material shall be placed sufficiently back from the edge of the excavation to prevent caving of the trench wall, to permit safe access along the trench and not cause any drainage problems. Excavated material shall be placed so as not to damage existing landscape features or man-made improvements.

3.02 Sheeting, Bracing and Shoring

A. Sheeting, bracing and shoring shall be installed in the following instances:

1. Where sloping of the trench walls does not adequately protect persons within the trench from slides or cave-ins.

2. In caving ground.

3. In wet, saturated, flowing or otherwise unstable materials.

4. Where necessary to prevent damage to adjoining buildings, structures, roadways, pavement, utilities, trees or private properties which are required to remain.

5. Where necessary to maintain the top of the trench within the available construction easement or right-of-way.

B. In all cases, excavation protection shall strictly conform to the requirements of the Occupational Safety and Health Act of 1970, as amended.

C. Timber: Timber for shoring, sheeting, or bracing shall be sound and free of large or loose knots and in good, serviceable condition. Size and spacing shall be in accordance with OSHA regulations.

D. Steel Sheeting and Sheet Piling: Steel sheet piling shall be the continuous interlock type. The weight, depth and section modulus of the sheet piling shall be sufficient to restrain the loads of earth pressure and surcharge from existing foundations and live loads. Procedure for installation and bracing shall be so scheduled and coordinated with the removal of the earth that the ground under existing structures shall be protected against lateral movement at all times. The Contractor shall provide closure and sealing between sheet piling and existing facilities.

E. Trench Shield: A trench shield or box may be used to support the trench walls. The use of a trench shield does not necessarily preclude the additional use of bracing and sheeting. When trench shields are used, care must be taken to

avoid disturbing the alignment and grade of the pipe or disrupting the haunching of the pipe as the shield is moved. When the bottom of the trench shield extends below the top of the pipe, the trench shield will be raised in 6-inch increments with specified backfilling occurring simultaneously. At no time shall the trench shield be "dragged" with the bottom of the shield extending below the top of the pipe or utility.

F. Remove bracing and sheeting in units when backfill reaches the point necessary to protect the pipe and adjacent property. Leave sheeting in place when in the opinion of the Engineer it cannot be safely removed or is within three feet of an existing structure, utility, or pipeline. Cut off any sheeting left in place at least two feet below the surface.

G. Sheet piling within three feet of an existing structure or pipeline shall remain in place, unless otherwise directed by the Engineer.

3.03 Rock Excavation

A. Definition of Rock: Any material which cannot be excavated with conventional excavating equipment, and is removed by drilling and blasting, and occupies an original volume of at least one-half cubic yard.

B. Blasting: Provide licensed, experienced workmen to perform blasting. Conduct blasting operations in accordance with all existing ordinances and regulations. Protect all buildings and structures from the effects of the blast. Repair any resulting damage. If the Contractor repeatedly uses excessive blasting charges or blasts in an unsafe or improper manner, the Engineer may direct the Contractor to employ an independent blasting consultant to supervise the preparation for each blast and approve the quantity of each charge.

C. Removal of Rock: Dispose of rock off site that is surplus or not suitable for use as rip rap or backfill.

D. The Contractor shall notify the Engineer prior to any blasting. Additionally, the Contractor shall notify the Engineer and local fire department before any charge is set.

E. Following review by the Engineer regarding the proximity of permanent buildings and structures to the blasting site, the Engineer may direct the Contractor to employ an independent, qualified specialty sub- contractor, approved by the Engineer, to monitor the blasting by use of seismograph, identify the areas where light charges must be used, conduct pre-blast and post-blast inspections of structures, including photographs or videos, and maintain a detailed written log.

3.04 Dewatering Excavations

A. Dewater excavation continuously to maintain a water level two feet below the bottom of the trench.

B. Control drainage in the vicinity of excavation so the ground surface is properly pitched to prevent water running into the excavation.

C. There shall be sufficient pumping equipment, in good working order, available at all times, to remove any water that accumulates in excavations. Where the utility

crosses natural drainage channels, the work shall be conducted in such a manner that unnecessary damage or delays in the prosecution of the work will be prevented. Provision shall be made for the satisfactory disposal of surface water to prevent damage to public or private property.

D. In all cases, accumulated water in the trench shall be removed before placing bedding or haunching, laying pipe, placing concrete or backfilling.

E. Where dewatering is performed by pumping the water from a sump, crushed stone shall be used as the medium for conducting the water to the sump. Sump depth shall be at least two feet below the bottom of the trench. Pumping equipment shall be of sufficient quantity and/or capacity to maintain the water level in the sump two feet below the bottom of the trench. Pumps shall be a type such that intermittent flows can be discharged. A standby pump shall be required in the event the operating pump or pumps clog or otherwise stop operation.

F. Dewater by use of a well point system when pumping from sumps does not lower the water level two feet below the trench bottom. Where soil conditions dictate, the Contractor shall construct well points cased in sand wicks. The casing, 6 to 10-inches in diameter, shall be jetted into the ground, followed by the installation of the well point, filling casing with sand and withdrawing the casing.

3.05 Trench Foundation and Stabilization

A. The bottom of the trench shall provide a foundation to support the pipe and its specified bedding. The trench bottom shall be graded to support the pipe and bedding uniformly throughout its length and width.

B. If, after dewatering as specified above, the trench bottom is spongy, or if the trench bottom does not provide firm, stable footing and the material at the bottom of the trench will still not adequately support the pipe, the trench will be determined to be unsuitable and the Engineer shall then authorize payment for trench stabilization.

C. Should the undisturbed material encountered at the trench bottom constitute, in the opinion of the Engineer, an unstable foundation for the pipe, the Contractor shall be required to remove such unstable material and fill the trench to the proper subgrade with crushed stone as directed by the Engineer.

D. Where the replacement of unsuitable material with crushed stone does not provide an adequate trench foundation, the trench bottom shall be excavated to a depth of at least two feet below the specified trench bottom. Place filter fabric in the bottom of the trench and support the fabric along the trench walls until the trench stabilization, bedding, haunching and pipe have been placed at the proper grade. The ends of the filter fabric shall be overlapped by one foot above the pipe.

E. Where trench stabilization is provided, the trench stabilization material shall be compacted to at least 90 percent of the maximum dry density, unless shown or specified otherwise.

3.06 Bedding and Haunching

A. Prior to placement of bedding material, the trench bottom shall be free of any water, loose rocks, boulders or large dirt clods.

B. Bedding material shall be placed to provide uniform support along the bottom of the pipe and to place and maintain the pipe at the proper elevation. The initial layer of bedding placed to receive the pipe shall be brought to the grade and dimensions indicated on the Drawings. All bedding shall extend the full width of the trench bottom. The pipe shall be placed and brought to grade by tamping the bedding material or by removal of the excess amount of the bedding material under the pipe. Adjustment to grade line shall be made by scraping away or filling with bedding material. Wedging or blocking up of pipe shall not be permitted. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade shall not be permitted. Each pipe section shall have a uniform bearing on the bedding for the length of the pipe, except immediately at the joint.

C. At each joint, excavate bell holes of ample depth and width to permit the joint to be assembled properly and to relieve the pipe bell of any load.

D. After the pipe section is properly placed, add the haunching material to the specified depth. The haunching material shall be shovel sliced, tamped, vigorously chinked or otherwise consolidated to provide uniform support for the pipe barrel and to fill completely the voids under the pipe, including the bell hole. Prior to placement of the haunching material, the bedding shall be clean and free of any water, loose rocks, boulders or dirt clods.

E. Water Mains

1. Ductile Iron Pipe

a. Unless otherwise shown on the Drawings or specified, utilize earth materials for bedding and haunching. Type 2, 3, 4 and 5 bedding shall be as detailed on the Drawings.

b. Unless specified or shown otherwise, bedding shall meet the requirements for Type 2 Pipe Bedding. Unless specified or shown otherwise for restrained joint pipe and fittings, bedding shall meet the requirements for Type 3 Pipe Bedding.

c. Where the depth of cover over the piping exceeds 9 feet, the pipe bedding shall meet the requirements of Type 4 Pipe Bedding. Where the depth of cover over the piping exceeds 14 feet, the pipe bedding shall meet the requirements of Type 5 Pipe Bedding.

d. Type 4 or Type 5 Pipe Bedding called for on the Drawings, specified or ordered by the Engineer, shall meet requirements for Type 4 or Type 5 Pipe Bedding, utilizing crushed stone bedding and haunching material.

F. Manholes: Excavate to a minimum of 12-inches below the planned elevation of the base of the manhole. Place and compact crushed stone bedding material to the required grade before installing the manhole.

G. Excessive Width and Depth

1. Water Mains: If the trench is excavated to excess width, provide the next higher type or class of pipe bedding, but a minimum of Type 4, as detailed on the Drawings.

2. If the trench is excavated to excessive depth, provide crushed stone to place the bedding at the proper elevation or grade.

H. Compaction: Bedding and haunching materials under pipe, manholes and accessories shall be compacted to a minimum of 90 percent of the maximum dry density, unless shown or specified otherwise.

3.07 Initial Backfill

A. Initial backfill shall be placed to anchor the pipe, protect the pipe from damage by subsequent backfill and ensure the uniform distribution of the loads over the top of the pipe.

B. Place initial backfill material carefully around the pipe in uniform layers to a depth of at least 18-inches above the pipe barrel or duct bank. Layer depths shall be a maximum of 6-inches for pipe 18-inches in diameter and smaller and a maximum of 12-inches for pipe larger than 18-inches in diameter.

C. Backfill on both sides of the pipe simultaneously to prevent side pressures.

D. Compact each layer thoroughly with suitable hand tools or tamping equipment.

E. Initial backfill shall be compacted to a minimum 90 percent of the maximum dry density, unless shown or specified otherwise.

F. If materials excavated from the trench are not suitable for use as backfill materials, provide select backfill material conforming to the requirements of this Section.

3.08 Concrete Encasement for Pipelines

Where concrete encasement is shown on the Drawings for pipelines, excavate the trench to provide a minimum of 6-inches clearance from the bell of the pipe. Lay the pipe to line and grade on concrete blocks. In lieu of bedding, haunching and initial backfill, place concrete to the full width of the trench and to a height of not less than 12-inches above the pipe bell. Do not backfill the trench for a period of at least 24 hours after concrete is placed.

3.09 Final Backfill

A. Backfill carefully to restore the ground surface to its original condition.

B. The top 6-inches shall be topsoil obtained as specified in “Trench Excavation” of this Section.

C. Excavated material which is unsuitable for backfilling, and excess material, shall be disposed of, at no additional cost to the Owner, in a manner approved by the Engineer. Surplus soil may be neatly distributed and spread over the site, if approved by the Engineer. If such spreading is allowed, the site shall be left in a clean and sightly condition and shall not affect pre-construction drainage patterns. Surplus rock from the trenching operations shall be removed from the site.

D. If materials excavated from the trench are not suitable for use as backfill materials, provide select backfill material conforming to the requirements of this Section.

E. After initial backfill material has been placed and compacted, backfill with final backfill material. Place backfill material in uniform layers, compacting each layer thoroughly as follows:

1. In 6-inch layers, if using light power tamping equipment, such as a “jumping jack”.

2. In 12-inch layers, if using heavy tamping equipment, such as hammer with tamping feet.

3. In 24-inch layers, if using a hydra-hammer.

F. Settlement: If trench settles, re-fill and grade the surface to conform to the adjacent surfaces.

G. Final backfill shall be compacted to a minimum 90 percent of the maximum dry density, unless specified otherwise.

3.10 Additional Material

Where final grades above the pre-construction grades are required to maintain minimum cover, additional fill material will be as shown on the Drawings. Utilize excess material excavated from the trench, if the material is suitable. If excess excavated materials are not suitable, or if the quantity available is not sufficient, provide additional suitable fill material at no cost to the owner.

3.11 Backfill Under Roads

Compact backfill underlying pavement and sidewalks, and backfill under dirt and gravel roads to a minimum 95 percent of the maximum dry density. The top 12-inches shall be compacted to a minimum of 98 percent of the maximum dry density.

3.12 Backfill Within Georgia DOT Right-of-Way

Backfill within the Georgia DOT right-of-way shall meet the requirements stipulated in the “Utility Accommodation Policy and Standards”, published by the Georgia Department of Transportation.

?3.13 Backfill Along Restrained Joint Pipe

Backfill along restrained joint pipe shall be compacted to a minimum 90 percent of the maximum dry density.

3.14 Detection Tape

The detection tape shall be buried 4 to 10-inches beneath the ground surface directly over the top of the pipe. Should detection tape need to be installed deeper, the Contractor shall provide 3-inch wide tape. In no case shall detection tape be buried greater than 20-inches from the finished grade surface.

3.15 Testing and Inspection

A. The soils testing laboratory is responsible for the following:

1. Compaction tests in accordance with Article 1.02 of this Section.

2. Field density tests for each two feet of lift, one test for each 1,000 feet of pipe installed or more frequently if ordered by the Engineer.

3. Inspecting and testing stripped site, subgrades and proposed fill materials.

B. The Contractor's duties relative to testing include:

1. Notifying laboratory of conditions requiring testing.

2. Coordinating with laboratory for field testing.

3. Paying costs for additional testing performed beyond the scope of that required and for re-testing where initial tests reveal non-conformance with specified requirements.

4. Providing excavation as necessary for laboratory personnel to conduct tests.

C. Inspection

1. Earthwork operations, acceptability of excavated materials for bedding or backfill, and placing and compaction of bedding and backfill is subject to inspection by the Engineer.

D. Comply with applicable codes, ordinances, rules, regulations and laws of local, municipal, state or federal authorities having jurisdiction.

END OF SECTION

Part 1 General

1.01 Scope

A. The work covered by this Section includes furnishing all labor, materials and equipment required to bore and jack casings and to properly complete pipeline construction as described herein and/or shown on the Drawings.

B. Supply all materials and perform all work in accordance with applicable American Society for Testing and Materials (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI) or other recognized standards. Latest revisions of all standards are applicable. If requested by the Engineer, submit evidence that manufacturer has consistently produced products of satisfactory quality and performance over a period of at least two years.

1.02 Submittals

A. Submit shop drawings, product data and experience in accordance with the requirements of Section 01340 of these Specifications.

B. Material Submittals: The Contractor shall provide shop drawings and other pertinent specifications and product data as follows:

1. Shop drawings for casing pipe showing sizes and connection details.

2. Design mixes for concrete and grout.

3. Casing Spacers.

C. Experience Submittals

1. Boring and jacking casings is deemed to be specialty contractor work. If the Contractor elects to perform the work, the Contractor shall provide evidence as required by the General Conditions. A minimum of five continuous years of experience in steel casing construction is required of the casing installer. Evidence of this experience must be provided with the shop drawings for review by the Engineer.

1.03 Storage and Protection

All materials shall be stored and protected in accordance with the manufacturer's recommendations and as approved by the Engineer.

Part 2 Products

2.01 Materials and Construction

A. Casing

1. The casing shall be new and unused pipe. The casing shall be made from steel plate having a minimum yield strength of 35,000 psi. The steel plate shall also meet the chemical requirements of one of the following: ASTM A36; ASTM A139, Grade B, C, D or E; ASTM A53, Type S or Type E, Grade A or B.

2. The thicknesses of casing shown in paragraph B. below are minimum thicknesses. Actual thicknesses shall be determined by the casing installer, based on an evaluation of the required forces to be exerted on the casing when jacking. Any buckling of the casing due to jacking forces shall be repaired at no additional cost to the Owner.

3. The diameters of casing shown in paragraph B. below and shown on the Drawings are minimum. Larger casings, with the Engineer's approval, may be provided at no additional cost to the Owner, for whatever reasons the Contractor may decide, whether casing size availability, line and grade tolerances, soil conditions, etc.

B. Casing Sizes

UNDER RAILROADS			
Pipe Diameter, inches	Casing Diameter, inches	Wall Thickness, inches	
		Coated	Uncoated
6	14	0.250	0.282
8	18	0.250	0.313
10	20	0.281	0.344
12	22	0.312	0.375
14	24	0.344	0.407
16	30	0.406	0.469
18	30	0.406	0.469
20	32	0.438	0.501
24	36	0.469	0.532
30	42	0.500	0.563
36	48	0.625	0.688
42	54	0.750	0.813
48	60	0.813	0.876
54	66	0.938	1.000

UNDER HIGHWAYS		
Pipe Diameter, inches	Casing Diameter, inches	Wall Thickness, inches

UNDER HIGHWAYS		
Pipe Diameter, inches	Casing Diameter, inches	Wall Thickness, inches
6	12	0.250
8	16	0.250
10	16	0.250
12	18	0.250
14	22	0.250
16	24	0.250
18	30	0.312
20	30	0.312
24	36	0.375
30	42	0.375
36	48	0.500
42	54	0.500
48	60	0.500

C. Casing Spacers: Casing spacers shall meet one of the following requirements:

1. Casing spacers shall be flanged, bolt-on style with a two-section stainless steel shell lined with a PVC liner, minimum 0.09-inch thick also having a hardness of 85-90 durometer. Runners shall be attached to stainless steel risers which shall be properly welded to the shell. The height of the runners and risers shall be manufactured such that the pipe does not float within the casing.

2. Casing spacers shall be a two-section, flanged, bolt on style constructed of heat fused PVC coated steel, minimum 14 gauge band and 10 gauge risers, with 2-inch wide glass reinforced polyester insulating skids, heavy duty PVC inner liner, minimum 0.09-inch thick having a hardness of 85-90 durometer, and all stainless steel or cadmium plated hardware.

3. Casing spacers shall be equal to Cascade Waterworks Manufacturing Company, Pipeline Seal and Insulator, Inc., or Advance Products and Systems, Inc.

E. Surface Settlement Markers: Surface settlement markers within pavement areas shall be P.K. nails. Surface settlement markers within non-paved areas shall be wooden hubs.

2.02 Equipment

A. A cutting head shall be attached to a continuous auger mounted inside the casing pipe.

Part 3 Execution

3.01 General

A. Interpretation of soil investigation reports and data, investigating the site and determination of the site soil conditions prior to bidding is the sole responsibility of the Contractor. Any subsurface investigation by the Bidder or Contractor must be approved by the appropriate authority having jurisdiction over the site. Rock and/or water, if encountered, shall not entitle the Contractor to additional compensation.

B. Casing construction shall be performed so as not to interfere with, interrupt or endanger roadway surface and activity thereon, and minimize subsidence of the surface, structures, and utilities above and in the vicinity of the casing. Support the ground continuously in a manner that will prevent loss of ground and keep the perimeters and face of the casing, passages and shafts stable. The Contractor shall be responsible for all settlement resulting from casing operations and shall repair and restore damaged property to its original or better condition at no cost to the Owner.

C. Face Protection: The face of the excavation shall be protected from the collapse of the soil into the casing.

D. Casing Design: Design of the bore pit and required bearing to resist jacking forces are the responsibility of the Contractor. The excavation method selected shall be compatible with expected ground conditions. The lengths of the casing shown on the Drawings are the minimum lengths required. The length of the casing may be extended for the convenience of the Contractor, at no additional cost to the Owner. Due to restrictive right-of-way and construction easements, boring and jacking casing lengths less than the nominal 20 foot length may be necessary.

E. Highway Crossings

1. The Contractor shall be held responsible and accountable for the coordinating and scheduling of all construction work within the highway right-of-way.

2. Work along or across the highway department rights-of-way shall be subject to inspection by such highway department.

3. All installations shall be performed to leave free flows in drainage ditches, pipes, culverts or other surface drainage facilities of the highway, street or its connections.

4. No excavated material or equipment shall be placed on the pavement or shoulders of the roadway without the express approval of the highway department.

5. In no instance will the Contractor be permitted to leave equipment (trucks, backhoes, etc.) on the pavement or shoulder overnight.

Construction materials to be installed, which are placed on the right-of-way in advance of construction, shall be placed in such a manner as not to interfere with the safe operation of the roadway.

? 6. The Contractor shall be responsible for providing the Owner sufficient information to obtain a blasting permit in a timely manner.

F. Railroad Crossings

1. The Contractor shall secure permission from the Railroad to schedule work so as not to interfere with the operation of the Railroad.

2. Additional insurance is required for each railroad crossing. The Contractor shall furnish the Railroad with such additional insurance as may be needed, cost of the same shall be borne by the Contractor.

3. All work on the Railroad right-of-way, including necessary support of tracks, safety of operations and other standard and incidental operation procedures may be under the supervision of the appropriate authorized representative of the Railroad affected and any decisions of this representative pertaining to construction and/or operations shall be final and construction must be governed by such decisions.

4. If, in the opinion of the Railroad, it becomes necessary to provide flagging protection, watchmen or the performance of any other work in order to keep the tracks safe for traffic, the Contractor shall coordinate such work and shall reimburse the Railroad, in cash, for such services, in accordance with accounting procedures agreed on by the Contractor and affected Railroad before construction is started.

5. No blasting shall be permitted within the Railroad right-of-way.

3.02 Groundwater Control

A. The Contractor shall control the groundwater throughout the construction of the casing.

B. Methods of dewatering shall be at the option and responsibility of the Contractor. Maintain close observation to detect settlement or displacement of surface facilities due to dewatering. Should settlement or displacement be detected, notify the Engineer immediately and take such action as necessary to maintain safe conditions and prevent damage.

C. When water is encountered, provide and maintain a dewatering system of sufficient capacity to remove water on a 24 hour basis keeping excavations free of water until the backfill operation is in progress. Dewatering shall be performed in such a manner that removal of soil particles is held to a minimum. Dewater into a sediment trap and comply with requirements specified in Section 02125 of these Specifications.

3.03 Safety

A. Provide all necessary bracing, bulkheads and shields to ensure complete safety to all traffic, persons and property at all times during the work. Perform the work in such a manner as to not permanently damage the roadbed or interfere with normal traffic over it.

B. Observe all applicable requirements of the regulations of the authorities having jurisdiction over this site. Conduct the operations in such a manner that all work will be performed below the level of the roadbed.

C. Perform all activities in accordance with the Occupational Safety and Health Act of 1970 (PL-596), as amended, applicable regulations of the Federal Government, OSHA 29CFR 1926 and applicable criteria of ANSI A10.16-81, "Safety Requirements for Construction of Tunnel Shafts and Caissons".

3.04 Surface Settlement Monitoring

A. Provide surface settlement markers, placed as specified and as directed by the Engineer. The Contractor shall place settlement markers outside of pavement area, along the centerline of the casing at 20 foot intervals and offset 10 feet each way from the centerline of the tunnel. Markers shall also be placed at each shoulder of the roadway, at each edge of pavement, at the centerline of the pavement and at 10 and 25 feet in each direction from the centerline of the casing. Tie settlement markers to bench marks and indices sufficiently removed as not to be affected by the casing operations.

B. Make observations of surface settlement markers, placed as required herein, at regular time intervals acceptable to the Engineer. In the event settlement or heave on any marker exceeds 1-inch, the Contractor shall immediately cease work and using a method approved by the Engineer and the authority having jurisdiction over the project site, take immediate action to restore surface elevations to that existing prior to start of casing operations.

C. Take readings and permanently record surface elevations prior to start of dewatering operations and/or shaft excavation. The following schedule shall be used for obtaining and recording elevation readings: all settlement markers, once a week; all settlement markers within 50 feet of the casing heading, at the beginning of each day; more frequently at the Engineer's direction if settlement is identified. Make all elevation measurements to the nearest 0.01 foot.

D. The Contractor shall cooperate fully with jurisdictional personnel. Any settlement shall be corrected by, and at the expense of, the Contractor.

E. Promptly report any settlement and horizontal movement immediately to the Engineer and take immediate remedial action.

3.05 Boring and Jacking

A. Shaft

1. Conduct boring and jacking operations from a shaft excavated at one end of the section to be bored. Where conditions and accessibility are suitable, place the shaft on the downstream end of the bore.

2. The shaft shall be rectangular and excavated to a width and length required for ample working space. If necessary, sheet and shore shaft properly on all sides. Shaft sheeting shall be timber or steel piling of ample strength to safely withstand all structural loadings of whatever nature due to site and soil conditions. Keep preparations dry during all operations. Perform pumping operations as necessary.

3. The bottom of the shaft shall be firm and unyielding to form an adequate foundation upon which to work. In the event the shaft bottom is not stable, excavate to such additional depth as required and place a gravel sub-base or a concrete sub-base if directed by the Engineer due to soil conditions.

B. Jacking Rails and Frame

1. Set jacking rails to proper line and grade within the shaft. Secure rails in place to prevent settlement or movement during operations. The jacking rails shall cradle and hold the casing pipe on true line and grade during the progress of installing the casing.

2. Place backing between the heels of jacking rails and the rear of the shaft. The backing shall be adequate to withstand all jacking forces and loads.

3. The jacking frame shall be of adequate design for the magnitude of the job. Apply thrust to the end of the pipe in such a manner to impart a uniformly balanced load to the pipe barrel without damaging the joint ends of the pipe.

C. Boring and jacking of casing pipes shall be accomplished by the dry auger boring method without jetting, sluicing or wetboring.

D. Auger the hole and jack the casing through the soil simultaneously.

E. Bored installations shall have a bored-hole diameter essentially the same as the outside diameter of the casing pipe to be installed.

F. Execute boring ahead of the casing pipe with extreme care, commensurate with the rate of casing pipe penetration. Boring may proceed slightly in advance of the penetrating pipe and shall be made in such a manner to prevent any voids in the earth around the outside perimeter of the pipe. Make all investigations and determine if the soil conditions are such as to require the use of a shield.

G. As the casing is installed, check the horizontal and vertical alignment frequently. Make corrections prior to continuing operation.

H. Any casing pipe damaged in jacking operations shall be repaired, if approved by the Engineer, or removed and replaced at Contractor's own expense.

I. Lengths of casing pipe, as long as practical, shall be used except as restricted otherwise. Joints between casing pipe sections shall be butt joints with complete joint penetration, single groove welds, for the entire joint circumference, in accordance with AWS recommended procedures. Prior to welding the joints, the Contractor shall ensure that both ends of the casing sections being welded are square.

J. The Contractor shall prepare a contingency plan which will allow the use of a casing lubricant, such as bentonite, in the event excessive frictional forces jeopardize the successful completion of the casing installation.

K. Once the jacking procedure has begun, it should be continued without stopping until completed, subject to weather and conditions beyond the control of the Contractor.

L. Care shall be taken to ensure that casing pipe installed by boring and jacking method will be at the proper alignment and grade.

M. The Contractor shall maintain and operate pumps and other necessary drainage system equipment to keep work dewatered at all times.

N. Adequate sheeting, shoring and bracing for embankments, operating pits and other appurtenances shall be placed and maintained to ensure that work proceeds safely and expeditiously. Upon completion of the required work, the sheeting, shoring and bracing shall be left in place, cut off or removed, as designated by the Engineer.

O. Trench excavation, all classes and type of excavation, the removal of rock, muck, debris, the excavation of all working pits and backfill requirements of Section 02225 are included under this Section.

P. All surplus material shall be removed from the right-of-way and the excavation finished flush with the surrounding ground.

Q. Grout backfill shall be used for unused holes or abandoned pipes.

3.06 Free Boring

A. Where the Drawings indicate a pipeline is to be installed by boring without casing, the Contractor shall construct the crossing by the free bore method. The free bore method shall be accomplished by the dry auger boring method without jetting, sluicing, or wet boring.

B. The diameter of the free bore shall not exceed the pipe bell outside diameter or the pipe barrel outside diameter plus 1-inch, whichever is greater.

C. Free boring, where indicated on the Drawings, is to be performed at the Contractor's option. The Contractor may choose to construct the crossing by the conventional bore and jack casing methodology.

D. The Contractor shall be responsible for any settlement of the roadway caused by the free bore construction activities.

E. If the Contractor elects to free bore, and an acceptable installation does not result for any reason, the Contractor shall install a casing pipe by the bore and jack method at no additional cost to the Owner.

3.07 Ventilation and Air Quality

Provide, operate and maintain for the duration of casing project a ventilation system to meet safety and OSHA requirements.

3.08 Rock Excavation

A. In the event that rock is encountered during the installation of the casing pipe which, in the opinion of the Engineer, cannot be removed through the casing, the Engineer may authorize the Contractor to complete the crossing by a method established in a change order.

B. At the Contractor's option, the Contractor may continue to install the casing and remove the rock through the casing at no additional cost to the Owner.

3.09 Installation of Pipe

A. After construction of the casing is complete, and has been accepted by the Engineer, install the pipeline in accordance with the Drawings and Specifications.

B. Check the alignment and grade of the casing and prepare a plan to set the pipe at proper alignment, grade and elevation, without any sags or high spots.

C. The carrier pipe shall be supported within the casing by use of casing spacers sized to limit radial movement to a maximum of 1-inch. Provide a minimum of two casing spacers per nominal length of pipe. Casing spacers shall be attached to the pipe at maximum 9 to 10 foot intervals. Casing spacers shall also be provided within two feet of each end of the casing.

D. Close the ends of the casing with 4-inch brick walls.

3.10 Sheeting Removal

Remove sheeting used for shoring from the shaft and off the job site. The removal of sheeting, shoring and bracing shall be done in such a manner as not to endanger or damage either new or existing structures, private or public properties and also to avoid cave-ins or sliding in the banks.

END OF SECTION

Part 1 General

1.01 Scope

The Contractor shall furnish all labor, materials, equipment, and incidentals required to construct asphalt concrete pavements to the grades and cross-sections shown on the Drawings and as specified herein.

1.02 Quality Assurance

A. Use only materials which are furnished by a bulk asphalt concrete producer regularly engaged in production of hot-mix, hot-laid asphalt concrete.

B. Comply with applicable requirements of Georgia Department of Transportation, Standard Specifications for Construction of Roads and Bridges, current edition.

1.03 Submittals

A. Provide certificates stating that materials supplied comply with Specifications. Certificates shall be signed by the asphalt producer and the Contractor.

B. Traffic paint manufacturer's application instructions and a description and other data relative to the Contractor's application equipment and methods shall be submitted to the Project Landscape Architect for approval.

1.04 Conditions

A. Weather Limitations:

1. Apply bituminous prime and tack coats only when the ambient temperature in the shade has been at least 40 degrees F.

2. Do not conduct paving operations when surface is wet, frozen, or contains excess of moisture which would prevent uniform distribution and required penetration.

3. Construct asphaltic courses only when atmospheric temperature in the shade is above 35 degrees F, when the underlying base is dry and when weather is not rainy.

4. Place base course when air temperature is above 35 degrees F and rising. No base course shall be placed on a frozen, saturated, or otherwise unsuitable subgrade material.

B. Grade Control: Establish and maintain the required lines and grades for each course during construction operations.

1.05 Inspection and Testing

A. Pavement and base testing will be performed by an independent testing laboratory selected by the Owner.

B. The testing agency shall test in-place courses for compliance with specified compaction, thickness, and surface smoothness requirements.

C. The testing agency shall take one 4-inch diameter core per 500 linear feet of asphalt paved areas at locations selected by the Project Landscape Architect for density and thickness tests. Repair holes resulting from coring to match existing paving.

D. Compaction:

1. Graded Aggregate Base: Minimum acceptable density shall be 98 percent of maximum dry density in accordance with ASTM D 698. Conduct one test for each 2,500 square yards of in-place material, but in no case less than one daily for each layer. Test density of graded aggregate base according to ASTM D 2167.

2. Asphaltic Concrete: Compare density of in-place material against laboratory specimen of same mixture. Minimum acceptable density of in-place material shall be 94 percent of the calculated voidless density based upon the effective specific gravity of the aggregate used. It is intended that acceptance density testing will be accomplished while the bituminous mixture is hot enough to permit further densification if such is shown to be necessary. If the density does not conform to the requirements stated herein above, the Contractor shall continue compactive effort until the required density is obtained.

E. Pavement Thickness: Inspect the cores of the base, and surface courses to determine the average thickness of the course. If the average thickness exceeds the allowable variation below, additional cores shall be made at the Contractor's expense to determine the area of deficient thickness. The deficient area shall be corrected by overlay with the same type mix to the limits as determined by the Project Landscape Architect.

1. Base Course: $\pm$1/2-inch.

2. Binder Course: $\pm$ 1/4 - inch.

3. Surface Course: $\pm$ 1/4-inch.

F. Surface Smoothness: Test finished surface of each asphalt course for smoothness using a 10 foot straightedge. Intervals of tests shall be as directed by the Owner. Surfaces will not be acceptable if exceeding the following:

1. Base Course: 1/4-inch in 10 feet.

2. Binder Course: 1/4 - inch in 10 feet.

3. Surface Course: 1/8-inch in 10 feet.

G. Contractor's Duties Relative to Testing:

1. Notifying laboratory of conditions requiring testing.

2. Coordinating with laboratory for field testing.

3. Paying costs for additional testing performed beyond the scope of that required and for retesting where initial tests reveal non-conformance with specified requirements.

4. Paying the cost of overlays or pavement removal and replacement which does not comply with the specified testing limits.

Part 2 Products

2.01 Materials

A. Graded Aggregate Base Course: Graded aggregate base course shall be of uniform quality throughout and shall meet the requirements of Section 815.01 of the Georgia Department of Transportation Standard Specifications.

B. Binder Course: Binder course shall be uniform quality throughout and conform to the requirements of Section 828, Type "B- Modified" of the Georgia Department of Transportation Standard Specifications

C. Surface Course: Surface course shall be of uniform quality throughout and shall conform to the requirements of Section 828, Type "F" of the Georgia Department of Transportation Standard Specifications.

D. Prime Coat: Prime coat shall conform to the requirements of Section 412 of the Georgia Department of Transportation Standard Specifications.

E. Tack coat shall conform to the requirements of Section 413 of the Georgia Department of Transportation Standard Specifications.

Part 3 Execution

3.01 Surface Preparation

A. Graded Aggregate Base Course:

1. Check subgrade for conformity with elevations and section immediately before placing aggregate base material.

2. Place aggregate base material in compacted layers not more than 6-inches thick, unless continuing tests indicate that the required results are being contained with thicker layers.

3. In no case shall more than 8-inches of compacted base be placed in one lift.

4. Spread, shape, and compact all aggregate base material deposited on the subgrade during the same day.
5. The compacted base shall have sufficient stability to support construction traffic without pumping.

6. If compacted base becomes unstable as a result of too much moisture, the base material and underlying subgrade, if necessary, shall be dried and reworked to a moisture content that can be recompacted.

B. Loose and Foreign Material:

1. Remove loose and foreign material from surface immediately before application of paving.

2. Use power brooms or blowers, and hand brooming as required.

3. Do not displace surface material.

C. Prime Coat:

1. Uniformly apply at a rate of 0.20 to 0.50 gallon per square yard over compacted and cleaned subbase surface.

2. Apply enough material to penetrate and seal, but not flood the surface.

3. Allow to cure and dry as long as required to attain penetration and evaporation of volatile, and in no case less than 24 hours unless otherwise acceptable to the Project Landscape Architect.

4. Blot excess asphalt with just enough sand to prevent pick-up under traffic.

5. Remove loose sand before paving.

D. Tack Coat:

1. Dilute material with equal parts of water and apply to contact surfaces of previously constructed asphalt concrete or Portland cement concrete and similar surfaces.

2. Apply at a rate of 0.05 to 0.15 gallon per square yard of surface.

3. Apply tack coat by brush to contact surfaces of curbs, gutters, manholes, and other structures projecting into or abutting asphalt concrete pavement.

4. Allow surfaces to dry until material is at condition of tackiness to receive pavement.

3.02 Equipment

A. Provide size and quantity of equipment to complete the work specified within the Project time schedule.

B. Bituminous pavers shall be self-propelled that spread hot asphalt concrete mixtures without tearing, shoving, or gouging surfaces, and control pavement edges to true lines without use of stationary forms.

C. Rolling equipment shall be self-propelled, steel-wheeled, and pneumatic-tired rollers that can reverse direction without backlash.

D. Provide rakes, lutes, shovels, tampers, smoothing irons, pavement cutters, portable heaters, and other miscellaneous small tools to complete the Work specified.

3.03 Asphaltic Concrete Placement

A. Place asphalt concrete mix on prepared surface, spread, and strike-off using paving machine.

B. Spread mixture at a minimum temperature of 225 degrees F.

C. Inaccessible and small areas may be placed by hand.

D. Place each course at a thickness such that when compacted it will conform to the indicated grade, cross-section, finish thickness, and density indicated.

E. Pavement Placing:

1. Unless otherwise directed, begin placing along centerline of areas to be paved on crowned section, and at high side of sections on one-way slope, and in direction of traffic flow.

2. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips.

3. Complete base courses for a section before placing surface courses.

4. Place mixture in as continuous an operation as practical.

F. Hand Placing:

1. Spread, tamp, and finish mixture using hand tools in areas where machine spreading is not possible, as acceptable to Project Landscape Architect.

2. Place mixture at a rate that will ensure handling and compaction before mixture becomes cooler than acceptable working temperature.

G. Joints:

1. Carefully make joints between old and new pavements, or between successive days work, to ensure a continuous bond between adjoining Work.

2. Construct joints to have same texture, density and smoothness as adjacent sections of asphalt concrete course.

3. Clean contact surfaces free of sand, dirt, or other objectionable material and apply tack coat.

4. Offset transverse joints in succeeding courses not less than 24-inches.

5. Cut back edge of previously placed course to expose an even, vertical surface for full course thickness.

6. Offset longitudinal joints in succeeding courses not less than 6-inches.

7. When the edges of longitudinal joints are irregular, honeycombed, or inadequately compacted, cut back unsatisfactory sections to expose an even, vertical surface for full course thickness.

3.04 Asphaltic Concrete Compaction

A. Provide sufficient rollers to obtain the required pavement density.

B. Begin rolling operations as soon after placing as the mixture will bear weight of roller without excessive displacement.

C. Do not permit heavy equipment, including rollers to stand on finished surface before it has thoroughly cooled or set.

D. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

E. Start rolling longitudinally at extreme lower side of sections and proceed toward center of pavement. Roll to slightly different lengths on alternate roller runs.

F. Do not roll centers of sections first under any circumstances.

G. Breakdown Rolling:

1. Accomplish breakdown or initial rolling immediately following rolling of transverse and longitudinal joints and outside edge.

2. Operate rollers as close as possible to paver without causing pavement displacement.

3. Check crown, grade, and smoothness after breakdown rolling.

4. Repair displaced areas by loosening at once with lutes or rakes and filling, if required, with hot loose material before continuing rolling.

H. Second Rolling:

1. Follow breakdown rolling as soon as possible, while mixture is hot and in condition for compaction.

2. Continue second rolling until mixture has been thoroughly compacted.

I. Finish Rolling:

1. Perform finish rolling while mixture is still warm enough for removal of roller marks.

2. Continue rolling until roller marks are eliminated and course has attained specified density.

J. Patching:

1. Remove and replace defective areas.

2. Cut-out and fill with fresh, hot asphalt concrete.

3. Compact by rolling to specified surface density and smoothness.

4. Remove deficient areas for full depth of course.

5. Cut sides perpendicular and parallel to direction of traffic with edges vertical.

6. Apply tack coat to exposed surfaces before placing new asphalt concrete mixture.

3.05 Cleaning And Protection

A. Cleaning: After completion of paving operations, clean surfaces of excess or spilled asphalt materials to the satisfaction of the Project Landscape Architect.

B. Protection:

1. After final rolling, do not permit vehicular traffic on asphalt concrete pavement until it has cooled and hardened, and in no case no sooner than six hours.

2. Provide barricades and warning devices as required to protect pavement and the general public.

C. Maintenance: The Contractor shall maintain the surfaces of pavements until the acceptance of the Project. Maintenance shall include replacement, overlay, milling, and reshaping as necessary to prevent raveling of the pavement, the preservation of smooth surfaces and the repair of damaged or unsatisfactory surfaces, to the satisfaction of the Project Landscape Architect.

3.06 Supervision and Approval

A. Pavement shall meet the requirements of the regulatory agency responsible for the maintenance of pavement. Obtain approval of pavement by the Governing Entity (and State DOT if required) before requesting final payment.

B. Failure of Pavement: Should any pavement restoration or repairs fail or settle during the life of the Contract, including the bonded period, promptly restore or repair defects.

END OF SECTION

Part 1 General

1.01 Scope

A. This Section describes products to be incorporated into the water mains and requirements for the installation and use of these items. Furnish all products and perform all labor necessary to fulfill the requirements of these Specifications.

B. Supply all products and perform all work in accordance with applicable American Society for Testing and Material (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI), or other recognized standards. Latest revisions of all standards are applicable.

1.02 Qualifications

If requested by the Engineer, submit evidence that manufacturers have consistently produced products of satisfactory quality and performance for a period of at least two years.

1.03 Submittals

Complete shop drawings, product data and engineering data for all products shall be submitted to the Engineer in accordance with the requirements of Section 01800 of these Specifications.

1.04 Transportation and Handling

A. Unloading: Furnish equipment and facilities for unloading, handling, distributing and storing pipe, fittings, valves and accessories. Make equipment available at all times for use in unloading. Do not drop or dump materials. Any materials dropped or dumped will be subject to rejection without additional justification. Pipe handled on skids shall not be rolled or skidded against the pipe on the ground.

B. Handling: Handle pipe, fittings, valves and accessories carefully to prevent shock or damage. Handle pipe by rolling on skids, forklift, or front end loader. Do not use material damaged in handling. Slings, hooks or pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior coatings or internal lining of the pipe.

1.05 Storage and Protection

A. Store all pipe which cannot be distributed along the route. Make arrangements for the use of suitable storage areas.

B. Stored materials shall be kept safe from damage. The interior of all pipe, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times. Valves and hydrants shall be drained and stored in a manner that will protect them from damage by freezing.

C. Pipe shall not be stacked higher than the limits recommended by the manufacturer. The bottom tier shall be kept off the ground on timbers, rails or concrete. Pipe in tiers shall be alternated: bell, plain end; bell, plain end. At least two rows of timbers shall be placed between tiers and chocks, affixed to

each other in order to prevent movement. The timbers shall be large enough to prevent contact between the pipe in adjacent tiers.

D. Stored mechanical and push-on joint gaskets shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.

E. Mechanical-joint bolts shall be handled and stored in such a manner that will ensure proper use with respect to types and sizes.

1.06 Quality Assurance

The manufacturer shall provide written certification to the Engineer that all products furnished comply with all applicable requirements of these Specifications.

Part 2 Products

2.01 Piping Materials and Accessories

A. Ductile Iron Pipe (DIP)

1. Ductile iron pipe shall be manufactured in accordance with AWWA C151. All pipe, except specials, shall be furnished in nominal lengths of 18 to 20 feet. Sizes will be as shown on the Drawings. All pipe shall have a minimum pressure rating as indicated in the following table, and corresponding minimum wall thickness, unless otherwise specified or shown on the Drawings:

Pipe Sizes (inches)	Pressure Class (psi)
4 - 12	350
14 - 18	350
20	300
24	250
30 - 54	200
60 - 64	200

2. Pipe and fittings shall be cement lined in accordance with AWWA C104. Pipe and fittings shall be furnished with a bituminous outside coating.

3. Fittings shall be ductile iron and shall conform to AWWA C110 or AWWA C153 with a minimum rated working pressure of 250 psi. Fittings shall be manufactured in the United States.

4. Joints

a. Unless shown or specified otherwise, joints shall be push-on or restrained joint type for pipe and standard mechanical, push-on or restrained joints for fittings. Push-on and mechanical joints

shall conform to AWWA C111. Restrained joints shall be American “LOK-FAST”, “FLEX-RING” or “LOK-RING”, Clow “SUPER-LOCK”, or U.S. Pipe “TR FLEX” or “LOK-TYTE”. No field welding of restrained joint pipe will be permitted.

5. Provide the appropriate gaskets for mechanical.

6. Bolts and Nuts

   a. Provide the necessary bolts for connections. All bolts and nuts shall be threaded in accordance with ANSI B1.1, Coarse Thread Series, Class 2A external and 2B internal fit. All bolts and nuts shall be made in the U.S.A.

   b. Bolts and nuts for mechanical joints shall be Tee Head Bolts and nuts of high strength low-alloy steel in accordance with ASTM A 242 to the dimensions shown in AWWA C111/ANSI A21.11.

   c. Bolts for exposed service shall be zinc plated, cold pressed, steel machine bolts conforming to ASTM A 307, Grade B. Nuts for exposed service shall be zinc plated, heavy hex conforming to ASTM A 563. Zinc plating shall conform to ASTM B 633, Type II.

7. Mechanical joint glands shall be ductile iron.

8. Thrust collars shall be welded-on ductile iron body type designed to withstand thrust due to 250 psi internal pressure on a dead end.

9. Acceptance will be on the basis of the Engineer's inspection and the manufacturer's written certification that the pipe was manufactured and tested in accordance with the applicable standards.

2.02 Valves

A. Gate Valves (GV)

1. 4-Inches and larger in Diameter: Gate valves shall be resilient wedge type conforming to the requirements of AWWA C509 or AWWA C515 rated for 200 psi working pressure.

   a. Valves shall be provided with two O-ring stem seals with one O-ring located above and one O-ring below the stem collar. The area between the O-rings shall be filled with lubricant to provide lubrication to the thrust collar bearing surfaces each time the valve is operated. At least one anti-friction washer shall be utilized to further minimize operating torque. All seals between valve parts, such as body and bonnet, bonnet and bonnet cover, shall be flat gaskets or O-rings.

   b. The valve gate shall be made of cast or ductile iron having a vulcanized, synthetic rubber coating, or a seat ring attached to the disc with retaining screws. Sliding of the rubber on the seating surfaces to compress the rubber will not be allowed.

The design shall be such that compression-set of the rubber shall not affect the ability of the valve to seal when pressure is applied to either side of the gate. The sealing mechanism shall provide zero leakage at the water working pressure when installed with the line flow in either direction.

c. All internal ferrous surfaces shall be coated with epoxy to a minimum thickness of 4 mils. The epoxy shall be non-toxic, impart no taste to the water and shall conform to AWWA C550.

d. Gate valves larger than 4-inches shall be manufactured by American Flow Control, Mueller or M & H Valve.

B. Butterfly Valves (BV)

1. Butterfly valves shall be resilient seated, short body design, and shall be designed, manufactured, and tested in accordance with all requirements of AWWA C504 for Class 150B.

2. Valve bodies shall be ductile iron conforming to ASTM A 536, Grade 65-45-12 or ASTM A 126, Grade B cast iron. Shafts shall be ASTM A 276, Type 304 stainless steel, machined and polished. Valve discs shall be ductile iron, ASTM A 536, Grade 65-45-12 or ASTM A 126, Grade B cast iron. The valve shall have a resilient seat.

3. Valves shall be installed with the valve shafts horizontal. Valves and actuators shall have seals on all shafts and gaskets on valve actuator covers to prevent the entry of water. Actuator mounting brackets shall be totally enclosed and shall have gasket seals.

4. Actuators

a. Valves shall be equipped with traveling nut, self-locking type actuators designed, manufactured and tested in accordance with AWWA C504. Actuators shall be capable of holding the disc in any position between full open and full closed without any movement or fluttering of the disc.

b. Actuators shall be furnished with fully adjustable mechanical stop-limiting devices. Actuators that utilize the sides of the actuator housing to limit disc travel are unacceptable.

c. Valve actuators shall be capable of withstanding a minimum of 450 foot pounds of input torque in either the open or closed position without damage.

5. Operators: Valves for buried service shall have a nut type operator and shall be equipped with a valve box and stem extension, as required.

6. Valve ends shall be mechanical joint type, except where joint ends are shown.

7. Butterfly valves shall be manufactured by Mueller, M & H Valve, DeZurik, Val-Matic, or Pratt.

2.03 Fire Hydrants (FH)

A. All fire hydrants shall conform to the requirements of AWWA C502 for 150 psi working pressure. Hydrants shall be the compression type, closing with line pressure. The valve opening shall not be less than 5-1/4-inches.

B. In the event of a traffic accident, the hydrant barrel shall break away from the standpipe at a point above grade and in a manner which will prevent damage to the barrel and stem, preclude opening of the valve, and permit rapid and inexpensive restoration without digging or cutting off the water.

C. The means for attaching the barrel to the standpipe shall permit facing the hydrant a minimum of eight different directions.

D. Hydrants shall be fully bronze mounted with all working parts of bronze. Valve seat ring shall be bronze and shall screw into a bronze retainer.

E. All working parts, including the seat ring shall be removable through the top without disturbing the barrel of the hydrant.

F. The operating nut shall match those on the existing hydrants. The operating threads shall be totally enclosed in an operating chamber, separated from the hydrant barrel by a rubber O-ring stem seal and lubricated by a grease or an oil reservoir.

G. Hydrant shall be a non-freezing design and be provided with a simple, positive, and automatic drain which shall be fully closed whenever the main valve is opened.

H. Hose and pumper connections shall be breech-locked, pinned, or threaded and pinned to seal them into the hydrant barrel. Each hydrant shall have two 2-1/2-inch hose connections and one 4-1/2-inch pumper connection, all with National Standard threads and each equipped with cap and non-kinking chain.

I. Hydrants shall be furnished with a mechanical joint connection to the spigot of the 6-inch hydrant lead.

J. Minimum depth of bury shall be 4.5 feet. Provide extension section where necessary for proper vertical installation and in accordance with manufacturer's recommendations.

K. All outside surfaces of the barrel above grade shall be painted with enamel equal to Koppers Glamortex 501 in a color to be selected by the Owner.

L. Hydrants shall be traffic model and shall be American Flow Control B-84-B, Mueller Super Centurion or M & H Valve 929.

2.04 Valve Boxes (VB) and Extension Stems

A. All valves shall be equipped with valve boxes. The valve boxes shall be cast iron two-piece screw type with drop covers. Valve boxes shall have a 5.25-inch inside diameter. Valve box covers shall weigh a minimum of 13 pounds. The valve boxes shall be adjustable to 6-inches up or down from the nominal required

cover over the pipe. Valve boxes shall be of sufficient length that bottom flange of the lower belled portion of the box is below the valve operating nut. Ductile or cast iron extensions shall be provided as necessary. Covers shall have "WATER VALVE" or "WATER" cast into them. Valve boxes shall be manufactured in the United States.

B. All valves shall be furnished with extension stems, as necessary, to bring the operating nut to within 30-inches of the top of the valve box. Connection to the valve shall be with a wrench nut coupling and a set screw to secure the coupling to the valve's operating nut. The coupling and square wrench nut shall be welded to the extension stem. Extension stems shall be equal to Mueller A-26441 or M & H Valve Style 3801.

2.05 Valve Markers (VM)

The Contractor shall provide a concrete valve marker as detailed on the Drawings for each valve installed. Valve markers shall be stamped "WATER".

2.06 Tapping Sleeves and Valves (TS&V)

Tapping sleeves shall be cast or ductile iron of the split-sleeve, mechanical joint type. The Contractor shall be responsible for determining the outside diameter of the pipe to be connected to prior to ordering the sleeve. Valves shall be gate valves furnished in accordance with the specifications shown above, with flanged connection to the tapping sleeve and mechanical joint connection to the branch pipe. The tapping sleeve and valve shall be supplied by the valve manufacturer. Tapping sleeves shall be equal to American Flow Control, Mueller or M & H Valve.

2.07 Air Valves for Water Service

A. Air Release Valves: The air release valve shall automatically release air accumulations from the pipeline due to the action of the float. When the air valve body fills with air, the float falls freely from the orifice to allow the air to escape to the atmosphere. When all the air has been exhausted from the valve body, the float will be buoyed up to seat against the orifice and prevent water from being exhausted from the valve. The valve body and cover shall be constructed of cast iron (ASTM A 126-B). A synthetic orifice button shall be affixed to the valve cover to provide a non-corrosive seat for the float. The float shall be constructed of stainless steel. A resilient, Buna-N seat shall be attached to the float for drop-tight closure. The float shall be free floating within the valve body. Valve orifice size shall be as shown on the Drawings.

B. All air valves and accessories shall be supplied by a single manufacturer and shall be G.A. Industries, APCO Valve Corporation or Val-Matic.

2.08 Manholes and Precast Concrete Products

A. Provide precast concrete products in accordance with the following:

1. Precast Concrete Sections

   a. Precast concrete sections shall meet the requirements of ASTM C 478. The minimum compressive strength of the concrete in

precast sections shall be 4,000 psi. The minimum wall thickness shall be one-twelfth of the inside diameter of the base, riser or the largest cone diameter.

b. Transition slabs which convert bases larger than four feet in diameter to four foot diameter risers shall be designed by the precast concrete manufacturer to carry the live and dead loads exerted on the slab.

c. Seal joints between precast sections by means of rubber O-ring gaskets or flexible butyl rubber sealant. Butyl rubber sealants shall meet the requirements of AASHTO M-198. Sealant shall be pre-formed type with a minimum nominal diameter of 1-inch.

d. Butyl rubber sealant shall be equal to Kent Seal No. 2 or Concrete Sealants CS 202.

2. Brick and Mortar: Brick shall be whole and hardburned, conforming to ASTM C 32, Grade MS. Mortar shall be made of one part Portland cement and two parts clean sharp sand. Cement shall be Type 1 and shall conform to ASTM C 150. Sand shall meet ASTM C 144.

3. Iron Castings

a. Cast iron manhole frames, covers and steps shall meet the requirements of ASTM A 48 for Class 30 gray iron and all applicable local standards. All castings shall be tough, close grained, smooth and free from blow holes, blisters, shrinkage, strains, cracks, cold shots and other imperfections. No casting will be accepted which weighs less than 95 percent of the design weight. Shop drawings must indicate the design weight and provide sufficient dimensions to permit checking. All castings shall be thoroughly cleaned in the shop and given two coats of approved bituminous paint before rusting begins.

b. Manhole frames and covers shall be equal to the following:

Type	Design Weight	Manufacturer's Reference	
Bolt Down	400#	Neenah A-1916-F1	Vulcan V-2358

c. All frames and covers shall have machined horizontal bearing surfaces.

4. Plastic Steps: Manhole steps of polypropylene, molded around a steel rod, equal to products of M.A. Industries may be used.

5. Where vent pipes are shown on the Drawings, vents shall be of one-piece, welded steel construction. Vent pipes shall equal air valve size, but no less than 4-inches. The vent pipe shall be grouted into a precast hole in the vault. The discharge of the vent pipe shall be provided with a 3/16-inch PVC coated mesh screen.

2.09 Retainer Glands

A. Retainer glands for ductile iron pipe shall be Megalug Series 1100, as manufactured by EBAA Iron, or Uni-Flange Series 1400, as manufactured by Ford Meter Box Company.

B. Retainer glands shall be provided at all mechanical joints, including fittings, valves, hydrants and other locations as shown on the Drawings.

2.10 Hydrant Tees

Hydrant tees shall be equal to ACIPCO A10180 or U.S. Pipe U-592.

2.11 Concrete

Concrete shall have a compressive strength of not less than 3000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5-inches. For job mixed concrete, submit the concrete mix design for approval by the Engineer. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C 94. Reinforcing steel shall conform to the requirements of ASTM A 615, Grade 60.

Part 3 Execution

3.01 Existing Utilities and Obstructions

A. The Drawings indicate utilities or obstructions that are known to exist according to the best information available to the Owner. The Contractor shall call the Utilities Protection Center (UPC) (404-325-5000 or 1-800-282-7411) as required by Georgia law (Code Section 25-9-1 through 25-9-13) and all utilities, agencies or departments that own and/or operate utilities in the vicinity of the construction work site at least 72 hours (three business days) prior to construction to verify the location of the existing utilities.

B. Existing Utility Location: The following steps shall be exercised to avoid interruption of existing utility service.

1. Provide the required notice to the utility owners and allow them to locate their facilities according to Georgia law. Field utility locations are valid for only 10 days after original notice. The Contractor shall ensure, at the time of any excavation, that a valid utility location exists at the point of excavation.

2. Expose the facility, for a distance of at least 200 feet in advance of pipeline construction, to verify its true location and grade. Repair, or have repaired, any damage to utilities resulting from locating or exposing their true location.

3. Avoid utility damage and interruption by protection with means or methods recommended by the utility owner.

4. Maintain a log identifying when phone calls were made, who was called, area for which utility relocation was requested and work order number

issued, if any. The Contractor shall provide the Engineer an updated copy of the log bi-weekly, or more frequently if required.

C. Conflict with Existing Utilities

1. Horizontal Conflict: Horizontal conflict shall be defined as when the actual horizontal separation between a utility, main, or service and the proposed water main does not permit safe installation of the water main by the use of sheeting, shoring, tieing-back, supporting, or temporarily suspending service of the parallel or crossing facility. The Contractor may change the proposed alignment of the water main to avoid horizontal conflicts if the new alignment remains within the available right-of-way or easement, complies with regulatory agency requirements and after a written request to and subsequent approval by the Engineer. Where such relocation of the water main is denied by the Engineer, the Contractor shall arrange to have the utility, main, or service relocated.

2. Vertical Conflict: Vertical conflict shall be defined as when the actual vertical separation between a utility, main, or service and the proposed water main does not permit the crossing without immediate or potential future damage to the utility, main, service, or the water main. The Contractor may change the proposed grade of the water main to avoid vertical conflicts if the changed grade maintains adequate cover and complies with regulatory agencies requirements after written request to and subsequent approval by the Engineer. Where such relocation of the water main is denied by the Engineer, the Contractor shall arrange to have the utility, main, or service relocated.

D. Electronic Locator: Have available at all times an electronic pipe locator and a magnetic locator, in good working order, to aid in locating existing pipe lines or other obstructions.

E. Water and Sewer Separation

1. Water mains should maintain a minimum 10 foot edge-to-edge separation from sewer lines, whether gravity or pressure. If the main cannot be installed in the prescribed easement or right-of-way and provide the 10 foot separation, the separation may be reduced, provided the bottom of the water main is a minimum of 18-inches above the top of the sewer. Should neither of these two separation criteria be possible, the water main shall be installed below the sewer with a minimum vertical separation of 18-inches.

2. No water main shall pass through, or come in contact with, any part of a sanitary sewer manhole.

3.02 Construction Along Highways, Streets and Roadways

A. Install pipe lines and appurtenances along highways, streets and roadways in accordance with the applicable regulations of, and permits issued by, the Department of Transportation and Fulton County with reference to construction operations, safety, traffic control, road maintenance and repair.

B. Traffic Control

1. The Contractor shall provide, erect and maintain all necessary barricades, suitable and sufficient lights and other traffic control devices; provide qualified flagmen where necessary to direct traffic; take all necessary precautions for the protection of the work and the safety of the public. Flagmen shall be certified by a Georgia DOT approved training program.

2. Construction traffic control devices and their installation shall be in accordance with the current Manual On Uniform Traffic Control Devices for Streets and Highways.

3. Placement and removal of construction traffic control devices shall be coordinated with the Georgia Department of Transportation and Fulton County a minimum of 48 hours in advance of the activity.

4. Placement of construction traffic control devices shall be scheduled ahead of associated construction activities. Construction time in street right-of-way shall be conducted to minimize the length of time traffic is disrupted. Construction traffic control devices shall be removed immediately following their useful purpose. Traffic control devices used intermittently, such as “Flagmen Ahead”, shall be removed and replaced when needed.

5. Existing traffic control devices within the construction work zone shall be protected from damage. Traffic control devices requiring temporary relocation shall be located as near as possible to their original vertical and horizontal locations. Original locations shall be measured from reference points and recorded in a log prior to relocation. Temporary locations shall provide the same visibility to affected traffic as the original location. Relocated traffic control devices shall be reinstalled in their original locations as soon as practical following construction.

6. Construction traffic control devices shall be maintained in good repair and shall be clean and visible to affected traffic for daytime and nighttime operation. Traffic control devices affected by the construction work zone shall be inspected daily.

7. Construction warning signs shall be black legend on an orange background. Regulatory signs shall be black legend on a white background. Construction sign panels shall meet the minimum reflective requirements of the Georgia Department of Transportation and Fulton County. Sign panels shall be of durable materials capable of maintaining their color, reflective character and legibility during the period of construction.

8. Channelization devices shall be positioned preceding an obstruction at a taper length as required by the current Manual On Uniform Traffic Control Devices for Streets and Highways, as appropriate for the speed limit at that location. Channelization devices shall be patrolled to insure that they are maintained in the proper position throughout their period of use.

D. Construction Operations

1. Perform all work along highways, streets and roadways to minimize interference with traffic.

2. Stripping: Where the pipe line is laid along road right-of-way, strip and stockpile all sod, topsoil and other material suitable for right-of-way restoration.

3. Trenching, Laying and Backfilling: Do not open the trench any further ahead of pipe laying operations than is necessary. Backfill and remove excess material immediately behind laying operations. Complete excavation and backfill for any portion of the trench in the same day.

4. Shaping: Reshape damaged slopes, side ditches, and ditch lines immediately after completing backfilling operations. Replace topsoil, sod and any other materials removed from shoulders.

E. Excavated Materials: Do not place excavated material along highways, streets and roadways in a manner which obstructs traffic. Sweep all scattered excavated material off of the pavement in a timely manner.

F. Drainage Structures: Keep all side ditches, culverts, cross drains, and other drainage structures clear of excavated material. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.

G. Landscaping Features: Landscaping features shall include, but are not necessarily limited to: fences; property corners; cultivated trees and shrubbery; manmade improvements; subdivision and other signs within the right-of-way and easement. The Contractor shall take extreme care in moving landscape features and promptly re-establishing these features.

H. Maintaining Highways, Streets, Roadways and Driveways

1. Maintain streets, highways, roadways and driveways in suitable condition for movement of traffic until completion and final acceptance of the Work.

2. During the time period between pavement removal and completing permanent pavement replacement, maintain highways, streets and roadways by the use of steel running plates. Running plate edges shall have asphalt placed around their periphery to minimize vehicular impact. The backfill above the pipe shall be compacted as specified elsewhere up to the existing pavement surface to provide support for the steel running plates.

3. Furnish a road grader or front-end loader for maintaining highways, streets, and roadways. The grader or front-end loader shall be available at all times.

4. Immediately repair all driveways that are cut or damaged. Maintain them in a suitable condition for use until completion and final acceptance of the Work.

3.03 Pipe Distribution

A. Pipe shall be distributed and placed in such a manner that will not interfere with traffic.

B. No pipe shall be strung further along the route than 1,000 feet beyond the area in which the Contractor is actually working without written permission from the Owner. The Owner reserves the right to reduce this distance to a maximum distance of 200 feet in residential and commercial areas based on the effects of the distribution to the adjacent property owners.

C. No street or roadway may be closed for unloading of pipe without first obtaining permission from the proper authorities. The Contractor shall furnish and maintain proper warning signs and obstruction lights for the protection of traffic along highways, streets and roadways upon which pipe is distributed.

D. No distributed pipe shall be placed inside drainage ditches.

E. Distributed pipe shall be placed as far as possible from the roadway pavement, but no closer than five feet from the roadway pavement, as measured edge-to-edge.

3.04 Location and Grade

A. The Drawings show the alignment and grade of the water main and the location of valves, hydrants and other appurtenances.

B. Prior to clearing and grubbing, the Engineer will provide a temporary bench mark along the water main route and [a hub at the center line of each bend] and at all other locations where the alignment of the water main changes significantly.

C. Construction Staking

1. The base lines for locating the principal components of the work and a bench mark adjacent to the work are shown on the Drawings. Base lines shall be defined as the line to which the location of the water main is referenced, i.e., edge of pavement, road centerline, property line, right-of-way or survey line. The Contractor shall be responsible for performing all survey work required for constructing the water main, including the establishment of base lines and any detail surveys needed for construction. This work shall include the staking out of permanent and temporary easements to insure that the Contractor is not deviating from the designated easements.

2. The level of detail of survey required shall be that which the correct location of the water main can be established for construction and verified by the Engineer. Where the location of components of the water main, e.g. tunnels and fittings, are not dimensioned, the establishment on the location of these components shall be based upon scaling these locations from the Drawings with relation to readily identifiable land marks, e.g., survey reference points, power poles, manholes, etc.

D. Reference Points

1. The Contractor shall take all precautions necessary, which includes, but is not necessarily limited to, installing reference points, in order to protect and preserve the centerline or baseline established by the Engineer.

2. Reference points shall be placed, at or no more than three feet, from the outside of the construction easement or right-of-way. The location of the reference points shall be recorded in a log with a copy provided to the Engineer for use, prior to verifying reference point locations. Distances between reference points and the manhole centerlines shall be accurately measured to 0.01 foot.

3. The Contractor shall give the Engineer reasonable notice that reference points are set. The reference point locations must be verified by the Engineer prior to commencing clearing and grubbing operations.

E. After the Contractor locates and marks the water main centerline or baseline, the Contractor shall perform clearing and grubbing.

F. Construction shall begin at a connection location and proceed without interruption. Multiple construction sites shall not be permitted without written authorization from the Engineer for each site.

G. The Contractor shall be responsible for any damage done to reference points, base lines, center lines and temporary bench marks, and shall be responsible for the cost of re-establishment of reference points, base lines, center lines and temporary bench marks as a result of the operations.

H. Construction Verification Survey allowance: The Construction Verification Survey cash allowance is solely for the use of the Engineer for verification of the Contractor's reference points, centerlines and work performed. The presence of this cash allowance in no way relieves the Contractor of the responsibility of installing reference points, centerlines, temporary bench marks, providing as-built drawings, or verifying that the work has been performed accurately.

3.05 Laying and Jointing Pipe and Accessories

A. Lay all pipe and fittings to accurately conform to the lines and grades established by the Engineer.

B. Pipe Installation

1. Proper implements, tools and facilities shall be provided for the safe performance of the Work. All pipe, fittings, valves and hydrants shall be lowered carefully into the trench by means of slings, 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.

2. All pipe, fittings, valves, hydrants and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the Engineer, who may prescribe corrective repairs or reject the materials.

3. 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 free from dirt, sand, grit or any foreign materials before the pipe is laid. No pipe containing dirt shall be laid.

4. 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.

5. 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 approved backfill material.

6. It is not mandatory to lay pipe with the bells facing the direction in which work is progressing.

7. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade, shall not be permitted.

C. Alignment and Gradient

1. Lay pipe straight in alignment and gradient or follow true curves as nearly as practicable. Do not deflect any joint more than the maximum deflection recommended by the manufacturer.

2. Maintain a transit, level and accessories on the job to lay out angles and ensure that deflection allowances are not exceeded.

D. Expediting of Work: Excavate, lay the pipe, and backfill as closely together as possible. Do not leave unjointed pipe in the trench overnight. Backfill and compact the trench as soon as possible after laying and jointing is completed. Cover the exposed end of the installed pipe each day at the close of work and at all other times when work is not in progress. If necessary to backfill over the end of an uncompleted pipe or accessory, close the end with a suitable plug, either push-on, mechanical joint, restrained joint or as approved by the Engineer.

E. Joint Assembly

1. Push-on, mechanical, flange and restrained type joints shall be assembled in accordance with the manufacturer's recommendations.

2. The Contractor shall inspect each pipe joint within 1,000 feet on either side of main line valves to insure 100 percent seating of the pipe spigot, except as noted otherwise.

3. Each restrained joint shall be inspected by the Contractor to ensure that it has been “homed” 100 percent.

4. The Contractor shall internally inspect each pipe joint to insure proper assembly for pipe 24-inches in diameter and larger after the pipe has been brought to final alignment.

F. Cutting Pipe: Cut ductile iron pipe using an abrasive wheel saw. The Contractor shall cut the pipe and bevel the end, as necessary, to provide the correct length of pipe necessary for installing the fittings, valves, accessories and closure pieces in the correct location. Only push-on or mechanical joint pipe shall be cut.

G. Lining Repair: Repair epoxy linings and recoat spigot ends of cut pipe with an epoxy coating as specified in Part 2 of this Section and as specified below:

1. Remove all burrs and areas of loose lining materials by sanding or scraping to bare metal.

2. Remove oil and lubricants used during field cutting.

3. Lining shall be stripped back a minimum of 1-inch from the spigot end into well adhered lined areas.

4. Roughen 1 to 2-inches of good lining with a rough grade (40 grit) emery paper, rasp or small chisel, to allow an overlap between new and existing lining.

5. Apply lining repair material in the number of coats required to match the thickness requirements as specified in Part 2 of this Section and in accordance with the manufacturer's recommendations.

H. Valve and Fitting Installation

1. Prior to installation, valves shall be inspected for direction of opening, number of turns to open, freedom of operation, tightness of pressure-containing bolting and test plugs, cleanliness of valve ports and especially seating surfaces, handling damage and cracks. Defective valves shall be corrected or held for inspection by the Engineer. Valves shall be closed before being installed.

2. Valves, fittings, plugs and caps shall be set and joined to the pipe in the manner specified in this Section for cleaning, laying and joining pipe, except that 12-inch and larger valves shall be provided with special support, such as treated timbers, 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. A valve box shall be provided on each underground valve. They shall be carefully set, centered exactly over the operating nut and truly plumbed. The valve box shall not transmit shock or stress to the valve. The bottom flange of the lower belled portion of the box shall be placed below the valve operating nut. This flange shall be set on brick, so arranged that the weight of the valve box and superimposed loads will bear on the base and not on the valve or pipe. Extension stems shall be installed where depth of bury places the operating nut in excess of 30-inches beneath finished grade so as to set the top of the operating nut 30-inches below finished grade. The valve box cover shall be flush with the surface of the finished area or such other level as directed by the Engineer.

4. 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.

5. A valve marker shall be provided for each underground valve. Unless otherwise detailed on the Drawings or directed by the Engineer, valve markers shall be installed 6-inches inside the right-of-way or easement.

I. Hydrant Installation

1. Prior to installation, inspect all hydrants for direction of opening, nozzle threading, operating nut and cap nut dimensions, tightness of pressure-containing bolting, cleanliness of inlet elbow, handling damage and cracks. Defective hydrants shall be corrected or held for inspection by the Engineer.

2. All hydrants shall stand plumb and shall have their nozzles parallel with or at right angles to the roadway, with pumper nozzle facing the roadway, except that hydrants having two-hose nozzles 90 degrees apart shall be set with each nozzle facing the roadway at an angle of 45 degrees.

3. Hydrants shall be set to the established grade, with the centerline of the lowest nozzle at least 12-inches above the ground or as directed by the Engineer.

4. Each hydrant shall be connected to the main with a 6-inch branch controlled by an independent 6-inch valve. When a hydrant is set in soil that is pervious, drainage shall be provided at the base of the hydrant by placing coarse gravel or crushed stone mixed with coarse sand from the bottom of the trench to at least 6-inches above the drain port opening in the hydrant to a distance of 12-inches around the elbow.

5. When a hydrant is set in clay or other impervious soil, a drainage pit 2 x 2 x 2 feet shall be excavated below each hydrant and filled with coarse gravel or crushed stone mixed with coarse sand under and around the elbow of the hydrant and to a level of 6-inches above the drain port.

6. Hydrants shall be located as shown on the Drawings or as directed by the Engineer. In the case of hydrants that are intended to fail at the ground-line joint upon vehicle impact, specific care must be taken to provide adequate soil resistance to avoid transmitting shock moment to the lower barrel and inlet connection. In loose or poor load bearing soil, this may be accomplished by pouring a concrete collar approximately 6-inches thick to a diameter of 24-inches at or near the ground line around the hydrant barrel.

J. Air Valve Manholes

1. Construct the manhole as detailed on the Drawings.

2. The frame and cover shall be cast into the top slab or cone.

3. Manholes shall be constructed such that their walls are plumb.

3.06 Connections to Water Mains

A. Make connections to existing pipe lines with tapping sleeves and valves, unless specifically shown otherwise on the Drawings.

B. Location: Before laying pipe, locate the points of connection to existing water mains and uncover as necessary for the Engineer to confirm the nature of the connection to be made.

C. Interruption of Services: Make connections to existing water mains only when system operations permit. Operate existing valves only with the specific authorization and direct supervision of the Owner.

D. Tapping Saddles and Tapping Sleeves

1. Holes in the new pipe shall be machine cut, either in the field or at the factory. No torch cutting of holes shall be permitted.

2. Prior to attaching the saddle or sleeve, the pipe shall be thoroughly cleaned, utilizing a brush and rag, as required.

3. Before performing field machine cut, the watertightness of the saddle or sleeve assembly shall be pressure tested. The interior of the assembly shall be filled with water. An air compressor shall be attached, which will induce a test pressure as specified in this Section. No leakage shall be permitted for a period of five minutes.

4. After attaching the saddle or sleeve to an existing main, but prior to making the tap, the interior of the assembly shall be disinfected. All surfaces to be exposed to potable water shall be swabbed or sprayed with a one percent hypochlorite solution.

E. Connections Using Solid Sleeves: Where connections are shown on the Drawings using solid sleeves, the Contractor shall furnish materials and labor necessary to make the connection to the existing pipe line.

F. Connections Using Couplings: Where connections are shown on the Drawings using couplings, the Contractor shall furnish materials and labor necessary to make the connection to the existing pipe line, including all necessary cutting, plugging and backfill.

3.07 Thrust Restraint

A. Provide restraint at all points where hydraulic thrust may develop.

B. Retainer Glands: Provide retainer glands where shown on the Drawings and on fire hydrants and all associated fittings, valves and related piping. Retainer glands shall be installed in accordance with the manufacturer's recommendations, particularly, the required torque of the set screws. The Contractor shall furnish a torque wrench to verify the torque on all set screws which do not have inherent torque indicators.

C. Hydrants: Hydrants shall be attached to the water main by the following method:

1. The isolation valve shall be attached to the main by connecting the valve to the hydrant tee.

2. The isolation valve shall be attached to the hydrant by providing an anchor coupling between the valve and hydrant, if the hydrant and valve are less than two feet apart. Otherwise, provide ductile iron pipe with retainer glands on the hydrant and valve.

D. Thrust Collars: Collars shall be constructed as shown on the Drawings. Concrete and reinforcing steel shall meet the requirements as specified in this Section. The welded-on collar shall be designed to meet the minimum allowable load shown on the Drawings. The welded-on collar shall be attached to the pipe by the pipe manufacturer.

E. Concrete Blocking

1. Provide concrete blocking for all bends, tees, valves, and other points where thrust may develop, except where other exclusive means of thrust restraint are specifically shown on the Drawings.

2. Concrete shall be as specified in this Section.

3. Form and pour concrete blocking at fittings as shown on the Drawings and as directed by the Engineer. Pour blocking against undisturbed earth. Increase dimensions when required by over excavation.

3.08 Inspection and Testing

A. Pressure and Leakage Test

1. All sections of the water main subject to internal pressure shall be pressure tested in accordance with AWWA C600. A section of main will be considered ready for testing after completion of all thrust restraint and backfilling.

2. Each segment of water main between main valves shall be tested individually.

3. Test Preparation

a. For water mains less than 24-inches in diameter, flush sections thoroughly at flow velocities, greater than 2.5 feet per second, adequate to remove debris from pipe and valve seats. For water mains 24-inches in diameter and larger, the main shall be carefully swept clean, and mopped if directed by the Engineer. Partially open valves to allow the water to flush the valve seat.

b. Partially operate valves and hydrants to clean out seats.

c. Provide temporary blocking, bulkheads, flanges and plugs as necessary, to assure all new pipe, valves, and appurtenances will be pressure tested.

d. Before applying test pressure, air shall be completely expelled from the pipeline and all appurtenances. Insert corporation cocks at highpoints to expel air as main is filled with water as necessary to supplement automatic air valves. Corporation stops shall be constructed as detailed on the Drawings with a meter box.

e. Fill pipeline slowly with water. Provide a suitable pump with an accurate water meter to pump the line to the specified pressure.

f. The differential pressure across a valve or hydrant shall equal the maximum possible, but not exceed the rated working pressure. Where necessary, provide temporary backpressure to meet the differential pressure restrictions.

g. Valves shall not be operated in either the opening or closing direction at differential pressures above the rated pressure.

4. Test Pressure: Test the pipeline at 250 psi measured at the lowest point for at least two hours. Maintain the test pressure within 5 psi of the specified test pressure for the test duration. Should the pressure drop more than 5 psi at any time during the test period, the pressure shall be restored to the specified test pressure. Provide an accurate pressure gage with graduation not greater than 5 psi.

5. Leakage

   a. Leakage shall be defined as the sum of the quantity of water that must be pumped into the test section, to maintain pressure within 5 psi of the specified test pressure for the test duration plus water required to return line to test pressure at the end of the test. Leakage shall be the total cumulative amount measured on a water meter.

   b. The Owner assumes no responsibility for leakage occurring through existing valves.

6. Test Results: No test section shall be accepted if the leakage exceeds the limits determined by the following formula:

$$L = \frac{SD\,(P)1/2}{133{,}200}$$

Where: L = allowable leakage, in gallons per hour
S = length of pipe tested, in feet
D = nominal diameter of the pipe, in inches
P = average test pressure during the leakage test, in pounds per square inch (gauge)
As determined under Section 4 of AWWA C600.

If the water main section being tested contains lengths of various pipe diameters, the allowable leakage shall be the sum of the computed leakage for each diameter. The leakage test shall be repeated until the test section is accepted. All visible leaks shall be repaired regardless of leakage test results.

7. Completion: After a pipeline section has been accepted, relieve test pressure. Record type, size and location of all outlets on record drawings.

3.09 Disinfecting Pipeline

A. After successfully pressure testing each pipeline section, disinfect in accordance with AWWA C651 for the continuous-feed method and these Specifications.

B. Specialty Contractor: Disinfection shall be performed by an approved specialty contractor. Before disinfection is performed, the Contractor shall submit a written procedure for approval before being permitted to proceed with the disinfection. This plan shall also include the steps to be taken for the neutralization of the chlorinated water.

C. Chlorination

1. Apply chlorine solution to achieve a concentration of at least 25 milligrams per liter free chlorine in new line. Retain chlorinated water for 24 hours.

2. Chlorine concentration shall be recorded at every outlet along the line at the beginning and end of the 24 hour period.

3. After 24 hours, all samples of water shall contain at least 10 milligrams per liter free chlorine. Re-chlorinate if required results are not obtained on all samples.

D. Disposal of Chlorinated Water: Reduce chlorine residual of disinfection water to less than one milligram per liter if discharged directly to a body of water or to less than two milligrams per liter if discharged onto the ground prior to disposal. Treat water with sulfur dioxide or other reducing chemicals to neutralize chlorine residual. Flush all lines until residual is equal to existing system.

E. Bacteriological Testing: After final flushing and before the water main is placed in service, the Contractor shall collect samples from the line and have tested for bacteriological quality in accordance with the rules of the Georgia Department of Natural Resources, Environmental Protection Division. Testing shall be performed by a laboratory certified by the State of Georgia. Re-chlorinate lines until required results are obtained.

3.10 Protection and Restoration of Work Area

A. General: Return all items and all areas disturbed, directly or indirectly by work under these Specifications, to their original condition or better, as quickly as possible after work is started.

1. The Contractor shall plan, coordinate, and prosecute the work such that disruption to personal property and business is held to a practical minimum.

2. All construction areas abutting lawns and yards of residential or commercial property shall be restored promptly. Backfilling of

underground facilities, ditches, and disturbed areas shall be accomplished on a daily basis as work is completed. Finishing, dressing, and grassing shall be accomplished immediately thereafter, as a continuous operation within each area being constructed and with emphasis placed on completing each individual yard or business frontage. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.

3. Handwork, including raking and smoothing, shall be required to ensure that the removal of roots, sticks, rocks, and other debris is removed in order to provide a neat and pleasing appearance.

4. The Department of Transportation's engineer shall be authorized to stop all work by the Contractor when restoration and cleanup are unsatisfactory and to require appropriate remedial measures.

B. Man-Made Improvements: Protect, or remove and replace with the Engineer's approval, all fences, walkways, mail boxes, pipe lines, drain culverts, power and telephone lines and cables, property pins and other improvements that may be encountered in the Work.

C. Cultivated Growth: Do not disturb cultivated trees or shrubbery unless approved by the Engineer. Any such trees or shrubbery which must be removed shall be heeled in and replanted under the direction of an experienced nurseryman.

D. Cutting of Trees: Do not cut trees for the performance of the work except as absolutely necessary. Protect trees that remain in the vicinity of the work from damage from equipment. Do not store spoil from excavation against the trunks. Remove excavated material stored over the root system of trees within 30 days to allow proper natural watering of the root system. Repair any damaged tree over 3-inches in diameter, not to be removed, under the direction of an experienced nurseryman. All trees and brush that require removal shall be promptly and completely removed from the work area and disposed of by the Contractor. No stumps, wood piles, or trash piles will be permitted on the work site.

E. Disposal of Rubbish: Dispose of all materials cleared and grubbed during the construction of the Project in accordance with the applicable codes and rules of the appropriate county, state and federal regulatory agencies.

END OF SECTION

Part 1 General

1.01 Scope

The Work covered in this Section shall include the furnishing and laying of precast concrete pipe or corrugated metal pipe with fittings as called for on the Drawings and specified, including trench excavation and backfill.

1.02 Quality Assurance

A. Each length of pipe, each fitting, and special fitting shall be inspected by an independent commercial testing laboratory acceptable to the Engineer prior to delivery. Each joint of pipe and each special shall be stenciled or otherwise clearly and legibly marked with the laboratory's mark of acceptance.

B. Each pipe shall be clearly marked as required by the governing ASTM standard specifications to show its class or gauge, date of manufacture, and the name or trademark of the manufacturer. Elliptical reinforced concrete pipe shall be clearly marked top and bottom and the minor axis clearly noted on the interior surface of the pipe.

C. Any pipe or specials which have been broken, cracked, or otherwise damaged before or after delivery or which have failed to meet the required tests shall be removed from the site and shall not be used therein.

Part 2 Products

2.01 Pipe

A. Pipe and special fittings shall be furnished in sizes, types, and classes at the locations shown on the Drawings, and/or specified herein.

B. All pipe and special fittings shall be of all new materials which have not been previously used.

2.02 Concrete Pipe

A. Concrete pipe less than 12-inches in diameter shall be nonreinforced concrete pipe conforming to ASTM C 14.

B. Concrete pipe 12-inches and larger in diameter shall be reinforced concrete pipe conforming to ASTM C 76. All pipe shall be Class III unless shown otherwise on the Drawings. Minimum wall thickness design shall correspond to Wall C.

C. Joints shall be bell and spigot joints and shall be 0-ring rubber gasket joints conforming ASTM C 443.

2.03 Polyvinyl Chloride (PVC) Gravity Sewer Pipe

A. Pipe and Fittings, 4 to 15-inches in Diameter: Pipe and fittings shall meet one of the following requirements:

1. Pipe and fittings shall be manufactured in accordance with ASTM D 3034. The minimum wall thickness shall be that which will provide an

SDR of 35. The pipe shall also have a minimum pipe stiffness of 46 psi at five percent deflection as determined by ASTM D2412.

2. Pipe and fittings shall be manufactured in accordance with ASTM F 789. The minimum wall thickness shall conform to T-3 as defined in ASTM F 789. The pipe shall also have a minimum pipe stiffness of 46 psi at five percent deflection as determined by ASTM D2412.

B. Pipe and Fittings, Larger than 15-inches in Diameter: Pipe and fittings shall be manufactured in accordance with ASTM F679. The minimum wall thickness shall conform to T-1 as defined in ASTM F679. The pipe shall also have a minimum pipe stiffness of 46 psi at five percent deflection as determined by ASTM D 2412.

C. PVC gravity pipe shall be supplied in lengths not longer than 13 feet.

D. Fittings: Fittings for pipe 8-inches and less in diameter shall be one-piece with no solvent welded joints. Fittings for pipe 10-inches and larger in diameter may be fabricated using solvent welding. No field fabrication of fittings will be allowed. All such fabrications shall be performed at the factory and the fittings shall be delivered ready for use.

E. Joints: Joints for pipe and fittings shall be made of the integral bell and spigot type with a confined elastomeric gasket having the capability of absorbing expansion and contraction without leakage. Joints shall meet the requirements of ASTM D 3212; gaskets shall meet the requirements of ASTM FF477. The joint system shall be subject to the approval of the Engineer and shall be identical for pipe and fittings.

F. Acceptance: Acceptance will be on the basis of the Engineer's inspection and the manufacturer's written certification that the pipe was manufactured and tested in accordance with the applicable standards.

2.04 Joint Materials

A. Rubber gaskets for bell and spigot joints shall be 0-ring rubber gasket joints conforming to the latest revisions of ASTM Standard Specification C 443 for Joints for Circular Concrete Sewer and Culvert Pipe, Using Flexible Watertight Rubber Gaskets.

B. Joints for corrugated metal drainage structures shall be the standard type single piece of corrugated coupling bands fabricated of the same material as the drainage structure. Coupling bands shall be fabricated according to AASHTO M 190, and the minimum band length shall be 12 inches.

C. Pits, blisters, rough spots, breakage, and other imperfections may be repaired, subject to the approval of the Architect, after demonstration by the manufacturer that strong permanent repairs result. Repairs shall be carefully inspected before final approval. Non-shrink cement mortar used for repairs shall have a minimum compressive strength of 6,000 psi at the end of seven days and 7,000 psi at the end of 28 days, when tested in 3-inch cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs. Mortar for joining shall consist of one part Portland cement and two parts sand, using a minimum amount of water, sufficient to make a workable mortar.

2.05 Bedding

A. Bedding for concrete and corrugated metal pipe shall be provided in Class "A", Class "B" and Class "C" sizes, as shown on the Drawings to fit the depth of trench, type and size of pipe, width of trench, and bearing value of subgrade.

B. Class "A" Bedding shall consist of Class "B" concrete cradles constructed as shown on the Drawings. Wherever the Contractor places concrete for cradles outside the dimensions shown on the Drawings, the cost of such concrete will be at the expense of the Contractor.

C. Where concrete cradle is used, the pipe shall be laid on concrete saddles so constructed as to provide both vertical and lateral support for the pipe while the cradle is being placed. Pipe supports of wood blocks, loose brick, etc., will not be permitted. The concrete cradle shall be poured after the joints have been made with care being taken to prevent movement of the pipe.

D. Class "B" Bedding shall consist of 1/2-inch or smaller crushed rock or gravel, sand, or other approved granular materials as shown on the Drawings. Placement of this material shall be done carefully. Material shall be thoroughly compacted by tamping.

E. Class "C" Bedding shall consist of 1/2-inch or smaller crushed rock or gravel, sand, or other approved materials as shown on the Drawings. Placement of this material shall be done carefully. Material shall be thoroughly compacted by tamping.

F. The determination of the bedding class shall be from actual width of trench. If Contractor increases width of trench for the Contractor's convenience or due to collapse of trench walls so that a higher class of bedding is required, the increased cost of the same shall be borne by the Contractor. If the bearing value of the subgrade is determined by the soils testing agency to be inadequate for a particular class of bedding, the Contractor shall substitute a higher class of bedding as indicated in the Contract Document, unless otherwise directed by the Engineer.

Part 3 Execution

3.01 Excavation

Excavation shall be performed in accordance with the requirements of Section 02200 of these Specifications.

3.02 Pipe Laying - Concrete Pipe

A. Immediately prior to laying the pipe, all projections or irregularities which will prevent the joints from closing properly shall be removed.

B. Concrete pipe shall be laid true to line and grade on a bed which is uniformly firm throughout its entire length. If material in the bottom of the excavation is of such character as to cause unequal settlement along the length of the storm sewer or culvert, the material shall be removed below the grade given, to such depth as ordered and shall be backfilled with granular bedding material and thoroughly tamped or otherwise compacted to ensure an unyielding foundation. Pipe shall not be laid upon frozen ground.

C. Pipe, unless otherwise provided or directed by the Engineer, shall be laid beginning at the lower end and with the bells or receiving ends upgrade. The spigot or tongue end shall be inserted into hub or receiving end as far as the construction of the pipe will permit.

D. The pipe shall be protected from water during placing and until the mortar in the joints has thoroughly set.

E. For mortar joints, the pipe ends shall be thoroughly cleaned and wetted with water before the joint is made. Stiff mortar shall then be placed in the lower half of the bell or groove of the pipe section already laid and on the upper half of the spigot or tongue of the section to be laid. The two pipe sections shall then be tightly jointed with their inner surfaces flush and even. Pipe with mortar joints shall not be placed when the temperature is below 40 degrees F.

F. After each section of the pipe is laid and uniformly matched and the sections have been fitted as closely as the construction of the pipe will permit, the joint shall be entirely filled and packed with a stiff cement mortar, one part Portland cement and 1-1/2 parts sand by volume. Sufficient additional mortar shall be used to form a bead around the joint. The joint on the inside of the pipe shall be filled with similar mortar and finished smooth and even with the adjacent sections of pipe.

G. After the initial set, the mortar on the outside shall be protected from the air and sun with a thoroughly wetted earth, cotton or jute mat, or burlap cover for at least 48 hours.

H. The ends of the pipe shall be rigidly supported to prevent any movement pending which might occur during the construction of end supports.

I. Laying of 0-ring rubber gasket pipe shall be done in accordance with the pipe manufacturer's instructions using all the necessary materials, lubricants, and equipment recommended by the manufacturer. Rubber 0-ring gaskets shall be installed so as to form a flexible watertight seal.

J. Any pipe which is not in true alignment or which shows any settlement after laying, or is damaged, shall be taken up and relaid at the Contractor's expense

3.03 Filling Around and Over Storm Sewers and Pipe Culverts

A. When storm sewers or pipe culverts are placed under the roadway proper, granular backfill material will be used as detailed in the Drawings. The trench for the pipe shall be cut 6-inches below the proposed bottom of pipe and shall be cut to a width as indicated on the bedding detailed in the Drawings. The trench shall be filled to a compacted depth of 6-inches with granular backfill material. Additional granular backfill material shall be placed and shaped by means of a template to fit the bottom of the pipe to a depth of 1/4 the outside diameter of the pipe or to the spring line of pipe arches. After the pipe is laid to line and grade, the granular backfill material shall be compacted by means of a vibrator or mechanical tampers. Tamping by hand will not be permitted. The remaining portion of the trench shall be filled in 6-inch lifts with suitable backfill material. Each lift shall be compacted with mechanical tampers.

B. The bedding for the pipe must be laid in a dry trench, and any water encountered in ditches, springs, etc. shall be considered a necessary part of construction and shall be handled by pumping, ditching or any other method satisfactory to the

Engineer.

3.04 Existing Utilities

All existing sewers, water lines, gas lines, underground conduits, telephone lines, sidewalks, curbs, gutters, pavements, electric lines, or other utilities or structures in the vicinity of the Work shall be carefully protected by the Contractor from damage at all times. Where it is necessary for the proper accomplishment of the Work to repair, remove and/or replace any such utility, the Work shall be done as directed by the Engineer. No separate payment shall be made for removing and replacing and/or repairing damaged existing sewers, water, gas, electric, or telephone lines, or conduits, or other utilities, culverts, drains, or similar existing services or structures that are to remain in service. The removal, replacement and/or repair of these items shall be paid for in the unit price bid by the Contractor on other items of work. Similar repair and replacement of sidewalks, curbs, gutters, and pavements are provided elsewhere herein.

3.05 Cleaning

After completing each section of the storm sewer or culvert, the Contractor shall remove all debris and construction materials and equipment from the site, grade and smooth over the surface on both sides of the line, and leave the entire right-of-way in a clean, neat and serviceable condition in accordance with the requirements of the General Conditions of these Specifications.

3.06 Seeding

All ground areas that are disturbed during construction of the storm sewer or culvert shall be prepared and seeded in accordance with the requirements of Section 02933 of these Specifications. No separate payment shall be made for seeding or seeding preparation, but shall be included in the unit prices bid for other items of Work done under this Section.

END OF SECTION

Part 1 General

1.01 Scope

A. The Contractor shall furnish all labor, materials, equipment and miscellaneous items as necessary for the installation of a complete chain link fence system. Fencing shall be installed in the location as shown on the Drawings in complete conformity with the manufacturer's written recommendations and as specified herein.

B. Security fencing for the Contractor is at Contractor's option and is not included as part of the work specified.

1.02 Submittals

Product data shall be submitted in complete conformance with the requirements of Section 01340 of these Specifications.

1.03 Delivery and Handling

A. Deliver materials with the manufacturer's tags and labels intact.

B. Handle and store materials in such a manner that will avoid damage.

1.04 Storage and Protection

Provide storage and protection in accordance with the requirements of Section 01640 of these Specifications.

1.05 Quality Assurance

A. Standards of manufacturer shall comply with the standards of the Chain Link Manufacturers Institute and these Specifications.

B. Provide fencing as a complete unit produced by a single manufacturer including the required erection accessories, fittings and fasteners.

Part 2 Products

2.01 General

A. Overall height for new fencing shall be seven feet including three strands of barbed wire on malleable iron post tops. Posts shall be set at no more than 10 foot centers, a full three feet deep in concrete footings, poured the full size of the holes as excavated. Corner posts shall have the necessary strut and tie bracing. Gates shall be provided of the size and at the locations indicated on the Drawings.

B. Where fencing crosses ditches, steep grades, and other unusual conditions, make special provisions to insure that the security, appearance, maintainability and permanence of the standard fencing are equaled or exceeded.

2.02 Materials and Construction

A. Fence Mesh: 9 gauge wire, woven to 2-inch squares, galvanized after weaving, six foot

wide roll. Continuous tension wire shall be provided at the lower edge of the mesh.

B. Line Post: 2-1/2-inch O.D. Galvanized Pipe (3.65 #/ft.).

C. Corner Post: 3-inch O.D. Galvanized Pipe (5.79 #/ft.).

D. Gate Post: 4-inch O.D. Galvanized Pipe (9.11 #/ft.).

E. Top Rail: 1-5/8-inch O.D. Galvanized Pipe (2.27 #/ft.) with extra long pressed steel sleeves.

F. Gates shall be supplied with heavy-duty latches, keepers and heavy duty hardened bronze padlocks with duplicate keys.

G. Gate Frames: 2-inch O.D. Galvanized Pipe Frame (2.72 #/ft.).

H. Barbed wire shall consist of three strands of 12 gauge wire, with 4-point pattern barbs, galvanized after weaving.

I. Concrete shall be furnished in accordance with the requirements of Section 03300 of these Specifications.

Part 3 Execution

3.01 Installation

A. Fence installation shall not be started before the final grading is completed, with finish grade elevations established, unless otherwise permitted.

B. Excavation: Drill holes of diameters and spacings shown, for post footings in firm, undisturbed or compacted soil.

1. If not shown on the Drawings, excavate holes to the minimum diameters as recommended by fence manufacturer.

2. Unless otherwise indicated, excavate hole depths approximately 3-inches lower than the post bottom, with bottom of posts set not less than 36-inches below the surface when in firm, undisturbed soil.

3. If solid rock is encountered near the surface, drill into rock at least 12-inches for line posts and at least 18-inches for end, pull corner, and gate posts. Drill hole at least 1-inch greater diameter than the largest dimension for the post to be placed. If solid rock is below soil overburden, drill to full depth required. Penetration into rock need not exceed the minimum depths specified above.

C. Setting Posts: Remove loose and foreign materials from sides and bottoms of holes and moisten soil prior to placing concrete.

1. Center and align posts in holes 3-inches above bottom of excavation.

2. Place concrete around posts in a continuous pour and vibrate or tamp for consolidation. Check each post for vertical and top alignment and hold in position during placement and finishing operations.

3. Trowel finish tops of footings and slope of dome to direct water away from posts. Extend footings for gate posts to the underside of bottom hinge. Set keeps, stops, sleeves and other accessories into concrete as required.

4. Keep exposed concrete surfaces moist for at least seven days after placement or cure with membrane curing materials or other acceptable curing methods.

5. Grout-in posts set into sleeved holes, concrete constructions or rock excavations with non-shrink Portland cement grout or other acceptable grouting material.

D. Concrete Strength: Allow concrete to attain at least 75 percent of its minimum 28 day compressive strength, but in no case sooner than seven days after placement, before rails, tension wires, barbed wire or fabric is installed. Do not stretch and tension fabric and wires and do not hang gates until the concrete has attained its full design strength.

E. Top Rails: Run rail continuously through post caps or extension arms, bending to radius for curved runs. Provide expansion couplings as recommended by fencing manufacturer.

F. Brace Assemblies: Install braces so posts are plumb when diagonal rod is under proper tension.

G. Tension Wire: Install tension wires by weaving through the fabric and tying to each post with not less than 6 gauge galvanized wire or by securing the wire to the fabric.

H. Fabric: Pull fabric taut and tie to posts, rails and tension wires. Install fabric on security side of fence and anchor to framework so that fabric remains in tension after pulling force is released.

I. Repair damaged coatings in the shop or during field erection by recoating with manufacturer's recommended repair compound, applied per manufacturer's directions.

J. Stretcher Bars: Thread through or clamp to fabric 4-inches on center and secure to posts with metal bands spaced 15-inches on center.

K. Barbed Wire: Install three parallel wires on each extension arm; on security side of fence, unless otherwise indicated. Pull wire taut and fasten securely to each extension arm.

L. Tie Wires: Use U-shaped wire appropriate for the diameter of pipe. Attach pipe and fabric firmly with tie wire ends twisted at least two full turns. Bend ends of wire to minimize hazard to persons or clothing.

M. Fasteners: Install nuts for tension band and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

3.02 Cleaning

Perform cleaning during installation of the work and upon completion of the work. Remove from site all debris and equipment. Repair all damage resulting from chain link fence system installation. Cleaning shall be in accordance with the requirements of Section 01710 of these Specifications.

END OF SECTION

Part 1 General

1.01 Scope

A. The extent of grassing consists of those areas which are disturbed by operations of the Contractor and are not covered over by improvements, except where specifically noted otherwise, together with any additional areas shown on the Drawings or authorized by the Engineer.

B. Types of work required include following:

1. Fine grading and preparing of lawn areas.

Part 1 General

1.01 Scope

A. The work covered by this Section consists of furnishing all labor, equipment and material required to place topsoil, seed, commercial fertilizer, agricultural limestone and mulch material, including seedbed preparation, harrowing, compacting and other placement operations on graded earthen areas as described herein and/or shown on the Drawings. In general, seeding operations shall be conducted on all newly graded earthen areas not covered by structures, pavement or sidewalks; all cleared or grubbed areas which are to remain as finish grade surfaces; and on all existing turf areas which are disturbed by construction operations and which are to remain as finish grade surfaces. Areas disturbed by borrow activities shall also be seeded according to these Specifications.

B. The work shall include temporary seeding operations to stabilize earthen surfaces during construction or inclement weather and to minimize stream siltation and erosion. Temporary seeding shall be performed at the times and locations as directed by the Engineer.

1.02 Quality Assurance

A. Prior to seeding operations, the Contractor shall furnish to the Engineer labels or certified laboratory reports from an accredited commercial seed laboratory or a state seed laboratory showing the analysis and germination of the seed to be furnished. Acceptance of the seed test reports shall not relieve the Contractor of any responsibility or liability for furnishing seed meeting the requirements of this Section.

B. Prior to topsoil operations, the Contractor shall obtain representative samples and furnish soil test certificates including textural, pH, and organic analysis from the State University Agricultural Extension Services or other certified testing laboratory.

Part 2 Products

2.01 Acceptable Manufacturers

A. All materials shall conform to the requirements and standards of this Section.

Wood-cellulose fiber mulch shall be manufactured by Weyerhauser Company or Conway Corporation.

2.02 Topsoil

A. Utilizing designated stockpiles or borrow areas on site, the Contractor shall place a minimum of 4-inches of topsoil over all graded earthen areas and over any other areas to be seeded. Sources of topsoil shall be approved by the Engineer prior to disturbance. Importing topsoil from offsite sources shall be at the discretion of the Engineer and shall be justification for additional compensation to the Contractor. A change order properly authorized by the Owner shall be agreed upon prior to importing offsite topsoil. No additional compensation will be allowed for spreading of topsoil.

B. Topsoil shall be a friable loam containing a large amount of humus and shall be original surface soil of good, rich, uniform quality, free from any material such as hard clods, stiff clay, hardpan, partially disintegrated stone, pebbles larger than 1/2-inch in diameter, lime, cement, bricks, ashes, cinders, slag, concrete, bitumen or its residue, boards, sticks, chips or other undesirable material harmful or unnecessary to plant growth. Topsoil shall be reasonably free from perennial weeds and shall not contain objectionable plant material, toxic amounts of either acid or alkaline elements or vegetable debris undesirable or harmful to plant life.

C. Topsoil shall be natural topsoil without admixture of subsoil material, and shall be classifiable as loam, silt loam, clay loam, sandy loam or a combination thereof. The pH shall range from 5.5 to 7.0. Topsoil shall contain not less than five percent nor more than 20 percent, by weight, of organic matter as determined by loss on ignition of oven-dried samples to 65 degrees C.

2.03 Seed

A. Seed shall be delivered in new bags or bags that are sound and labeled in accordance with the U.S. Department of Agriculture Federal Seed Act.

B. All seed shall be from the last crop available at time of purchase and shall not be moldy, wet or otherwise damaged in transit or storage.

C. Seed shall bear the growers analysis testing to 98 percent for purity and 90 percent for germination. At the discretion of the Engineer, samples of seed may be taken for verification against the grower's analysis.

D. Species, rate of seeding, fertilization and other requirements are shown on Drawings.

2.04 Fertilizer and Liming Materials

A. Fertilizer and liming materials shall comply with applicable state, local and federal laws concerned with their production and use.

B. Commercial fertilizer shall be a ready mixed material equivalent to the grade or grades specified in Table 1. Container bags shall have the name and address of the manufacturer, the brand name, net weight and chemical composition.

C. Agricultural limestone shall be a pulverized dolamitic limestone having a calcium carbonate content of not less than 85 percent by weight. Agricultural limestone shall be crushed so that at least 85 percent of the material will pass a No. 10 mesh screen and 50 percent will pass a No. 40 mesh screen.

2.05 Mulch Material

A. All mulch materials shall be air dried and reasonably free of noxious weeds and weed seeds or other materials detrimental to plant growth.

B. Mulch shall be composed of wood cellulose fiber, straw or stalks, as specified herein. Mulch shall be suitable for spreading with standard mulch blowing equipment.

C. Straw mulch shall be partially decomposed stalks of wheat, rye, oats or other approved grain crops.

D. Stalks shall be the partially decomposed, shredded residue of corn, cane, sorghum or other approved standing field crops.

2.06 Mulch Binder

A. Mulch on slopes exceeding 3 to 1 ratio shall be held in place by the use of an approved mulch binder. The mulch binder shall be non-toxic to plant life and shall be acceptable to the Engineer.

B. Emulsified asphalt binder shall be Grade SS-1, ASTM D 977. Cutback asphalt binder shall be Grade RC 70 or RC 250.

2.07 Innoculants for Legumes

All leguminous seed shall be inoculated prior to seeding with a standard culture of nitrogen-fixing bacteria that is adapted to the particular seed involved.

2.08 Water

Water shall be clean, clear water free from any objectionable or harmful chemical qualities or organisms and shall be furnished by the Contractor.

Part 3 Execution

3.01 Securing and Placing Topsoil

A. Topsoil shall be secured from areas from which topsoil has not been previously removed, either by erosion or mechanical methods. Topsoil shall not be removed to a depth in excess of the depth approved by the Engineer.

B. The area or areas from which topsoil is secured shall possess such uniformity of soil depth, color, texture, drainage and other characteristics as to offer assurance that, when removed the product will be homogeneous in nature and will conform to the requirements of these Specifications.

C. All areas from which topsoil is to be secured, shall be cleaned of all sticks, boards, stones, cement, ashes, cinders, slag, concrete, bitumen or its residue and any other refuse which will hinder or prevent growth.

D. In securing topsoil from a designated pit, or elsewhere, should strata or seams of material occur which do not come under the requirements for topsoil, such material shall be removed from the topsoil or if required by the Engineer, the pit shall be abandoned.

E. Before placing or depositing topsoil upon any areas, all improvement within the area shall be completed, unless otherwise approved by the Engineer.

F. The areas in which topsoil is to be placed or incorporated shall be prepared before securing topsoil for use.

3.02 Seedbed Preparation

A. Before fertilizing and seeding, the topsoil surfaces shall be trimmed and worked to true line from unsightly variation, bumps, ridges and depressions and all detrimental material, roots and stones larger than 3-inches in any dimension shall be removed from the soil.

B. Not earlier than 24 hours before the seed is to be sown, the soil surface to be seeded shall be thoroughly cultivated to a depth of not less than 4-inches with a weighted disc, tiller, pulvimixer or other equipment, until the surface is smooth and in a condition acceptable to the Engineer.

C. If the prepared surface becomes eroded as a result of rain or for any other reason, or becomes crusted before the seed is sown, the surface shall again be placed in a condition suitable for seeding.

D. Ground preparation operations shall be performed only when the ground is in a tillable and workable condition, as determined by the Engineer.

3.03 Fertilization and Liming

A. Following seedbed preparation, fertilizer shall be applied to all areas to be seeded so as to achieve the application rates shown on Drawings.

B. Fertilizer shall be spread evenly over the seedbed and shall be lightly harrowed, raked, or otherwise incorporated into the soil for a depth of 1-inch.

C. Fertilizer need not be incorporated in the soil as specified above when mixed with seed in water and applied with power sprayer equipment. The seed shall not remain in water containing fertilizer for more than 30 minutes when a hydraulic seeder is used.

D. Agricultural limestone shall be thoroughly mixed into the soil according to the rates shown on Drawings. The specified rate of application of limestone may be reduced by the Engineer if pH tests indicate this to be desirable. It is the responsibility of the Contractor to obtain such tests and submit the results to the Engineer for adjustment in rates.

E. It is the responsibility of the Contractor to make one application of a maintenance fertilizer according to the recommendations listed in Table 1.

3.04 Seeding

A. Seed of the specified group shall be sown as soon as preparation of the seedbed has been completed. No seed shall be sown during high winds, nor until the surface is suitable for working and is in a proper condition. Seeding shall be performed during the dates shown in Table 1 unless otherwise approved by the Engineer. Seed mixtures may be sown together provided they are kept in a thoroughly mixed condition during the seeding operation.

B. Seed shall be uniformly sown by any approved mechanical method suitable for the slope and size of the areas to be seeded, preferably with a broadcast type seeder, windmill hand seeder or approved mechanical power drawn seed drills. Hydro-seeding and hydro-mulching may be used on steep embankments, provided full coverage is obtained. Care shall be taken to adjust the seeder for seedings at the proper rate before seeding operations are started and to maintain their adjustment during seeding. Seed in hoppers shall be agitated to prevent segregation of the various seeds in a seeding mixture.

C. Immediately after sowing, the seeds shall be covered and compacted to a depth of 1/8 to 3/8-inch by a cultipacker or suitable roller.

D. Leguminous seeds shall be inoculated prior to seeding with an approved and compatible nitrogen-fixing inoculant in accordance with the manufacturer's mixing instructions.

3.05 Mulching

A. All seeded areas shall be uniformly mulched in a continuous blanket immediately after seeding. The mulch shall be applied evenly so as to permit sunlight to penetrate and the air to circulate and at the same time shade the ground, reduce erosion and conserve soil moisture. Approximately 45 percent of the ground shall be visible through the mulch blanket.

B. One of the following mulches shall be spread evenly over the seeded areas at the following application rates:

1. Wood Cellulose Fiber: 1,400 pounds/acre.

2. Straw: 4,000 pounds/acre.

3. Stalks: 4,000 pounds/acre.

4. These rates may be adjusted at the discretion of the Engineer at no additional cost to the Owner, depending on the texture and condition of the mulch material and the characteristics of the seeded area.

C. Mulch on slopes greater than 3 to 1 ratio shall be held in place by the use of an approved mulch binder. Binder shall be thoroughly mixed and applied with the mulch. Emulsified asphalt or cutback asphalt shall be applied at the approximate rate of five gallons per 1,000 square feet as required to hold the mulch in place.

D. The Contractor shall cover structures, poles, fences and appurtenances if the mulch binder is applied in such a way that it would come in contact with or discolor the structures.

E. Mulch and binder shall be applied by suitable blowing equipment at closely controlled application rates in a manner acceptable to the Engineer.

3.06 Watering

A. The Contractor shall be responsible for maintaining the proper moisture content of the soil to insure adequate plant growth until a satisfactory stand is obtained. If necessary, watering shall be performed to maintain an adequate water content in the soil.

B. Watering shall be accomplished by hoses, tank truck or sprinklers in such a way to prevent erosion, excessive runoff and over-watered spots.

3.07 Maintenance

A. Upon completion of seeding operations, the Contractor shall clear the area of all equipment, debris and excess material and the premises shall be left in a neat and orderly condition.

B. The Contractor shall maintain all seeded areas without additional payment until final acceptance of the work by the Owner, and any regrading, refertilizing, reliming, reseeding or remulching shall be done at Contractor's own expense. Seeding work shall be repeated on defective areas until a satisfactory uniform stand is accomplished. Damage resulting from erosion, gulleys, washouts or other causes shall be repaired by filling with topsoil, compacting and repeating the seeding work at Contractor's expense.

END OF SECTION

Part 1 General

1.01 Scope

A. This Section includes, but is not necessarily limited to, standards for cleaning and the painting of structures and equipment described in the Drawings and Specifications. Furnish all materials, equipment and labor necessary to complete the work. The terms "paint" and "coating material" shall be considered synonymous.

B. Interior ferrous metal (submerged) surfaces are defined as all inside areas of the tank bowl, both below and above the high water line, including the underside of the roof, ladders, pipe, stiffeners, rafters, fittings, and appurtenances. Interrior ferrous metal (not submerged) refers to all ferrous metal surfaces inside steel pillar.

C. Exterior surfaces are defined as all outside areas of the tank, including the pillar, struts, rods, ladders, pipe, fittings, and appurtenances.

1.02 Substitutions

All coatings shall be the products of a single manufacturer. Guidelines for determination of acceptability of product substitutions are given in Section 01630 of these Specifications. Contractors intending to furnish substitute materials or equipment are cautioned to read and strictly comply with these guidelines.

1.03 Submittals

A. All submittals shall be made in accordance with the requirements of Section 01340 of these Specifications.

B. The Contractor shall submit to the Owner, for review, the following information concerning the materials the Contractor proposes to use in work covered by this Section:

1. A list of all components (paints or other materials) to be used in each painting system required herein.

2. A complete descriptive specification, including manufacturer's data sheet, of each component.

3. Prior to completing the purchase and delivery of the coating material selected by the Contractor, the Contractor shall obtain a letter from the material supplier stating that the selected material is suitable and compatible for application and use as directed under these Specifications, and that if properly applied will provide metal protection and a pleasing appearance for five years or longer.

1.04 Painting Requirements

A. Manufactured products may be shop cleaned and primed. Shop cleaning must equal or exceed cleaning specified in this Section. Clean as specified and reprime

all abrasions, weld splatter, excessive weathering and other defects in the shop prime coating.

B. Manufacturers furnishing shop primed products shall certify that cleaning was performed in accordance with these Specifications and that the specified primer was used.

C. Fully field clean and prime any shop primed products which the Owner determines that were not cleaned in accordance with the Specifications prior to priming, that the wrong primer was applied, that the primer was applied improperly, or has excessively weathered, or that the product is otherwise unacceptable.

D. Certain products, e.g., safety climb rails, electrical control panels, may, with the Engineer's approval, be furnished galvanized or finish painted. Properly protect these products throughout the Project to maintain a bright and new appearance. If the finish surfaces are defaced, weathered, or not of the selected color, repaint as necessary.

1.05 Quality Assurance

A. Only those systems and components which are judged acceptable by the Owner shall be utilized in the work covered by this item. No materials shall be delivered to the job site until the Owner has evaluated their acceptability.

B. The following information shall be included on the label of all containers of materials supplied under this Section:

1. Manufacturer's name.

2. Type of paint or other generic identification.

3. Manufacturer's stock number / batch number.

4. Color (if any).

5. Instructions for mixing, thinning, or reducing (as applicable).

6. Manufacturer's application recommendations.

7. Safety and storage information.

C. All coating material used on this Project shall be purchased specifically for this Project and furnished in new, unopened containers.

1.06 Manufacturer's Representative During Painting Operations

An authorized representative of the coating manufacturer shall be present at the start-up of painting operations. Such representatives shall instruct the Contractor's workers on the manufacturer's application recommendations.

1.07 Testing Equipment

A. The Contractor shall furnish and make available to the Owner the following items of testing equipment for use in determining if the requirements of this Section are being satisfied. The specified items of equipment shall be available for the Owner's use at all times when field painting or surface preparation is in progress:

1. Wet film gauge.

2. Surface thermometer.

3. "Surface Profile Comparator" as published by SSPC-The Society for Protective Coatings (with magnifier and three discs) or replica tape as manufactured by Testex.

4. "Visual Standard for Abrasive Blast Cleaned Steel", as published by SSPC. (SSPC-VIS 1)

5. "Visual Standard for Power- and Hand-Tool Cleaned Steel", as published by SSPC. (SSPC-VIS 3)

6. Holiday (pin hole) detector (low voltage).

7. Sling-psychrometer or other on-site device used to calculate relative humidity and ambient air temperature.

8. Magnetic dry film gauge, meeting the requirements of SSPC-PA2 Type I or Type II, including calibration.

1.08 Product Handling

A. Delivery

1. Deliver materials in original, sealed containers of the manufacturer with labels legible and intact.

2. Each container shall be clearly marked or labeled to show paint identification, date of manufacture, batch number, analysis or contents, identification of all toxic substances and special instructions.

B. Storage

1. Store only acceptable Project materials on the Project site.

2. Store material in a suitable location and in such a manner as to comply with all safety requirements including any applicable federal, state and local rules and requirements. Storage shall also be in accordance with the instructions of the paint manufacturer and the requirements of the insurance underwriters.

3. Restrict storage area to paint materials and related equipment.

4. Place any material, which may constitute a fire hazard, in closed metal containers and remove daily from the Project site.

1.09 Material Schedules

Material Schedules at the end of this Section list prime coats, intermediate coats, finish coats and cover coats that comprise a complete and compatible system of surface protection for the particular substrate. Maintain the unity of these systems, making sure all coats applied to any surface are from the same system and same manufacturer. Verify with the manufacturer the compatibility of the materials used.

Part 2 Products

2.01 Abrasive Material

A. The abrasive used in the abrasive cleaning shall be a material acceptable to the regulatory agencies of the State of Georgia for use in the described work. The material shall be of a shape and size to produce a uniform surface of acceptable profile to properly bond the prime coat.

B. The abrasive may be a combination of materials, including additives such as dust inhibitors.

2.02 Coating Materials

A. Acceptable Manufacturers: The only acceptable manufacturers and products shall be those listed in the Material Schedules at the end of this Section.

B. All applicable data currently published by the paint manufacturer relating to surface preparation, coverages, film thickness, application technique, drying and overcoating times is included by reference as a part of this Section. It is the responsibility of the Contractor to obtain and fully understand the appropriate data sheets for the coatings specified.

C. Products

1. Paints shall be factory mixed and delivered to the site in unbroken original packages bearing the manufacturer's name and brand designation and shall be applied in strict accordance with the manufacturer's printed specifications. Two-component coatings shall be mixed in accordance with manufacturer's instructions. All two-component coatings, once mixed, shall be applied within the pot-life recommended by the manufacturer.

2. Unless otherwise specified, paints shall be of the best grade. All thinners, driers, varnish, etc., shall be of the best grade and shall be furnished by the coating manufacturer for use with the specified paints.

D. Colors: The Owner will select the colors to be used on the various portions of the work. Provide color cards for the coatings proposed. Where more than one coat of paint is required, job tint off-shade the paint for each undercoat to show complete coverage.

2.03 Mixing and Tinting

A. When possible, all paints and other materials shall be mixed and tinted by the paint manufacturer prior to delivery to the job site.

B. When job site mixing and/or tinting is required, the manufacturer's recommendations shall be strictly adhered to. The Contractor shall be solely responsible for the proper conduct of all on-site mixing and/or tinting.

Part 3 Execution

3.01 General

A. Protect other surfaces from paint and damage. Furnish sufficient shields and protective equipment to prevent spray or droppings from fouling surfaces not being painted. Repair damage as a result of inadequate or unsuitable protection.

B. The Contractor's on-site representative shall keep a record of work performed each day and shall submit it to the Owner weekly. The forms for this record will be furnished by the Owner.

C. No coat of paint shall be applied until the surface has been inspected and accepted by the Owner. The Contractor shall give at least 24 hours notice to the Owner when cleaning is to be performed to prevent inspection delays. The Contractor shall provide the necessary access for inspection by the Owner.

D. Shop applied prime coatings which are damaged during transportation, construction or installation shall be thoroughly cleaned and touched-up in the field as directed by the Owner. The Contractor shall use repair procedures which insure the complete protection of all adjacent primer. The specified repair method and equipment may include wire brushing, hand or power tool cleaning, or dry air blast cleaning. In order to prevent injury to surrounding painted areas, blast cleaning may require use of lower air pressure, small nozzle and abrasive particle sizes, short blast nozzle, distance from surface, shielding and masking. If damage is too extensive or uneconomical to touch-up, then the item shall be re-cleaned and coated or painted as directed by the Engineer.

E. Surface Preparation and Application Overview

1. Tank Exterior

    a. Shop blast
    b. Shop prime
    c. After tank erection, spot blast seams, welded areas, abraded areas and unprimed edges
    d. Spot prime newly blasted areas
    e. Apply intermediate coat
    f. Apply final coat

2. Tank Interior

    a. Shop blast
    b. Shop prime
    c. After tank erection, spot blast seams, welded areas, abraded areas and unprimed edges
    d. Spot prime newly blasted areas

e. Apply stripe coat
f. Apply intermediate coat
g. Apply final coat

3.02 Environmental Conditions

A. Environmental conditions which affect coating application include, but are not necessarily limited to, ambient air temperature, surface temperature, humidity, dew point and environmental cleanliness. Comply with the manufacturer's recommendations regarding environmental conditions under which coatings may be applied.

B. Surface preparation and cleaning of the exterior surfaces must be performed during periods of still air or only a slight breeze so that fallout of the dust produced does not drift onto adjacent property. The Owner reserves the right to temporarily stop the Contractor from exterior blasting (or painting) when by observation it is apparent that the wind direction or velocity prevents compliance with this requirement. Any clean-up of fall-out on adjacent property shall be the responsibility of the Contractor.

C. All blast residue from the tank shall be properly disposed of off-site by the Contractor.

3.03 Safety

A. General

1. The Contractor is responsible for the safety of all workers and subcontractor and suppliers performing work on this Project.

2. The Contractor shall protect the Owner, their agents, and the General Public from harm attributable to the Contractor's performance, or non-performance, of the work on this Project. The protection shall include, but not be limited to, providing the necessary safety equipment and instructions for its use by the Owner, and their agents.

3. The Contractor shall protect the existing structures and environment from damage attributable to the Contractor's performance, or non-performance, of the work on this Project.

4. The Contractor shall comply with the applicable standards of 29 CFR Part 1910 and 29 CFR Part 1926.

5. The listing of the following potential hazards shall in no way relieve the Contractor's responsibility for safety on this Project.

B. The interior of these tanks may be considered a confined space hazard. The Contractor shall confirm to the Owner, in writing, prior to the start of the Project, that the Contractor has training programs, trained personnel, and is otherwise in compliance with CFR 1910.146.

3.04 Surface Preparation

A. All surfaces shall be thoroughly clean, dry, and free from oil, grease or dust. All fabricated metal products shall have all weld flux and weld splatter removed, and sharp peaks in welds ground smooth.

B. Dry Blast Method: All paint, dirt, rust, and foreign material shall be removed by abrasive blasting using the dry blast method, to a near white finish (SSPC-10). Standards for the surface preparation of ferrous metals required in the Material Schedules are the standards of SSPC-The Society for Protective Coatings. Care shall be taken to blast clean all pits, welds, and other rough surfaces so that the rough surfaces do not cause a "shadow" effect.

C. All surface preparation and cleaning shall be performed in accordance with AWWA D102, the standards and guidelines of SSPC - The Society for Protective Coatings, and as specified in this Section. All cleaning shall be done in accordance with OSHA regulations.

D. The work shall be done from scaffolding or platforms of the Contractor's selection, but in no event will blasting be done from an unteathered boson chair that allows the operator to be pushed away from the work surface by the reaction force of the nozzle. This requirement applies to all horizontal and diagonal rods in the tank structure as well as heavier sections and plate surfaces.

E. Inspection

1. Cleaned surfaces shall be inspected by the Owner prior to primer application.

2. Abrasive blast cleaned surfaces shall be inspected utilizing the SSPC Visual Standards and the SSPC Surface Profile Comparator or replica tape. These plates shall be securely wrapped in clear plastic and sealed to protect them from deterioration and marring.

3.05 Shop Priming

A. Shop Cleaning: After fabrication, all steel shall be grit or shot blasted or shall be pickled to remove all mill scale. Surface preparation shall conform to the requirements of the Materials Schedules.

B. Shop Priming: All steel, except for contact surfaces and edges to be welded, shall receive shop primer applied immediately after cleaning. Shop primer shall be applied by brush, roller, conventional or airless spray. Shop primer shall be as specified in the Materials Schedules for Primer.

3.06 Application

A. General

1. No paint shall be applied upon damp or frosty surfaces, or in wet or foggy weather. No paint shall be applied in temperatures below 40 degrees F, when freezing (32 degrees F) is predicted within 24 hours of application, or under temperature or humidity conditions not recommended by the manufacturer.

2. After specified surface preparation, all surfaces shall be cleaned free of dust or foreign matter. Surfaces shall be completely dry before any paint is applied.

3. All painting shall be done in accordance with AWWA D102 and as specified herein. The application of paint shall be in strict accordance with the printed instructions of the paint manufacturer.

4. Paint shall be evenly spread in the proper thickness, so that there shall be no drips, runs or saggings of the coating. A uniform coating shall be worked around all irregularities. If runs and drips do occur, they shall be removed and the surface re-coated to the satisfaction of the Engineer prior to application of the next coat. As the painter makes its "drops", any oversprays that may have settled on the surfaces, especially weld seams, shall be swept or blown off. All overspray, heavy drips, or sags shall be removed. Any coating applied on top of overspray shall be removed and the area repainted.

5. Sufficient time, as directed by the manufacturer, shall be allowed for the paint to dry before the application of succeeding coats.

6. Colors shall be chosen by the Owner. Each coat shall be tinted to facilitate positive identification of areas receiving subsequent coats.

B. Interior

1. Spot Prime Coats

   a. After completion of the surface preparation and cleaning all bare surfaces, including welds, edges and abraded areas shall receive a spot prime coat. All areas cleaned within one day shall be primed the same day.
   b. Immediately before priming, the metal shall be cleaned of dust and foreign materials. Air used to blow-off dust shall be dry and free of oil.
   c. The prime coat shall be applied by brush, roller or airless spray.

2. Interior Stripe Coat: After completion of the prime coat, all interior weld seams, including attachment welds, shall receive an intermediate stripe coat applied by brush. The purpose of this coat is to assure that no "shaded" areas around the welds exist and to provide more protection for the rough weld areas. Coating shall cover the weld and adjacent metal a minimum of 2-inches each side of the weld.

3. Intermediate Coat: After completion of the stripe coat, all surfaces shall receive an intermediate coat. The intermediate coat shall be applied by brush, roller or airless spray.

4. Finish Coats: After completion of the intermediate coats, all surfaces shall receive a finish coat. The finish coats shall be applied by brush, roller or airless spray.

5. Ventilation: The Contractor shall provide adequate forced ventilation sufficient to change the air within the tanks at the rate of 1,000 cfm per man. The minimum rate shall be 3,000 cfm. The blower or blowers shall be placed so as to introduce air at the top and withdraw from the bottom. The ventilation system shall operate continuously.

C. Exterior

1. Spot Prime Coats

a. After completion of the surface preparation and cleaning all bares surfaces, including welds, edges and abraded areas shall receive a spot prime coat. All areas cleaned within one day shall be primed the same day.
b. Immediately before priming, the metal shall be cleaned of dust and foreign materials. Air used to blow-off dust shall be dry and free of oil.
c. The prime coat shall be applied by brush, roller or airless spray.

D. Inspection: Unless otherwise noted, film thicknesses specified are minimum dry film thicknesses. Each coat shall be checked as follows:

1. Immediately after application, wet film thickness readings shall be taken with a wet film gauge.

2. When thoroughly cured, dry film thickness readings shall be made with a properly calibrated Elcometer dry film thickness gauge or other gauge approved by the Engineer. Where the prime coat is found deficient and finish coating is of a different formulation, additional prime coats shall be applied at no additional cost to the Owner. The finish coating may not be used to correct deficiencies in the thickness of the prime coat.

3. The total dry film thickness shall be checked prior to acceptance and if found to be less than specified, additional finish coats shall be applied at no additional cost to the Owner to obtain the specified thickness.

4. After the coating has been applied, the coated surface shall be tested in the presence of the Engineer with an approved 60 volt low current wet sponge type holiday detector. Any thin areas, defects, flaws and holidays in the coating shall be immediately repaired.

5. The Contractor shall provide the necessary equipment for making the above tests.

E. Defective Work: Remove and replace, at the direction of the Owner, any painting work found to be defective or applied under adverse conditions.

3.07 Contractor's Work Door

The Contractor may, at its own expense, cut a work door in the bottom ring of the tank. If the Contractor elects to cut this door, it shall be laid out with all cuts vertical and horizontal. All corners shall have a 6-inch radius. No cut shall be within 6-inches of an existing seam. All welding shall comply with the requirements of the American Welding Society under the "Code for Arc and Gas Welding in Building Construction". All welding shall be performed by operators qualified by tests prescribed in the "Standard Qualifications Procedure of the American Welding Society".

3.08 Maintenance Materials

Furnish the Owner at least one gallon of each type and color of paint used for finish coats and one gallon of each type of thinner required. Containers shall be tightly sealed and clearly labeled.

PAINTING SCHEDULES

System: 144
Type: Epoxy
Use: Interior Ferrous Metal Not Submerged (Steel Pier Interior)
Surface Preparation: SSPC SP-10 Near White

Coat	Minimum Dry Film Thickness (Mils)	Tnemec	Carboline	Induron
Shop Prime	3.0 - 5.0	Series N69 Hi-Build Epoxoline II	Carboguard 893 SG	PE-54 Epoxy
Spot Prime	3.0 - 5.0	Series N69 Hi-Build Epoxoline II	Carboguard 893 SG	PE-54 Epoxy
Intermediate	4.0 - 6.0	SeriesN69 Hi-Build Epoxoline II	Carboguard 893 SG	PE-54 Epoxy
Finish	4.0 - 6.0	Series N69 Hi-Build Epoxoline II	Carboguard 893 SG	PE-54 Epoxy
System	12.0			

System: 247
Type: Epoxy/Polyurethane
Use: Exterior Ferrous Metal
Surface Preparation: SSPC SP-10 Near White

Coat	Minimum Dry Film Thickness (Mils)	Tnemec	Carboline	Induron
Shop Prime	3.0 - 5.0	Series N69 Hi-Build Epoxoline II	Carboguard 893 SG	PE-54 Epoxy
Spot Prime	3.0 - 5.0	Series N69 Hi-Build Epoxoline II	Carboguard 893 SG	PE-54 Epoxy
Intermediate	3.0 - 5.0	Series N69 Hi-Build Epoxoline II	Carboguard 893 SG	Induraguard
Finish	2.0 - 3.0	Series 1074 Endura-Shield II	Carbothane 134 HS	Indurethane 6600
System	12.0			

System: 344W Type: Epoxy Use: Interior Ferrous Metal Submerged in Potable Water (Tank Bowl Interior) Surface Preparation: SSPC SP-10 Near White Coatings must be approved under NSF Standard 61 for use in potable water				
Coat	Minimum Dry Film Thickness (Mils)	Tnemec	Carboline	Induron
Shop Prime	3.0 - 5.0	Series N140 Pota-Pox	Carboguard 561/561LT	PE-54 Epoxy
Spot Prime	3.0 - 5.0	Series N140 Pota-Pox	Carboguard 561/561LT	PE-54 Epoxy
Stripe	3.0 - 5.0	Series N140 Pota-Pox	Carboguard 561/561LT	PE-54 Epoxy
Intermediate	3.0 - 5.0	Series N140 Pota-Pox	Carboguard 561/561LT	PE-54 Epoxy
Field Finish	3.0 - 5.0	Series N140 Pota-Pox2	Carboguard 561/561LT	PE-54 Epoxy
System	15.0			

Provide additional coats as necessary to achieve total thickness of each coat, total thickness of system, smooth appearance, and elimination of pinholes.

Additional coats are applied at no additional cost to the Owner.

END OF SECTION

Part 1 General

1.01 Summary

A. Work Included: This section includes the design, construction, testing, and commissioning of two composite elevated tanks and related work including foundations, painting, electrical, mechanical, storage floor and appurtenances.

B. The tanks shall have a capacity of 2,000,000 gallons each. The Contractor shall furnish all materials and equipment and perform all labor necessary to fulfill the requirements of this Section of these Specifications.

C. The Contractor shall furnish all utilities except water for testing and disinfection which shall be furnished by the Owner.

1.02 System Description

A. Elevated Tanks: The composite elevated tanks shall consist of the following: foundation, reinforced concrete support structure and a welded steel water tank. The support structure shall extend vertically from the foundation as a circular concrete wall. A domed concrete slab shall be provided as structural support for the steel tank within the perimeter of the wall. A reinforced concrete ring beam shall be provided to connect the steel tank, concrete dome and concrete support wall. The elevated tanks shall be in accordance with the shape, dimensions and details required by these specifications and drawings.

B. Operating Parameters:

Minimum capacity within operating range	2,000,000 gallons each tank
Maximum operating range	40 feet
Maximum fill rate	12,000 gpm
Elevation – overflow/top capacity level	1284 feet (both tanks)
Elevation – grade slab	1166.67 feet – Tank A 1176.67 feet – Tank B
Elevation – final ground	1166.0 feet – Tank A 1176.0 feet – Tank B

C. General Design:

1. Design Standards - The structural design of the elevated storage tank shall conform to the following design standards except as modified or clarified by this section.
   a. Foundations and Support Structure — ACI 318 and ASCE 7
   b. Steel Tank — AWWA D100

2. Design Loads - Design loads shall be in accordance with ASCE 7 for Category IV (essential facility) structure.

   a. Dead load shall be the estimated weight of all permanent construction.

b. Water load shall be the weight of water when the tank is filled to overflow.
c. Roof live load in addition to snow load: none.
d. Roof snow load shall be the larger of 15 psf. or the snow load determined in accordance with ASCE 7. Ground snow load shall be determined from Figure 7-1 in ASCE 7.
e. Wind loads shall be in accordance with ASCE 7 for wind exposure category C, and basic wind speed of 90 mph. (see Figure 6-1 in ASCE 7)
f. Horizontal and vertical seismic loads shall be in accordance with ASCE 7 and the Site Class as determined in the soil investigation report.
g. Importance factor I = 1.50.
h. Response Modification Coefficient R = 3.0 in accordance with ASCE 7

3. Combination of Loads - The effect of combination of loads shall be considered in accordance with the following.

1.4D + 1.6F + 1.6(L+S)
1.2D + 1.2F + L + 0.5S + 1.6W
1.2D + 1.2F + L + E
0.9D + 1.6W
0.9D + F + E

D = Effect of dead load.
F = Effect of water load.
E = Effect of horizontal and vertical seismic load.
L = Effect of interior or roof live load.
S = Effect of roof snow load.
W = Effect of wind load.

E. Foundation Loads: The foundations shall be designed by the Contractor to safely support the structure based on the recommendations of the geotechnical engineer. Foundations shall be sized in accordance with AWWA D-100 subject to the following modifications:

a. Allowable permanent soil pressure shall not be exceeded under D+F.
b. Allowable short term soil pressure shall not be exceeded under D+F+0.7E or D+F+W.
c. No uplift under D+W or D+F+.75E unless anchorage is provided.
d. No overturning under D+1.5W or D+F+1.5(0.7E).
   D = Effect of dead load including net weight of the foundation.
   F = Effect of water load.
   E = Effect of seismic load.
   W = Effect of wind load.

1.03 Submittals

A. Proposal: Submit the following with the bid:

1. Experience List - A list of ten Composite elevated tank structures of equal or greater capacity that have been in satisfactory operation for at

least 5 years. These tanks shall be of the same design described in paragraph 1.02A. Provide the location, capacity, contact name and year completed. Failure to provide this information shall be cause for rejection of the bid.

2. Tank Drawing - A preliminary section view drawing of the tank proposed for this project. The drawing shall include sufficient detail to illustrate tank geometry, materials of construction, primary dimensions, support wall thickness and pour height, domed concrete slab thickness, the elevation of low and high water levels, interior wet, interior dry and exterior paint areas, and other information required to show compliance with the specification. If the proposed design does not comply with the Specifications, the Bid shall be rejected.

B. Submit to the Owner preliminary foundation and tank working drawings in accordance with the requirements of Section 01340 and 01010 of these Specifications. Submit sketches indicating all the live loads, wind loads, and seismic loads and their reactions. Along with the foundation submittal, the Contractor shall submit in writing the design engineers certification of maximum acceptable differential settlement.

C. Final Design Drawings:

1. Provide final design drawings in accordance with the requirements of Sections 01010 and 01340 of these Specifications. Provide elevation, plan and sectional view drawings of the foundation, support structure, tank and all appurtenant equipment and accessories. Show the location, dimensions, material specifications, and finish requirements. The submission shall be sealed by professional engineer registered in the State of Georgia.

2. Foundation details shall include excavation, soil protection and backfill.

3. Reinforced concrete details shall include construction joints, openings and inserts. Reinforcement shall be clearly indicated on the structural drawings and identified by mark numbers that are used on the fabrication schedule. Location, spacing and splice dimensions shall be shown. Placement and fabrication details shall conform to ACI 318.

4. Steel tank details shall include weld joints and a layout showing all primary and secondary shop and field welds.

D. Construction Procedures:

1. Provide design, detail drawings and procedures for the support structure forming system. Details shall include location of form and construction joints, rustications and ties. Procedures shall include form removal criteria and minimum elapsed time for adjacent concrete placement.

2. Provide shop and field weld procedures for all structural joints on the steel tank.

3. Drawings shall show necessary shop details, essential erection details, details of anchor bolts and accessories and schedule for fabrication and erection.

E. Design Data:

1. Provide a table showing capacity of the tank in gallons at all levels in one foot increments.

2. Provide a summary of the design for the foundation, support structure, tank and other components. Include the design basis, loads and load combinations and results.

3. Provide a finite element analysis that accurately models the intersecting elements of the interface region. The interface region includes those portions of the concrete support structure and steel tank affected by the transfer of forces from the tank cone and the tank floor to the concrete support wall. The analysis shall provide results including the shear, moment, and compression or tension caused by the intersecting elements in the interface region.

F. Product Data:

1. Provide a separate concrete mix design for each specified concrete compressive strength indicated on the drawings.

2. Provide technical data and color samples of all coating products.

3. Provide manufacturers descriptive information for appurtenant equipment and accessories that are not detailed on the construction drawings.

4. Submit product data for obstruction lighting.

G. Reports/Certification:

1. Provide documentation of all tests, inspections and certifications required by this section.

2. Provide qualifications of all welders.

3. Submit Certification from Contractors' registered engineer that the design is in compliance with applicable codes.

H. Operation/Maintenance: Provide operating instructions and maintenance procedures for the elevated tank and applicable appurtenant equipment, mechanical components and accessories.

1.04 Quality Assurance

A. Qualification of Manufacturer:

1. The work described in this section shall be performed by an experienced Contractor that has designed, constructed and commissioned a minimum of ten Composite elevated tanks (with structural concrete domes) of equal or greater capacity, all in satisfactory operation for at least 5 years. These tanks shall be of the same design as required in paragraph 1.02A and constructed using forming systems as required in paragraph 3.04.

2. Acceptable manufacturers prequalified to perform the work specified herein are: CB&I Constructors, Inc. and Landmark Structures.

Other manufacturers may be considered only if they meet the experience criteria and the specification requirements. . A written request for pre-qualification must be received by the Engineer a minimum of fourteen days prior to bid date and must include the following minimum information.

a. A completed contracts summary demonstrating minimum ten years experience and listing a minimum of ten composite elevated tanks of equal or greater capacity in successful operation for at least five years. Provide the location, capacity, Owner contact with phone number, and year completed.

b. A preliminary section view drawing of the tank proposed for this project. The drawing shall include sufficient detail to illustrate tank geometry, materials of construction, primary dimensions, support wall thickness and pour height, domed concrete slab thickness, the elevation of low and high water levels, and other information required to show compliance with the specification.

c. Detail drawings and/or photographs of the equipment and systems to be used for construction of the concrete support structure and erection of the steel tank. Submittal shall describe the forming system, concrete placement method, rustications, ties, methods used to prevent grout leakage, steel erection method.

d. Written procedures for concrete and steel quality control including wall form alignment, segmented wall pour, and steel cone dimension control.

e. A sample finite element analysis of the tank interface region.

f. A written affidavit confirming that no exceptions are taken to the requirements and procedures described in the specifications.

g. Proof of insurance for Professional Liability with a minimum limit of $2,000,000 each occurrence and aggregate.

h. Photographic evidence that the contractors concreting systems result in architectural concrete. Uniform color, uniform surface density and uniform alignment of rustication are primary measure. Photographs shall provide adequate detail to show absence of surface defects at construct joints and structure penetrations. Submit a photographic resume of ten projects with a minimum of four images each project proving the architectural concrete requirements have been attained.

The Owner and/or Engineer shall be the sole and final judge as to the acceptability of a manufacturer's qualifications. Bidders failing to obtain pre-qualification will be considered non-responsive and their bid will not be opened.

3. Elevated tank design, concrete support structure construction and steel tank construction shall not be subcontracted. These items shall be self performed by the Contractor.

4. The Contractor shall directly employ a full time professional Engineer with a minimum five years cumulative experience in the design and construction of Composite elevated tanks as described in paragraph 1.02A. The Engineer shall be registered in accordance with 1.04B and shall be in responsible engineering charge of the work.

5. A qualified supervisor directly employed by the Contractor shall be on site at all times during construction of the foundation, support structure and steel tank.

B. Regulatory Requirements:

1. The specifications, codes and standards referenced in this Specification shall govern the work with regard to materials, design, construction, inspection and testing to the extent specified.

2. The elevated tank shall be designed and constructed in compliance with applicable federal, state and local regulations.

3. Personnel safety equipment shall be provided in accordance with OSHA requirements and manufacturers documentation.

1.05 Delivery, Storage and Handling

A. Handling and Shipping: The Contractor shall handle materials and fabricated components in a manner that will protect them from damage. Allow painted materials adequate cure time prior to stacking or shipping.

B. Storage and Protection: Protect delivered materials and equipment from damage. Store in well drained areas and provide blocking to minimize contact with the ground.

1.06 Project Conditions

A. Existing Conditions: A geotechnical investigation has been carried out at the site and a report has been incorporated as Appendix A to these specifications. The allowable capacity of the foundation elements have been defined in this report. The Contractor shall be responsible for securing any further geotechnical information required beyond that provided in this report and confirming the foundation requirements necessary to support the tanks.

B. Access: The Contractor shall use existing access from public roads to the tank site.

C. Working Conditions:

1. Safety and Health - The Contractor shall comply with safe working practices and all health and safety regulations of OSHA, state and local health regulatory agencies and Material Safety Data Sheets (MSDS). Provide protective and lifesaving equipment for persons working at the site.

2. Times for Work - Times for work shall comply with local, state and federal regulations and laws.

D. Other Construction

1. Contractor is advised that construction of the pumping station shown on the plans may be ongoing at the start of this project.

1.07 Sequencing and Scheduling

A. Schedule: The Contractor shall provide a bar chart showing the anticipated schedule for design, submittals, site work and the major components of construction including foundation, support structure and steel tank. In addition, show tank painting, electrical installation and other significant activities. Update the schedule as required.

B. Notification: The Contractor shall provide notification of the intent to start work at least seven days prior to commencing each major phase of work.

C. Certifications:

1. Provide certification from the Engineer of record that the elevated tank has been designed in accordance with the requirements of the Specification.

2. Provide certification that testing and inspection requirements of 3.06 have been performed and the results comply with the requirements of the Specification.

Part 2 Products

2.01 Materials

A. Reinforced Concrete: Concrete materials and reinforcement shall comply with ACI 318, except as modified in this Section. (See 2.03 A)

B. Steel Tank: Steel tank components, including steel plates, sheets, structural shapes and filler metals shall be in accordance with AWWA D100, Section 2, "Materials".

2.02 Concrete Foundation

A. The tank Contractor shall design and construct the foundation system in accordance with ACI 318. Depth, size and shape shall be as required to limit total settlement and differential settlement. Minimum specified compressive strength shall be 4000 psi at 28 days. The service load reinforcement tension stress shall not exceed 30,000 psi under dead plus water load unless flexural cracking is otherwise controlled in accordance with ACI 318

B. Submit written statements from both the Contractor's engineer in responsible charge of the work and the geotechnical engineer retained for the Project regarding the suitability of the foundation. Statements shall establish the limits of total settlement and differential settlement which are acceptable and certify that in the opinion of the engineers, the foundation as designed will result in settlement in amounts within the stated limits.

2.03 Concrete Support Structure

A. The concrete support structure shall be designed in accordance with ACI 318. The specified compressive strength of concrete shall be as required by design, but not less than 4,000 psi at 28 days. The maximum specified compressive

strength of concrete for the wall and dome shall be 5500 and 4500 psi respectively.

B. Support Wall: Support wall shall be reinforced concrete with a minimum thickness of 8 inches exclusive of any architectural relief. Wall thickness shall be provided such that the average compressive stress due to the weight of the structure and stored water is limited to 25% of specified compressive strength, but not greater than 1000 psi. A minimum total wall reinforcement of 0.15% vertically and 0.20% horizontally shall be distributed approximately equally to each face. A minimum of 0.75% vertical reinforcement shall be provided in the top 6 feet of the wall extending into the concrete ring beam. Minimum concrete cover for interior/exterior faces shall be 1-inch and 1-1/2 inches respectively.

C. Tank Floor: Tank floor shall be a reinforced concrete dome not less than 8 inches thick. The average compressive stress due to the weight of the structure and stored water shall not exceed 15% of the specified compressive strength, nor greater than 600 psi. Minimum total reinforcement in orthogonal directions shall be 0.40% distributed approximately equally to each face. Additional reinforcement shall be provided for stress caused by edge restraint effects.

D. Openings:

1. The effects of openings in the wall shall be considered in the design. Not less than 60% of the interrupted reinforcement in each direction shall be placed each side of the opening. Reinforcement shall extend past the opening not less than half the transverse opening dimension.

2. Openings wider than 3 feet 6 inches shall be subjected to a rigorous analysis taking into account the stress concentrations and diminished lateral support that exist in the vicinity of such openings. Each side of the opening shall be designed as a column in accordance with ACI 318.

3. Openings 8 feet 0 inches or wider used for vehicle access shall be strengthened against vehicle impact and local buckling by means of an internal buttress located on each side of the opening. The buttress shall consist of a thickened, reinforced concrete wall section that is integrally formed and placed with the support wall. The buttress section shall be not less than 3 feet 0 inches wide and 6 inches thicker than the nominal wall dimension.

E. Concrete Support Structure/Steel Tank Interface

1. Interface Region:

a. The interface region includes those portions of the concrete support structure and steel tank affected by the transfer of forces from the tank cone and the tank floor to the concrete support wall. This includes a ring beam and connection details. The Contractor shall provide evidence that a thorough review of the interface region has been performed. Finite element and finite difference analyses are the required methods for examining such local stresses in detail.

b. The geometry of the interface shall provide for positive drainage and not allow either condensate or precipitation to accumulate at the top of the concrete wall or ring beam.

2. Ring Beam:

a. The ring beam shall be reinforced concrete with a nominal width and height of at least two times the support wall thickness. Minimum radial and circumferential reinforcement shall be 0.25%. For direct tension, reinforcement shall be provided such that the average service load stress in tension reinforcement due to the weight of the structure and stored water does not exceed 12,750 psi.

b. Ring beam design shall consider unbalanced forces from the steel tank cone and concrete dome, load conditions varying with water level, eccentricity of loads resulting from design geometry, and allowance for variations due to construction imperfection and tolerance.

2.04 Steel Tank

A. General: The steel tank shall be all welded construction and shall be designed in accordance with applicable sections of AWWA D100. The required capacity and dimensions of the tank are noted on the Drawings and in this section of the Specifications. All exposed lap joints shall be fully seal welded on both sides.

B Plate Thickness: All members shall be designed to safely withstand the maximum stress to which they may be subjected during erection and operation. The minimum thickness of any steel plate in contact with water shall be ¼-inch, except that plate used as a membrane over the structural concrete floor shall have a minimum thickness of 3/16-inch.

C. Roof Support: All structural members supporting the roof of the steel tank shall be flat bar or sealed square tubular sections. I-beams or other sections with horizontal projections may be used if the nominal depth is 10 inches or greater. Support beams shall be seal welded to the underside of the roof plate along the entire length of the beam.

D. Cone: Conical sections of the tank that support water shall be designed in accordance with AWWA D100.

E. Roof Design: The roof of the steel tank shall be conical in shape with a slope ranging from 8:1 to 12:1. The intersection of the vertical wall plate and the roof shall be configured with a 2'-6" high by 1'-6" wide transition knuckle. A flat domed roof with a 2'-6" pressed knuckle transition is also acceptable.

2.05 Appurtenances and Accessories

A. General: Accessories shall comply with the minimum requirements of the Specifications, Codes and Standards referenced in these Specifications, current applicable safety regulations, and the operating requirements of the structure.

B Ladder Access:

1. Ladders shall be provided from the slab on grade inside the base of the support wall to the upper walkway platform located below the tank floor. The tank floor manhole shall be provided with ladder access from the

upper platform. A ladder shall extend from the upper platform, through the access tube interior to the roof. A ladder mounted on the access tube exterior shall be provided for access to the tank interior, extending from the roof manhole to the tank floor.

2. Ladders that terminate at platforms or landings shall extend a minimum of 48 inches beyond the platform elevations.

3. Ladders located in the concrete support structure and access tube interior shall be galvanized steel. Tank interior ladders shall be coated in accordance with the tank interior coating system.

4. Ladder side rails shall be a minimum 3/8 inch by 2 inch with a 16 inch clear spacing. Rungs shall be minimum 3/4 inch diameter, spaced at 12 inch centers and plug welded into holes drilled in the side rails. Tank interior ladders shall be provided with 1 inch diameter rungs and 1/2 inch x 2 inch side rails and shall be fully seal welded.

5. Ladder shall be secured to the adjacent structure by brackets located at intervals not exceeding 10 feet. Brackets shall be of sufficient length to provide a minimum distance of 7 inches from the center of rung to the nearest permanent object behind the ladder.

C. Safe Climbing Device:

1. The safety climbing device shall be suitable for use on straight and curved ladders and shall withstand a minimum drop test of 250 pounds in a six foot free fall.

2. The device shall be the rigid rail type. The rail shall be steel tubing with a minimum wall thickness of 0.120-inch. Rail and guide channel shall be hot dip galvanized in accordance with ASTM A 153 with a minimum thickness equal to Class B-2.

3. The sliding sleeve shall be cast manganese bronze with a minimum tensile strength of 110,000 psi. The sleeve shall be fitted with roller bearings to ensure free travel of the sleeve on the rail.

4. All snaps, links and buckles shall be drop forged steel. The D ring shall be cold rolled steel welded to sustain a tensile test of 1,250 pounds. All hardware shall be finished smooth and galvanized.

5. The ladder rail shall extend beyond platforms and landings to allow the climber to have firm footing before disengaging the device.

6. The Contractor shall furnish two sleeves, two safety lanyards, and two safety belts. All items shall be new and unused.

7. The safety climbing device shall be equal to ‘SAF-T-CLIMB” as manufactured by North Specialty Products.

D. Rest Platforms: Aluminum rest platforms shall be provided as required on support wall ladders over 50 feet, at a maximum of 50 foot intervals. Rest platforms shall be designed such that they may be used without removing fall prevention equipment.

E. Platforms:

1. A 4 foot wide upper walkway platform shall be located at the top of the support wall to provide access from the support wall ladder to the roof access ladder located on the interior of the access tube. Platforms shall be provided with handrails, midrails and toe plates in accordance with OSHA requirements. Grating shall be used for the walking surface. All components shall be galvanized steel.

2. A fixed lanyard shall be provided at platforms to provide fall prevention.

F. Support Wall Doors:

1. Personnel Door – Provide one 36- inch wide personnel door for the tank. Door frames shall be 16-gauge with concealed reinforcement at hardware locations. Expansion type anchors for existing openings shall be installed near the top, bottom and intermediate point of each jamb to rigidly secure the frame. Door shall be 1-3/4-inch thick insulated, reinforced, full, flush type with 18-gauge face sheets and concealed reinforcement at hardware locations. All edges shall be finished flush with watertight seams. Shop applied finish for the frame and door shall be baked on rust inhibitive primer. Field finish shall be compatible with the tank exterior. Standard hardware shall be stainless steel and include three 4-1/2-inch by 4-1/2-inch hinges, industrial duty closer and Cyberlock.

2. Overhead Vehicle Door – Provide one 12 feet wide and 12 feet high, overhead vehicle door. Door installation shall be on the interior face of the support wall. The door frame shall be a steel plate fabrication suitably detailed, fastened and reinforced to accept the door. Operation shall be manual with a chain hoist. The curtain shall be formed of 22-gauge steel interlocking slats with end locks and wind locks designed for a wind loading of 20 psf. Torsion springs shall be mounted on a solid torsion rod, which is attached to an exterior mounted spring tension adjustment wheel. A 24-gauge steel hood shall be provided with a weather seal to protect the assembly. Steel brackets shall be installed to the interior face of the wall with expansion anchors which enclose and support the counterbalance assembly with sealed bearings. Steel curtain guides are mounted to the brackets. The curtain, bottom bar, brackets, guides, hood, pipe and chain shall be galvanized.

G. Tank Openings:

1. Floor - Provide a 30-inch diameter manhole through the tank floor. The manhole shall be operable from a ladder located on the upper platform and shall be designed to withstand the pressure of the tank contents without leakage. The manhole assembly shall include a stainless steel handwheel operator and threaded components.

2. Roof - Provide two 36-inch by 30-inch access hatches on the roof of the tank. One hatch shall allow egress from the access tube to the roof. The second hatch, located adjacent to the first, shall allow access to the interior of the tank via the ladder mounted on the exterior of the access tube. The opening shall have a minimum 4-inch curb. Provide aluminum covers with a 2-inch downturned edge, stainless steel hardware, hold

open arm and a locking mechanism. Access hatches shall be Type GS Roof Scuttles manufactured by Bilco.

H. Access Tube: Provide a minimum 48 inch diameter centrally located access tube through the steel tank to provide access to the tank roof from the upper walkway platform. The area under the access tube shall be provided with a galvanized drip pan to prevent condensation from dripping onto the concrete floor slab below. The drip pan shall extend 3-inches beyond the drip line of the access tube. A ¾-inch PVC drain pipe shall be provided. The drain shall discharge into the overflow line.

I. Roof Railing: A 42-inch high roof handrail shall be provided to enclose all centrally located roof accessories.

J. Rigging Access:

1. Provide a 24-inch x 36-inch opening at the top of the support wall. This opening shall be accessible from a platform and shall provide access to the exterior rigging rail located at the tank/support wall intersection. The access opening shall be provided with a hinged stainless steel cover or a removable vent in accordance with 2.05.M.2.

2. A minimum 24-inch diameter opening shall be provided on the tank roof to provide access to the tank interior rigging rails. This access opening may be combined with a pressure/vacuum relief mechanism.

K. Painters Rails: Provide permanently installed painter rails suitable for rolling trolleys at the interior of the tank at the wall/roof and access tube/roof connections. Provide an exterior painters rail at the base of the tank adjacent to the support structure.

L. Piping and Valves:

1. Site piping, valves and fittings shall comply with Section 02655 and Fulton County Standard Specifications for Water Main Construction.

2. Ball Valves (BLV):

a. Ball valves shall have a single piece bronze body construction. Valves shall have solder ends and lever operator. Ball shall be 316 stainless steel with TFE seats and packing. Valves shall be pressure rated for 400 psi at 68 degrees F.

b. Valves shall be Apollo Series 70-200, Watts No. B-6000, or Nibco S 580.

3. Flap Valves:

a. Provide resilient seat flap valves for gravity flow conditions as shown on the Drawings. Valve body and flap shall be cast iron in accordance with ASTM A 126, Class B. The flange shall be drilled for mounting to ASME/ANSI B16.1, Class 125 flange.

b. Resilient seat shall be wide seating Buna-N or neoprene, bonded in a groove machined into the valve body.

c. Hinge links shall be high tensile bronze conforming to ASTM B 584, Class A-865 or 304 stainless steel. Each hinge arm shall have two pivot points. A lubrication fitting shall be provided for each pivot.

d. The manufacturer shall include all necessary mounting hardware for mounting the valve to the pipe flange. All mounting hardware shall be 304 stainless steel.

e. Valve shall be manufactured by Rodney Hunt, Waterman or Hydro Gate.

4. Gate Valves and Butterfly Valves:

a. Gate Valves and Butterfly Valves shall meet the requirements of Section 02655 and Fulton County Standard Specifications for Water Main Construction.

5. Inlet/Outlet Pipe:

a. Provide a 20 inch diameter inlet/outlet pipe that extends from the base of the support structure to the tank floor elevation. Provide a minimum of 6 inch high removable silt stop where the inlet/outlet pipe enters the tank. The bottom capacity level of the tank's operating range shall be at or above the elevation of the top of the silt stop. Pipe material within the support structure shall be Schedule 10S Type 304L stainless steel. Piping below the grade slab shall be flanged cement lined ductile iron suitably restrained to prevent movement.

b. The inlet/outlet pipe shall be designed to support all related static and dynamic loads. Suitable galvanized steel brackets, guides and hangers shall be provided on the support wall and tank floor at intervals not exceeding 20 feet.

c. The inlet/outlet pipe shall be designed and constructed to accommodate any differential movement caused by settlement and by thermal expansion and contraction over the range of extreme temperature differences expected for the support wall and pipe. The required flexibility shall be provided by an expansion joint located near grade in the vertical section of pipe.

d. Provide DIP (Class 350) from water tank existing water main on Crossville Highway as shown on Drawings. Install the pipe with a 4 feet minimum cover.

6. Overflow Pipe:

a. Provide a 12 inch diameter overflow. The top of the overflow shall be located within the tank at the overflow elevation. It shall run vertically beside the central access tube and extend through the tank floor, at which point it shall turn 90° and run under the tank floor to the support wall. This horizontal run shall be sloped (0.5%) to drain. The pipe shall then turn 90° and run vertically beside the support wall to the floor slab where the overflow shall be connected to the drain piping as shown on the Drawings. A

base elbow shall direct the overflow through the support wall, where the pipe shall be terminated with a flap valve. Pipe material within the support structure shall be Type 304L (minimum 11 gauge) stainless steel. If the top of overflow is located above top capacity level, the tank shall be designed for the additional capacity provided by the difference.

b. The entrance to the overflow pipe shall be designed for the maximum inlet flow rate specified in 1.02B. The design shall be based on the water level cresting within 6 in. above the overflow elevation. A conical weir shall be provided if the entrance capacity of the overflow pipe diameter is not adequate. A vortex prevention device shall be used.

c. The overflow pipe shall be designed to support all related static and dynamic loads. Suitable galvanized steel brackets, guides and hangers shall be provided on the support wall and tank floor at intervals not exceeding 20 feet. The overflow and weir section within the tank shall be carbon steel and supported by the central access tube.

d. The overflow pipe shall be designed and constructed to accommodate any differential movement caused by settlement and by thermal expansion and contraction over the range of extreme temperature differences expected for the support wall and pipe. A layout with sufficient upper offset to accommodate differential movement is acceptable. If this method is not applicable, the required flexibility shall be provided by an expansion joint located near grade in the vertical section of pipe.

e. Provide DIP drain pipe, as shown on the drawings. Connect this pipe from the overflow discharge pipe at the tank.

M. Ventilation:

1. Tank Ventilation:

a. A tank vent shall be provided, located centrally on the tank roof above the maximum weir crest elevation. It shall consist of stainless steel or aluminum components, including a support frame, screened area and cap. The support shall be fastened to a flanged opening in the tank roof. The vent cap shall be provided with sufficient overhang to prevent the entrance of wind driven debris and precipitation. A minimum of 4 inches shall be provided between the roof surface and the vent cap.

b. The tank vent shall have an intake and relief capacity sized to prevent excessive pressure differential during the maximum flow rate of water, either entering or leaving the tank. The overflow pipe will not be considered as a vent. The maximum flow rate of water entering the tank is specified in 1.02B. The maximum flow rate of water exiting the tank shall be calculated assuming a break in the inlet/outlet at grade when the tank is full. The vent shall be provided with an insect screen. Vent capacity shall be determined based on open area provided by the screen.

c. In addition to the tank vent, a pressure/vacuum relief mechanism shall be provided that will operate in the event of vent failure. The mechanism shall be designed to return automatically to its original position after operation. The pressure/vacuum relief mechanism shall be located on the tank roof above the maximum weir crest elevation, and it may be incorporated in the vent assembly.

2. Support Structure Ventilation:

a. Ventilation within the support structure shall comply with the governing building code requirements, based on occupancy classification. As a minimum, one louvered vent shall be provided at the top of the support wall. This vent shall be accessible from the upper platform and may also be designed to provide access to the exterior rigging rails located at the tank/support wall intersection. Vents shall be accessible from the interior ladders, platforms or floors provided. Vents shall be stainless steel or aluminum and provided with a removable insect screen.

N. Interior Floors:

1. Slab on Grade - Provide a minimum 6-inch thick 3500 psi concrete floor slab in the base of the support structure. The slab shall be designed by the Design/Build Engineer. The slab shall be supported on compacted granular fill and shall be reinforced with reinforcing steel as recommended by the design engineer. Provide ½-inch expansion joint between floor slab and support wall and at pipes and supports that extend through the floor. Place cap strip and sealant over the expansion joint. The slab shall be sloped at 0.5% toward the truck door for drainage.

2. Future Structural Floor - Make provisions in the analysis, design, and detailing of the support structure for one future structural floor with a minimum uniform live load of 125 psf. The future structural floor shall be a clear span design supported entirely by the concrete support wall. Adequate beam supports shall be provided in the support wall at the time of the support structure construction for a finished floor elevation 16 feet above the grade slab.

O. Level Monitoring:

1. General - Provide three ¾-inch couplings welded to the inlet/outlet pipe 5 feet above grade. Each coupling shall be provided with a stainless steel nipple and an isolation gate valve.

2. Pressure Gauge - Provide a pressure gauge in accordance with ASME B40.1 Grade 2A. The dial shall be 4 1/2 inch diameter with black markings on white background. Pressure range is 0-100 psi.

3. Provide one capacitance type level switch for sensing “full” tank condition to connect to pump control system in pumping station constructed by others. (Cost of connecting to be paid under allowance item).

a. Level Switch – Capacitance

1. Type: Capacitance/RF admittance type with high frequency radio circuitry to minimize the effect of media build-up.
2. Probe: Rigid, 316 stainless steel construction/PTFE insulation.
3. Mounting: Provide 316 stainless steel mounting bracket per manufacturer's recommendation.
4. Output: One switch output with SPDT contacts rated at 5 Amps, 120 VAC.
5. Power: 120 VAC, 60 Hz.
6. Enclosure: Enclosure for probe and electronics shall be NEMA 4. Unit shall be suitable for mounting in non-hazardous or hazardous area.
7. Acceptable Manufacturers: Drexelbrook Z-tron.

P. Lightning Protection:

1. Provide a lightning protection system for the elevated tank structure and any roof mounted equipment that may be damaged by lightning. Install the system in accordance with NFPA 780 with materials that meet UL96 and UL96a.
2. Minimum requirements include two 28 strand by 14 gauge copper conductors bonded to the steel tank 180 degrees apart. The conductors shall be fastened to the interior support wall at 3 foot minimum spacing, and shall terminate with buried 5/8-inch diameter by 8 foot long copper clad ground rods.

3. Lightning protection for obstruction lights shall consist of an air terminal mounted on the support and formed to fit around the fixture. The ½-inch diameter copper air terminal shall extend a minimum of 10 inches above the light fixture and shall connect to a copper conductor that terminates in a bonding plate secured to the tank roof.

2.06 Electrical and Lighting

A. General: All work shall be performed and all materials shall be provided in accordance with National Electric Code and the governing electrical, safety and inspection codes, regulations and ordinances.

B Materials:

1. Interior Lights - Fixtures shall be enclosed and gasketed, metal halide type with aluminum body, clear glass globe and guard. Aluminum mounting hardware and brackets shall be provided to suit the installation.

2. Exterior Door Lights - Fixtures shall be enclosed and gasketed, 100-watt high pressure sodium wall mount type with aluminum base housing, polycarbonate cover, prismatic refractor, internal reflector and low temperature ballast. Fixture shall be vandal resistant and provided with a photo control.

3. Conduit - Exposed interior conduit shall be galvanized rigid steel, supported by galvanized hardware. Exposed exterior conduit shall be PVC coated galvanized rigid steel, supported by PVC coated hardware

with stainless steel fasteners. Underground conduit shall be Schedule 40 PVC. Minimum conduit size is ¾-inch.

4. Fittings and Boxes - Boxes, fittings and device plates shall be galvanized. Exterior applications shall be waterproof.

5. Enclosures - Load centers, power distribution panels, lighting panels, and enclosed switches shall be in Type 1 or NEMA 1 enclosures for interior applications and Type 3R or NEMA 3R for exterior applications. Exterior enclosures shall be lockable. Finish shall be galvanized or baked on enamel.

6. Receptacles - Standard convenience outlets shall be heavy duty, 3-wire duplex receptacles.

C. Lighting and Receptacles:

1. Interior Base - Incandescent light fixtures shall be provided 10 feet above the slab on grade at equal intervals along the support wall that do not exceed 30 feet. These lights shall be controlled by a single switch located 3 feet 6 inches above the slab on the interior wall, adjacent to the open side of the access door. One convenience outlet shall be provided adjacent to the power distribution panel.

2. Interior Ladder/Landing - Incandescent light fixtures shall be provided adjacent to the access ladder on the support wall at intervals that do not exceed 25 feet. The lower light shall be placed 10 feet above the floor slab and may be accommodated by a base light if it is located within 5 ft. of the ladder. The upper ladder light shall be placed above the upper platform. A light shall be provided 8 feet above any intermediate platforms. Lights shall be provided at the top and bottom of the interior access tube. These lights shall be controlled by a single switch located 3 feet 6 inches above the slab at the base of the ladder.

   a. Provide convenience outlets at the upper landing elevation and at the top of the access tube interior.

3. Exterior Door - A high pressure sodium light fixture shall be provided above the personnel access door and on both sides of the vehicle overhead door. These lights shall be controlled by a single switch located 3 feet 6 inches above the floor slab on the interior wall, adjacent to the open side of the access door.

D. Power Distribution: Provide a lighting panel mounted on the support wall interior. The panel shall be a 120/240 volt, single phase, with 12-circuit capacity and a 100A main circuit breaker.

E. Obstruction Lighting:

1. Obstruction lighting shall be provided in accordance with FAA standards.

2. The obstruction light shall be centrally located on the roof of the tank above all permanent installations. It shall be a steady burning, dual fixture type with a lamp-out relay switch. The fixture shall be weather sealed, corrosion resistant, with aluminum base and housing. Red globes with 116-watt clear traffic signal lamps rated at 8000 hour life

shall be provided. A pilot light located near the electrical panel shall be provided to indicate when the primary bulb has failed. Provide a photo electric controller.

F. Miscellaneous: Provide two 1-1/2 inch conduits for future exterior lighting that extend from the lighting panel through the slab on grade to a point 6 inches outside the foundation or support wall. Cap the ends.

2.07 Steel Tank Painting

General: All exposed interior and exterior surfaces of the steel tank including accessories and appurtenances shall be painted in accordance with the requirements of Section 09900 of these Specifications. Galvanized, stainless steel and concrete surfaces are not coated.

2.08 Source Quality Control

A. Tests: Review mill test certifications of all steel plate, structural components and reinforcement to ensure compliance with specification requirements.

B. Inspections: Provide inspection of shop fabricated components in accordance with AWWA D100.

2.09 Identification Plate

A. Provide a tank identification plate attached to the pier at the base of the tank. The plate shall be of a durable, weatherproof, rustproof metal with the following information stamped on it:

1. Tank Contractor:

2. Date Tank Completed:

3. Tank Capacity, gallons:

4. Tank Overflow Elevation, feet:

5. Tank Height Above Foundation to Overflow, feet:

2.10 Cathodic Protection Materials

A. The cathodic protection system shall be provided by a specialty subcontractor approved by the Owner and paid for under the cash allowance established in the Bid documents.

B. Anodes: Anodes shall be composed of high silicon cast iron with minimum dimensions of 1.125-inches diameter and 9-inches long. Electrical connection to the cable shall be made using a copper or brass compression nut. Cable penetrations to the anode shall be sealed by using a 100 percent solid electrical epoxy compound which is impervious to moisture penetration.

C. Hand Hole Covers: Hand hole gaskets shall be neoprene rubber and be a minimum 0.125-inch thick. The cover plate shall be 0.25-inch thick steel, coated in accordance with the specifications for the exterior surface of the tanks. The finish color shall match the color of the surrounding area.

Part 3 Execution

3.01 Examination

A. Foundation Excavation: The foundation bearing surface and excavation shall be inspected by a representative of the geotechnical engineer prior to foundation construction. Verification of the applicable design and construction recommendations is required. The geotechnical engineer shall be retained by the Contractor.

B. Environmental Conditions: Prior to performing any work, verify the expected temperature, humidity and weather conditions are within the specified limitations for executing the work.

C. Elevated Tank Components: After completion of each major component and prior to proceeding with the next stage of construction, verify that tolerance inspections and material quality control tests conform to the requirements of 3.06.

3.02 Reinforced Concrete Construction

A. Reinforcement:

1. Fabrication, placement, development and splicing of reinforcement shall be in accordance with ACI 318 and ACI 117.

B. Formwork:

1. Formwork design, installation and removal shall comply with the minimum requirements of ACI 318 and ACI 117 and with the applicable requirements of ACI 347.

2. Forming systems shall be designed with the provision of ties and bracing such that concrete components conform to the correct dimensions, shape, alignment and elevation without leakage of mortar. Formwork systems shall be designed to safely support all loading conditions. Embedded items shall be properly positioned and secured. Form surfaces shall be cleaned of foreign materials and coated with a release agent prior to placing reinforcement.

C. Concrete:

1. Concrete proportioning, production, placement, quality control and curing procedures shall comply with ACI 318 and ACI 117. Concrete shall satisfy the specific structural, durability and architectural requirements of the completed components.

2. Proportioning - The proportions of materials for concrete shall be established to provide adequate workability and proper consistency to permit concrete to be worked readily into the forms and around reinforcement without excessive segregation or bleeding. Unless otherwise specified, concrete without high range water reducer shall be

proportioned to produce concrete slumps at the point of placement between 2 and 4 inches. If high range water reducer is used, concrete slump prior to addition shall be 3 to 4 inches. The slump, after addition of high range water reducer, shall be a maximum of 9 inches. Air shall be entrained to provide concrete with 3.5% to 6.5% air content.

3. Production - Concrete that arrives at the project with slump below that suitable for placing, may have water added within the limits of the maximum permissible water-cement ratio. Maximum slump shall not be exceeded. The water shall be incorporated by additional mixing equal to at least half of the total mixing time required. For concrete with site-administered high range water reducer, the preplasticized minimum slump requirement shall be attained as permissible by addition of water and mixing prior to the addition of the water reducer.

4. Placement - Prior to concrete placement, all snow, ice, water or other foreign material shall be removed from the spaces that the concrete will occupy. Concrete shall be deposited in its final position in accordance with ACI 318. Drop chutes or tremies shall be used in walls and columns to prevent free-fall of the concrete over 5 feet and to allow the concrete to be placed through the cage of reinforcing steel. These shall be moved at short intervals to prevent stacking of concrete.

5. All concrete shall be consolidated by vibration so that the concrete is thoroughly worked into the corners of forms and around the reinforcement and embedded items to eliminate all air or stone pockets which may cause honeycombing, pitting, or planes of weakness. Internal vibrators shall be the largest practical size that can be used in the work and they shall be operated by competent workmen.

D. Weather:

1. Concrete shall not be placed during precipitation or extreme temperatures unless protection is provided.

2. During cold weather the recommendations of ACI 306 shall be followed.

3. During hot weather the recommendations of ACI 305 shall be followed.

3.03 Foundation

A. Excavation: Grade the site to prevent runoff from entering the excavation.

B Concrete Construction: The sides of foundations shall be formed using any suitable system conforming to ACI 318. Earth cuts shall not be used as forms for vertical surfaces. Forms shall be provided on top sloping surfaces steeper than 2.5 horizontal to 1 vertical. Straight form panels may be used to form circular foundation shapes. The minimum design radius shall be maintained at all sections.

C. Finish:

1. Formed surfaces shall have a smooth form finish when exposed and a rough form finish when not exposed.

2. Unformed surfaces shall have a troweled finish when exposed and floated finish when not exposed.

3.04 Concrete Support Structure

A. Architectural Concrete Construction:

1. The exposed exterior surface of the concrete support wall is designated architectural concrete. The concrete and formwork requirements of this section shall be strictly enforced to ensure concrete of the highest practicable structural and architectural standards. Formwork design, installation and removal shall comply with the minimum requirements of ACI 318, ACI 117 and the applicable requirements of ACI 347, except as modified by this Section.

2. Attention shall be given to ensure the same concrete design mix is used throughout the support wall. The proportion, type and source of cement and aggregates shall not be changed. Uniform moisture content and placing consistency shall be maintained.

3. All wall concrete shall be placed vertically and directly inside the reinforcement cage with drop chutes to prevent form splatter and the resulting surface finish variations. Placement methods that introduce concrete horizontally through wall reinforcement are strictly prohibited. Vertical pour rate shall be a minimum of 15 feet per hour.

4. Support wall reinforcement shall be installed with plastic supports. Maximum spacing of supports for welded wire fabric shall be 5 foot centers, horizontal and vertically. Forming systems shall be designed with the provision of ties and bracing such that concrete components conform to the correct dimensions, shape, alignment and elevation. Embedded items shall be properly positioned and secured. Form surfaces shall be thoroughly cleaned of concrete residue and coated with a release agent prior to placing reinforcement. Do not allow excessive release agent to accumulate on the form surface. Steel forms shall be coated with a non-staining, rust preventative form oil or otherwise protected. Rust stained steel formwork shall not be used.

5. The forming system for the pedestal wall shall be fully engineered and detailed with procedures to meet the increased demands of architectural concrete. The support wall shall be constructed with a jump form process using form segments prefabricated to match the wall curvature. Concrete pour height shall be a minimum of 6 feet and a maximum of 12 feet. Form panels shall extend the full height of the concrete pour using only vertical panel joints. Form system shall be designed to lap and be secured to the previous wall pour. The space between the form and the previous pour shall be sealed to prevent grout leakage. Form system shall incorporate a positive means of adjustment to maintain dimensional tolerances specified in 3.04C. Wall forms shall be adjusted for vertical plumb and circularity and secured using through wall form bolts prior to concrete placement. Panels shall be designed for lateral pressures associated with full height plastic concrete head, and support and bracing shall be provided for construction related impact loads and wind loads. Working platforms that allow safe access for inspection and

concrete placement shall be provided. Form facing material shall be metal, or plywood faced with plastic or fiberglass.

6. The form system shall incorporate a uniform pattern of vertical and horizontal rustications to provide architectural relief to the exterior wall surface. Rustication strips shall be sealed to the form face to eliminate the grout leakage that results in broken corners, color variations,a nd rock pockets. Broken edges and chamfers shall not be accepted. All construction joints and panel joints shall be located in rustications. Vertical panel joints shall be sealed using closures which combine with the form pattern to prevent grout leakage and panel joint lines. The vertical and horizontal rustications shall be proportioned and combined to impart a symmetrical architectural pattern to the completed structure. Form ties shall be located in a uniform pattern. No architectural form treatment is required on the interior surface.

7. Support wall concreting shall incorporate segmented placement procedures. Temporary vertical bulkheads shall divide the wall pour into segments corresponding to a single batch (truckload) of concrete. The bulkheads shall be located at rustications, braced rigid and tight to maintain vertical alignment under concrete load without grout leakage. Wall segment concrete shall be placed continuously to full form height from a single load. Placement from multiple batches is not permitted. Temporary bulkheads shall not be removed until adjacent concrete is placed. Support wall concreting operations shall occur a maximum of once per day. Multiple form movements and concrete placements within a day are not permitted.

8. Wall forms shall not be disturbed or removed until the concrete has attained sufficient strength to prevent forming operations or environmental loads from causing surface damage or excessive stress. Form removal shall be based on early age concrete strength testing. The minimum concrete strength shall be established by the Contractor, based on an analysis of stress at critical stages throughout the forming and concrete operations. Early age concrete testing shall be in accordance with ACI 228.1R-95. Pull Out testing in accordance with ASTM C 1074-93, or field cured cylinders compressive strength tested in accordance with ASTM C 172 are the acceptable methods to determine early concrete strength. Support wall concreting operations shall occur a maximum of once per day. Multiple form movements and concrete placements within a day are not permitted.

9. The formwork system for the domed structural floor shall be designed to support all construction loads. Adequate shoring and bracing shall be provided to transfer loads without appreciable movements. Form surfaces shall be steel, plastic or fiberglass coated material. Shoring and forms for the structural dome slab shall remain in place until the concrete has gained sufficient strength to carry the floor weight without damaging deflections.

10. Concrete surfaces shall be protected in accordance with the recommendations of ACI 306 until the component attains 35% of the specified compressive strength. At this time, protection may be removed subject to the allowable temperature differential. A reasonable temperature differential shall be defined, based on component thickness and restraint conditions.

B. Finish:

1. Provide a smooth form finish without rub for the interior and exterior support wall. Tie holes shall be plugged using grout on the interior and manufactured plugs on the exterior which match the color of the cured concrete as closely as possible. Provide a light sandblast to the exposed exterior concrete support wall surface.

2. Provide a smooth form finish without rub for the interior dome slab. The unformed surface shall have a floated finish.

C. Dimensional Tolerances: Support structure concrete construction shall conform to the following:

Variation in thickness:
wall -3.0% to +5.0%
dome -6.0% to +10%

Support wall variation from plumb:
in any 5 feet of height 3/8 inch
in any 50 feet of height 1-1/2 inch
maximum in total height 3 inches

Support wall diameter variation 0.4%
not to exceed 3 inches

Dome floor radius variation 1.0%

Level alignment variation:
from specified elevation 1 inch
from horizontal plane 1/2 inch

D Mock Up Panel

A mock up panel shall be constructed using the proposed form work, concrete and placement methods. Minimum size will be 4 ft wide by 6 ft high. This panel shall be agreed upon by the Contractor and Engineer as the reference standard with which to judge surface quality, appearance and uniformity of texture and color.

Review and acceptance of formed concrete surface must be made immediately upon form removal. Succeeding pours shall not be placed until the most recent wall pour has been stripped and the form surface approved. The Contractor shall be responsible to inform the Engineer as to pour schedule. The Engineer shall not delay the Contractor by lack of attendance. Non-attendance by the Engineer will be understood by the Contractor to mean acceptance of the lift by the Engineer.

Concrete with surface defects exceeding limitations specified herein or not meeting the standard represented by the mock-up panel shall be repaired to meet that standard, or removed.

3.05 Steel Tank

A. Welding:

1. Welding procedures and general welding requirements shall be in accordance with AWWA D100, Section 8, "Welding".

2. No structural welding is permitted to any steel embedded in hardened concrete, unless the weld is at least 2 ft. from the embedment interface.

3. Grinding of weld contour shall approximate Condition "D" of NACE Standard RP0178.

4. All plates except roof plates six vertical inches above the overflow level shall be butt welded. In lieu of butt welding, roof plates six vertical inches above the overflow level may be lap welded with a full fillet weld on the outside and at least a seal weld on the inside.

5. Tanks with rafter supported roofs shall have the roof plates fitted to the rafter and seal welded on all edges or supported above the rafters with brackets of sufficient dimension to permit cleaning and painting the facing surfaces of the rafter and roof plates. The supporting brackets shall be seal welded all around against both the rafter and roof plates.

6. All structural members, connections, attachments, permanent clips or other items joined to the tank or riser, inside or outside, or to the outside of the tower shall be continuously welded all around.

7. The design and fabrication details of all ladders and the balcony shall ensure that all metal to metal surfaces are sealed by the weld.

B. Fabrication:

1. Layout, cutting, forming, edge preparation and workmanship for steel tank components and fabrications shall be in accordance with AWWA D100, Section 9, "Shop Fabrication".

C. Tank Erection:

1. Steel tank erection procedures and general requirements shall be in accordance with AWWA D100, Section 10, "Erection".

D. Tolerances:

1. Steel tank tolerances shall be in accordance with the requirements of API 650, Section 5.5.

2. Steel cone shall be constructed to the following tolerance. The deviation from the theoretical conical surface shall not exceed $0.032\sqrt{RT}$, when measured in the radial direction over length $4\sqrt{RT}$, where R is the radius normal to the plate surface at the point of consideration, and T is the plate thickness.

E. Grouting: The interface between the steel tank floor plate and the supporting structural concrete slab shall be constructed with a minimum 1 in. void. Subsequent to testing, the void shall be filled with a flowable grout mix.

3.06 Field Quality Control

A. Soils and Foundation Testing:

1. Soils tests shall be conducted during construction to verify soil bearing valves. Drilled piers shall be individually inspected and approved by a qualified geotechnical engineer prior to concrete placement. A minimum load test shall be conducted on a minimum of one pier for each structure.

B Concrete Testing and Inspection:

1. The evaluation and acceptance of concrete shall be in accordance with Section 5.6 of ACI 318 and ACI 117, except as modified in this Section.

2. Three cylinders shall be made from each sample required. A 7-day compressive strength test shall be used to supplement the 28 day tests.

3. Slump, air and compressive cylinder testing shall be performed by an independent laboratory. The Contractor shall retain the independent laboratory and provide the Owner with copies of all test results.

4. The support wall radius, plumb and thickness shall be verified for each concrete lift at 45 degree intervals. An inspection report certified by the tank designer shall be provided to the Owner at project completion.

C. Steel Tank Testing & Inspection:

1. Inspection procedures for the steel tank shall be as required by AWWA D100, Section 11, "Inspection". Radiographic inspection of full penetration butt-welded joints shall be made by an independent inspection company retained by the Contractor.

2. Erection tolerance of the steel cone in the radial direction shall be measured. Provide field measurements at 30 degree intervals.

3. Weld joints of plate over the structural concrete floor shall be tested for leaks.

D. Contractor remains responsible for cost of all soils and materials testing and inspections required by the Specifications. Cash allowances established in the Bid for soils and concrete testing are to be used for independent quality control testing to be performed at the Owners discretion.

3.07 Disinfection

A. Upon completion of all work, the Contractor shall disinfect the tank before placing in service. The Contractor shall furnish all the necessary materials, equipment and labor required to accomplish the disinfection. Disinfection shall be done in accordance with the requirements of AWWA C652 “Disinfection of Water Storage Facilities” and the regulations of the State of Georgia.

B. Disposal of Chlorinated Water: Reduce chlorine residual of disinfection water to less than one milligram per liter if discharged directly to a body of water or to less than two milligrams per liter if discharged onto the ground prior to disposal. Treat water with sulfur dioxide or other reducing chemicals to neutralize chlorine

residual. Flush tank lines until residual is equal to that in the existing water system.

3.08 Bacteriological Sampling and Testing

A. After the disinfection procedure is completed, and before the storage facility is placed in service, water from the full facility shall be sampled and tested for bacteriological quality in accordance with the regulations of the State of Georgia. The testing method used shall be either the multiple- tube fermentation technique or the membrane-filter technique. Samples shall be analyzed by an independent laboratory certified by the State of Georgia. Re-chlorinate the tank until required results are obtained.

B. The water in the full facility should also be tested to assure that no offensive odor exists due to chlorine reactions or excess chlorine residual.

C. If the test for coliform organisms is negative, then the storage facility may be placed in service. If the test shows the presence of coliform bacteria, the situation shall be evaluated by the Owner. Repeat samples shall be taken until two consecutive samples are negative, or the storage facility shall again be subjected to disinfection.

D. All costs associated with disinfection and testing, including repeat testing and disinfection as may be required, shall be performed by the Contractor at no additional cost to the Owner.

3.09 Record of Compliance

The record of compliance shall be the bacteriological test results certifying that the water held in the facility is free from bacteria contamination.

3.10 Clean-Up

Before the Project is considered complete, all rubbish and unused material due to or connected with the construction must be removed from the premises and disposed of in a manner satisfactory to the Owner. Any private or public property disturbed or damaged shall be restored to former condition and final payment withheld until such work is finished.

END OF SECTION

Appendix A

Golder Associates Geotechnical Report

Golder Associates Inc.
3730 Chamblee Tucker Road
Atlanta, GA USA 30341
Telephone (770) 496-1893
Fax (770) 934-9476

November 15, 2007

Our Ref.: 073-90270

Khafra Engineering Consultants, Inc.
230 Peachtree Street NW, Suite 200
Atlanta, Georgia 30303

Attention: Mr. Michael Leung

RE: REPORT ON THE GEOTECHNICAL EXPLORATION AND RECOMMENDATIONS FOR TWO ELEVATED WATER STORAGE TANKS ON HACKETT ROAD ROSWELL, FULTON COUNTY, GEORGIA

Dear Mr. Leung:

Golder Associates Inc. (Golder) is pleased to present to Khafra Engineering Consultants, Inc. (Khafra) our report summarizing our geotechnical exploration and recommendations for the proposed Fulton County Department of Public Works elevated water storage tanks on Hackett Road in Roswell, Fulton County, Georgia. This report presents our understanding of the project, scope of services, testing program, our findings regarding the subsurface conditions, and our recommendations and conclusions. The work was completed in accordance with our proposal P7390270, dated September 20, 2007 and executed on September 22, 2007.

Please contact the undersigned at (770) 496-1893 if you have any questions regarding the information presented herein.

Sincerely,

GOLDER ASSOCIATES INC.

Anthony Sak, P.E.
Senior Geotechnical Engineer

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APPENDICES

1.0 INTRODUCTION

Golder Associates Inc. (Golder), under contract to Khafra Engineering Consultants, Inc. (Khafra), has completed a geotechnical subsurface exploration for the proposed Fulton County Department of Public Works elevated water storage tanks on Hackett Road in Roswell, Fulton County, Georgia. A vicinity map of the site location is shown on Figure 1. The objective of this exploration was to evaluate the general subsurface conditions within the project area and evaluate these conditions as they relate to foundation design and construction. This report discusses our understanding of the project, describes our exploratory procedures, presents our findings related to the subsurface stratigraphy, and presents our conclusions and recommendations.

1.1 Project Information

Our understanding of the project is based on email and telephone conversations with Mr. Michael Leung of Khafra and the documents and drawing included in the document "Geotechnical Investigation for North Fulton Composite Elevated Water Storage Tanks, Roswell, Fulton County, Georgia".

The proposed construction consists of two, 2-million gallon composite elevated water storage tanks, each supported by a single pedestal column resting on a 52-foot diameter ring wall on a shallow spread footing. We understand that these specifications are subject to change depending on the design chosen by the vendor.

The site occupies 1.29 acres of undeveloped land behind a commercial shopping center. Ground surface elevations vary from 1,162 to 1,178 ft above mean sea level. Surface vegetation consists of large trees and brush.

2.0 EXPLORATORY PROCEDURES

2.1 Subsurface Drilling Exploration

Six soil test borings were drilled at the approximate locations shown on the Boring Location Plan, Figure 2. The proposed center of the tanks was staked by others in the field prior to our mobilization. Drilling and sampling activities were supervised by a Golder engineer on a full-time basis.

Borings were advanced by a drilling contractor under contract to Golder using hollow stem augers (2.25 inch I.D.). At the north tank, four of four planned borings were advanced to a depth of 30 to 61 feet below the existing ground surface (BGS). One boring was advanced to auger refusal at 61 ft-BGS. At the south tank, two borings were advanced to auger refusal depth of 45 and 49 ft-BGS. Standard Penetration Tests (SPTs), generally following ASTM D 1586, were conducted continuously in the top 10 feet and at 5-foot intervals thereafter until boring termination or auger refusal was reached. Penetration resistance values ("N" values) were recorded to assess the consistency and/or relative density of in-situ soils. Representative soil samples were collected from the split-spoon samplers for field identification. The Unified Soil Classification System (USCS) was used for classification of the subsurface soils. The ground surface elevations were measured at each borehole location referencing site benchmark #2, as shown on Figure 2.

Soil and rock descriptions, SPT N-values, and groundwater levels are included on the Soil Test Boring Records in Appendix A. These records represent our interpretation of the field conditions as logged by the Golder representative during drilling and sampling.

2.2 LABORATORY TESTING PROGRAM

Representative split spoon soil and bulk auger samples were selected for laboratory testing. The laboratory-testing program included the following tests performed to the indicated standard. All laboratory data is presented in Appendix B.

- Particle-size Distribution of Soils - ASTM D-422;
- Moisture Content – ASTM D2216;
- Atterberg Limits – ASTM D4318; and
- Moisture-density Relation (standard effort) - ASTM D-698.

3.0 GENERAL SITE AND SUBSURFACE STRATIGRAPHY

3.1 Area and Site Geology

The project site is located within the Piedmont Physiographic Province. The following paragraphs give a brief description of the characteristic soil and bedrock conditions and groundwater levels in this region based on published literature and Golder's experience.

3.1.1 Soil and Bedrock Conditions

The Piedmont Physiographic Province is composed of crystalline rocks that are locally weathered into residual soils which have anisotropic and non-homogeneous engineering properties. Residual soils transition to rock at various depths below the surface. The boundary between soil and rock is typically not sharply defined. A transitional zone, locally known as partially-weathered rock (PWR) is commonly found overlying bedrock, which when loosened produces silty sands and sandy silts. These materials are strong, incompressible, and slow draining when compacted. PWR is locally defined as being able to be drilled by conventional hollow stem augers but having a standard penetration resistance (N-value) greater than 100 blows per foot (bpf). The depth to PWR and rock can vary rapidly over short distances due to variations in weathering of the parent rock. Lenses or boulders of hard rock and zones of PWR may be present in the soil above the general bedrock level. Residual soils typically grade from low-plastic, clayey soils near the surface where the soil is completely weathered to sandy silts and silty sands that generally become more dense / stiff with depth to the top of rock. The clay minerals in Piedmont soils are generally kaolin and gibbsite.

3.1.2 Groundwater Conditions

Groundwater levels are irregular in the Piedmont area. The phreatic surface is largely dependent on the topography and is generally parallel to the ground surface. It can exhibit some distortions due to anisotropic permeability and can fluctuate several feet with seasonal rainfall. In the partially weathered zone, groundwater is usually continuous. Localized zones of higher or lower pressure other than static conditions may exist due to impervious unweathered layers and pervious fractured zones.

3.2 General Site Stratigraphy

In general the soils encountered in the current borings consisted of a layer of residual soils underlain by PWR and bedrock materials. The following paragraphs summarize the subsurface materials encountered at the site. Figure 3 provides a geologic profile of the conditions encountered and detailed information is provided on the boring logs in Appendix A.

Fill Soils: Fill soils are typically derived from the upper residual soil zones, generally clayey silts, sandy silts, or silty sands. Fills often contain gravel or cobble-sized rock fragments, and occasionally manmade rubble or trash. The strength and compressibility of fill soils are highly dependent on the composition of the material, the moisture content, and the compactive effort applied at the time of placement. Standard Penetration Test (SPT) values in the fill ranged between 13 to 41 blows per foot (bpf), indicative of wide variations in density, strength and compressibility. The zone of fill materials encountered on the site varies from approximately 7 feet thick at the south tank location and ranging from 0 to approximately 12 feet thick across the proposed north tank location.

Residual and Saprolitic Soils: Residual soils are formed by in-place weathering of parent rocks. Saprolitic soils are a subclass of residual soils that have maintained the relict structures of the parent rock. Residual and saprolitic soils were encountered in all borings. The residual soils generally consist of compact micaceous silty sand (SM), and firm to stiff micaceous, silty clay (CL) or clayey silt (ML). The SPT values of the residual soils and saprolite ranged from 14 to 86 bpf and generally increased with depth.

Partially Weathered Rock: PWR was encountered in two of the four north tank boreholes (north and east boreholes) and in both boreholes at the south tank location. At the north tank location, thin lenses (approximately 1 to 2 feet) of PWR were encountered at depths of approximately 5 and 24 ft-BGS. These lenses were underlain by residual and saprolitic soils. Competent PWR , interpreted to overly the parent bedrock was encountered at depths of approximately 58 ft-BGS at the north tank location and 38 to 43 ft-BGS at the south tank. The thickness of PWR ranged from approximately 3 feet at the north tank and 2 to 11 feet at the south tank.

Refusal Material: Refusal is a designation applied to any material which cannot be further penetrated by the soil drilling process and is normally indicative of a very hard or dense material, such as boulders, rock lenses, or the upper surface of massive rock. Refusal to the soil drilling process was encountered at a depth of 61 ft-BGS in one borehole at the north tank and in both borings at depths

ranging from 45 to 49 ft-BGS. Due to the general increase in penetration resistance with depth of borings, the bedrock material was not cored.

Groundwater: Groundwater was encountered during drilling at approximately 49 ft-BGS at the north tank and between 32 and 43 ft-BGS at the south tank. Where possible, 24-hour depth to groundwater or borehole collapse measurements were taken

4.0 EVALUATIONS AND RECOMMENDATIONS

The conclusions and recommendations presented in the following sections of this report are based on the results obtained from the soil test borings, site observations, engineering evaluations, and the general geotechnical experience of Golder Associates Inc. It is possible that conditions may be encountered during construction that are substantially different from those indicated by the soil test borings. Subsurface conditions in uninvestigated locations may vary significantly from those at the specific locations investigated.

Project details, such as site grading, dead and live loads, type and size of proposed water tank have not been provided to Golder. We have assumed that the proposed tank will be founded near the existing ground surface elevations. As the design and site plan are further refined, Golder requests to be advised of changes to the present concepts which form the basis for this report. Recommendations could then be modified, if necessary, to suit the new design requirements.

Recommendations have been grouped by construction method into the following categories that are discussed in the following subsections:

1. Seismic Site Class;
2. Shallow Foundations;
3. Deep Foundations;
4. Ground Anchors;
5. Excavation Considerations;
6. At-Grade Construction; and
7. Lateral Earth Pressure Parameters.

4.1 Seismic Site Class

IBC 2006 provides 6 Site Class Definitions in Table 1613.5.2 that range from hard rock (A) to potentially unstable soil (F). Each Site Class definition is described by the average shear wave velocity, standard penetration resistance, or soil undrained shear strength in the top 100 feet of the site subsurface profile. The shear wave velocity is related to the site column shear modulus whereas the standard penetration resistance and undrained shear strength can be empirically related to the shear wave velocity.

The following Site Class Definition was based on the 6 soil test borings completed in the current study. The borings generally encountered stiff to dense residual soils to a depth varying from

approximately 45 to 60 ft-BGS. Standard penetration resistances in these soils were typically between 14 and 100+ bpf. Based on the subsurface conditions encountered and the typical increase in penetration resistance encountered in the local geologic region, the average penetration resistance for the 100-foot thick soil profile is greater than 50 bpf. Therefore, the site class according to IBC 2006 Table 1613.5.2 is "C". The likelihood of slope instability, liquefaction, and surface rupture due to faulting or lateral spreading during a seismic event is considered low for this site due to relatively flat topography, depth of groundwater and relative density / consistency of the materials encountered.

4.2 Shallow Foundations

A shallow foundation system consisting of an approximately 50-foot diameter ring wall is envisioned for the proposed water tanks. While the dead and live loads have not been provided for the tanks, the weight of 2 million gallons of water is approximately 8,000 tons. Assuming a 52-foot diameter, continuous structural mat foundation, we have estimated that the applied bearing pressure for the tanks is 8 to 10 ksf. The foundation soils on the site are not capable of supporting these loads without significant total and differential settlements on the order of 12 and 6 inches, respectively. Therefore, shallow foundations are not recommended for supporting the proposed tanks.

4.3 Deep Foundations

A deep foundation system is recommended for supporting the proposed tanks. The primary deep foundation types recommended for this project are drilled shafts and driven piles. Other foundation types include high-capacity micropiles and auger-cast piles. However, because the reactions under various loading conditions are unknown, it is difficult to recommend the preferred type of deep foundation system. For all deep foundations systems, we recommend that the construction be done in accordance with the current edition of the Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, Fulton County standards, or other nationally-recognized standard. All deep foundation construction should be monitored on a full-time basis by a geotechnical engineer under contract with the owner.

Drilled Shafts

Drilled shafts, particularly when socketed into rock, can develop very high compression and uplift resistance, with the added benefit of high resistance to lateral loads. Drilled shafts in the Atlanta area are readily advanced to 60 to 70 feet below the ground surface. Shaft excavation will typically need

to be dewatered and a temporary steel casing will need to support the excavation during construction. As stated above, no rock coring was advanced during our subsurface exploration. Should drilled shafts be selected for the foundation system, we recommend additional subsurface drilling to evaluate the quality (recovery and rock quality designation – RQD) of the bedrock material. Depending on the loading conditions, we recommend conducting a load test on a drilled shaft using the Osterberg method. The information from the load test can be used to optimize the shaft size and rock socket depth. For planning purposes, assuming moderately hard to hard rock with >90% core recovery and >70% RQD, a preliminary rock socket depth of 10 feet can be assumed using an allowable bearing pressure and side resistance of 100 ksf and 7 ksf, respectively. We recommend using 75% of the allowable compressive capacity for the uplift loading condition.

Driven Piles

Driven steel "H" piles are a common foundation system in the Atlanta area. Most designs for pile foundations incorporate moderate-capacity piles (in the range of 45 to 60 tons) or high-capacity piles (in the range of 80 to 100 tons). The use of either moderate or high-capacity piles depends on the load requirements and the subsurface conditions. The subsurface conditions for this site are generally suitable for support of high-capacity piles.

We estimate that an HP 14 x 89 steel H-pile can be driven to a sufficient depth into the partially weathered rock or to the top of rock to achieve a 100-ton allowable compression capacity and is recommended for this project. Hardened pile tips are recommended to permit the piles to be driven to sufficient depth into the partially weathered rock to develop this capacity. Should piles require a batter, we recommend using a slope no flatter than 1 horizontal to 3 vertical. For resisting uplift loads, we recommend an allowable uplift capacity of 25% of the allowable compressive capacity. We recommend that a pile drivability study be conducted using the contractors proposed pile driving equipment and pile type in order to confirm that the piles can be driven to the required depth / capacity. Additionally, we recommend conducting Pile Driving Analyzer (PDA) testing on the initial production piles in order to confirm that the piles are not being overstressed during driving. If PDA testing is not performed, we recommend conducting a static axial pile load test in accordance with ASTM D1143, quick method, on an initial production pile to verify the design capacity. Should larger uplift resistance be required than that stated above, an uplift load test in accordance with ASTM D3689 should be conducted. The load testing phase, as well as the installation of production

piles, should be observed by a geotechnical engineer or a qualified inspector. For production piles, the inspector's responsibility would be to confirm that each pile is driven to the established criteria (depth and/or dynamic resistance) and to confirm that equipment is operating properly.

The estimated pile tip elevation for the north and south tank is 1,112 and 1,122 ft-MSL, respectively. Variations in pile tip elevations of 5 to 10 feet should be expected. Piles may not achieve recommended tip elevations due to the presence of lenses of very dense soils or partially weathered rock in the residual soil mass, or because the residual soils provide more resistance than estimated. For this condition, predrilling may be required to achieve recommended tip elevations.

Micropiles

Micropiles are a recommended type of deep foundations for this project. A micropile is a small-diameter (typically 6 to 8 inches in diameter and not more than 12 inches), drilled and grouted pile that is typically reinforced with high strength steel and constructed in a similar manner to ground anchors. Micropiles can withstand axial and/or lateral loads, and may be considered a substitute for conventional piles for uplift load conditions. Typical allowable loads for double-corrosion protected micropile diameters of 6 and 8 inches are 36 and 48 tons, respectively, using a factor of safety equal to 2.5. As with drilled shafts, we recommend additional subsurface drilling to evaluate the quality (recovery and rock quality designation – RQD) of the bedrock material should micropiles be selected for the tank foundations. We recommend load testing the micropiles to verify the load carrying capacity.

Auger-Cast Piles

Auger-cast piles offer the advantage of placing the backfill grout as the drilling auger is removed, thereby eliminating the need for dewatering and casing as with drilled shafts. However, due to the presence of very dense soil lenses observed in several of the soil test borings, the possibility of shallow refusal of the auger-cast pile drilling equipment cannot be ruled out. Therefore, we do not recommend the use of auger-cast piles on this project.

4.4 Ground Anchors

Ground anchors can be used to resist overturning loads should the selected foundation system not have provide enough resistance. We recommend using double-corrosion protected, steel bars for the

ground anchors. Ground anchor capacities can vary significantly depending on both installation procedures and subsurface conditions. Thus, ground anchor capacities should be confirmed through load testing in the field soon after installation. We recommend additional subsurface exploration to evaluate the bedrock conditions for ground anchor design.

For ground anchor design, the allowable bond stress, using a factor of safety equal to 2.5, are:

1. 4 pounds per square inch (psi) for grout to residual soil;
2. 8 psi for grout to partially weathered rock;
3. 24 psi for grout to fractured rock; and
4. 40 psi for competent rock.

4.5 Excavation Considerations

4.5.1 Excavation Methods

Dependent on the final grading plan established for the site, excavations will most likely be required at the site for construction of the ring wall foundation. Excavations within the site may encounter existing earthfill, residual soil, and partially weathered rock. Our experience indicates that the residual material can generally be removed with conventional earth moving equipment provided that proper groundwater control is maintained, where necessary. Minor amounts of partially weathered rock can generally be removed by large front-end loaders, large hydraulic excavators, or heavy tractor drawn rippers. However, more extensive depths of partially weathered rock normally require blasting for removal. Blasting would also be required in areas where rock exists above the proposed grades. If rock is encountered above the proposed grade, we recommend that rock be excavated to at least one foot beyond the bearing elevation and a layer of compacted fill be placed in accordance with Section 4.2.3. If blasting is implemented at the site, the appropriate design considerations and cautions related to blasting should be investigated and implemented based on the encountered site conditions, local construction ordinances, and effect on nearby facilities. Site excavated blast-rock for use as fill material should be avoided.

To prevent the mixing of organic materials with soils to be used for earthwork construction, all topsoil and organic vegetation and roots should be removed through clearing and grubbing operations.

4.5.2 Groundwater Control

Groundwater control is not expected during construction. However, surface water control will be required across all site areas, and no temporary ponds should be allowed in areas to be used for foundation support. Erosion, sedimentation, and siltation controls should be provided at all times.

4.5.3 Slope Geometry

Based on the existing site conditions, we do not anticipate the need for temporary construction-related or permanent slopes for the proposed water tank. In any case, the general recommendations for slope geometry are included below.

4.5.3.1 Permanent Slopes

The geometry of cut or fill slopes should address the following aspects of slope stability:

1. Mass stability;
2. Localized geologic conditions; and
3. Long term stability to avoid surficial sloughing.

Mass stability is addressed by conventional geotechnical sampling, laboratory testing, and engineering analyses.

Localized conditions such as slickensides can result in localized instability. Common treatment is to remove affected materials and the planar slip surface, followed by backfilling to stabilize the slope. Drainage provisions are made either by the use of free draining backfill material or specific drain systems. In general, flatter design slopes will reduce the size of blocks isolated by slickensides and, therefore, the extent of the slope face affected.

For slopes in this area, degradation of soil slopes through wet-dry and freeze-thaw cycles is common. Therefore, vegetation is normally used to stabilize the surficial materials on permanent slopes.

Based on the site subsurface soils encountered, we recommend grades of 2(H):1.0(V) or flatter slope heights less than 20 feet. If soil conditions in the sloped areas do not conform to those encountered in the site investigation, additional investigation and analysis should be conducted to determine stability.

4.5.3.2 Construction Slopes

Temporary slopes may be necessary during installation of underground utilities and construction of shallow foundations. Our experience in the area indicates that temporary construction slopes should not be steeper than 1.5(H):1.0(V) or flatter for slopes less than 15 feet in height. In some locations, local flattening of slopes may be required, particularly where loose soils or discontinuities such as slickensides are encountered. Groundwater control is essential to the stability of temporary slopes extending beneath the groundwater levels. In addition, temporary drainage ditches should be provided around excavation areas to control runon and runoff water.

4.6 At-Grade Construction

We anticipate that the project will be constructed at-grade. Primary design considerations are the ability of existing soils to provide satisfactory subgrade or foundation support. These considerations are discussed in the following sections.

4.6.1 Subgrade Preparation

The first step in subgrade preparation should be the stripping of organic material, trash, rubble, and soft soils. Due to the potential presence of localized soft soils, the suitability of the exposed subgrades in all areas should be confirmed by proof rolling after the site has been stripped. The proof rolling should be done with a loaded, 20-ton tandem-wheeled dump truck, and observed by a geotechnical engineer or qualified inspector. Any soft subgrade materials detected by the proof rolling should be removed and replaced with well-compacted materials in accordance with the recommendations in Section 4.2.3 of this report.

We recommend that approved foundation subgrade be protected from inclement weather and construction activities by placing a "mud mat" of lean concrete on the approved subgrade.

4.6.2 Borrow Sources for Fill Soils

Since no site grading has been identified, we do not anticipate the need for borrow soils. If needed, residual soils from proposed cuts would be expected to provide the majority of borrow material for fills. The in-situ moisture content of the borrow soils should be compared to the range of moisture contents for which the required degree of compaction may be achieved for each soil type. Residual soils often retain water in excess of that required for compaction. Drying or wetting of the borrow

soils may be necessary before the proper density can be achieved, and should be expected to some extent. Fill soils placed at moisture contents in excess of the optimum (more than 3 percent) can exhibit greater long-term settlement than drier fills. Golder recommends that fill soils, and particularly those required for structural support at building foundations and in pavement support areas, be placed at moisture contents within 2 percentage points of the optimum moisture content. During fill placement, field density determinations should be conducted in order to verify that proper compaction is achieved. Golder recommends that a geotechnical engineer or a qualified inspector observe the fill placement and compaction operations as well as review the results of field density testing.

When soil is excavated and later compacted, it may occupy less volume than it did in its original state. This ratio of volume, called shrinkage, is expressed as a percentage of the original volume or as a shrinkage factor. In terms of unit weights, the shrinkage factor is the ratio of the in-situ dry unit weight of the borrow soils and a percentage of the maximum dry unit weight as obtained from the Standard Proctor test (ASTM D 698). A shrinkage factor below one represents a reduction in volume from the excavated conditions to the compacted condition. If the shrinkage factor exceeds one then swelling will occur and the soil in the bank condition will occupy more than one unit of volume after excavation and compaction. For this project, the shrinkage factor was not locally determined however, a typical range for shrinkage values would be 20 to 25%.

4.6.3 Fill Placement

New structural fill material, more than 3 feet below foundations and pavements, should be clean soil (free from organic matter, trash and rubble) placed in thin lifts (8 to 10 inches, loose measure), and compacted to at least 95 percent of its maximum dry density as determined by the "Standard Proctor" compaction test (ASTM Designation D 698). Moisture content during placement should be maintained within 2 percentage points of the optimum moisture content as defined by ASTM D 698.

Structural fill soils in the top three feet under structures and beneath pavements should also be clean soil placed in thin lifts, but should be compacted to 100 percent of its maximum dry density as determined by the Standard Proctor compaction test and with a compacted dry unit weight of no less than 95 pounds per cubic foot, whichever is higher.

Care must be taken during backfilling operations adjacent to the retaining walls and abutments to prevent excessive lateral earth pressure surcharge loads and accidental damage due to heavy

compaction equipment operating nearby. These walls may require temporary shoring during backfilling. The excess lateral earth pressure surcharge loads can be minimized by the use of the lightest equipment capable of achieving the recommended compaction (e.g., hand-operated pneumatic or self-driven tampers or compactors) within five feet of the structures. Golder recommends that any retaining walls and abutments be closely monitored during backfilling operations to detect any excessive lateral movements or accidental damage. Backfilling operations should be observed by a geotechnical engineer or qualified inspector.

4.6.4 Fill Settlements

Settlement of both fill/backfill and the underlying foundation soils should be expected as a result of fill placement. The amount of settlement could be several inches depending on fill height and subsurface conditions. This potential settlement should be anticipated during the design and construction sequencing. In order to reduce post-construction settlements, a waiting period may be desirable after fill placement before construction of pavements or foundations on top of the fill. The settlement could be monitored to document the rate and amount of settlement as a basis to confirm that the settlement is essentially complete. Once a final grading plan for the site has been established, it is recommended that a geotechnical engineer review the plan to provide a final recommendation.

4.7 Lateral Earth Pressure Parameters

The design of any temporary bracing system or permanent retaining wall must include the estimation of lateral earth pressures that will act on the wall. The lateral earth pressure is a function of the soil properties, surcharge loads behind the wall, and the amount of deformation that the wall or bracing system can undergo. This deformation is basically dependent upon the relative rigidity of the wall system.

Three conditions of lateral earth pressure have been analyzed in soil mechanics and are commonly used in design considerations. These considerations are the "active" earth pressure, the "at-rest" earth pressure, and the "passive" earth pressure. The active earth pressure case is employed when the anticipated movement of the retaining structure is sufficient for its development, while the at-rest pressure case is used when the movement of the structure is restricted. The passive earth pressure case is generally used to calculate passive resistance in the embedded portions of bracing systems, and in front of footings for retaining walls and are typically reduced by one-half for design purposes.

Experience in the area indicates that development of the full active earth pressure case requires a horizontal wall movement of approximately 0.3 to 0.4 percent of the wall height (i.e., approximately 1 to 1.5 inches of horizontal movement for a wall 30 feet high). Walls with limited flexibility or limited ability to rotate, such as walls founded on rock or supported on piles, should be designed for pressures between the active and at-rest case or for the full at-rest case.

The recommended parameters which follow are based on a level backfill, no friction at the wall-soil interface, and no surcharge effects. They are a starting point for more detailed analyses in which loading conditions and likely wall response are more clearly defined. A more detailed analysis should use standard design criteria which include the structural standards for construction of bracing structures and retaining walls.

Residual and New Compacted Soils: Based on the soils encountered within the project, design shear strength parameters for lateral earth pressures of ϕ' = 30 degrees (angle of internal friction) for residual soils and new compacted fills are recommended. A total unit weight of 120 pounds per cubic foot is applicable for use in wall designs. Based on these parameters, the following earth pressure coefficients and equivalent fluid pressures are calculated for residual soils:

Table 4.7.1 Lateral Earth Pressure Parameters – Residual and New-Compacted Soils

EARTH PRESSURE CONDITION	EARTH PRESSURE COEFFICIENT	RECOMMENDED EQUIVALENT FLUID UNIT WEIGHT (pcf)
Active	$K_a = 0.33$	40
At-Rest	$K_0 = 0.50$	60
Passive	$K_p = 3.00$	180

K_p is typically divided by 2 when used in design, the equivalent passive fluid pressure already incorporates this reduction.

As previously discussed in Report Section 4.2.3, compaction of backfill adjacent to the wall can create earth pressures greatly in excess of the active or at-rest condition. To minimize pressure in excess, Golder recommends the use of the lightest equipment capable of achieving the recommended compaction within five feet of the structure.

The use of highly plastic silts and clays is not recommended for backfill purposes. If these soils are encountered the use of select or other site backfill should be considered. The use of selected backfill, when judged only on the basis of reduction in earth pressure, may not be cost effective. However, when considered with the understanding that less wall movement may be required with select backfill

to reduce earth pressures to near active pressures, a significant reduction in lateral loads and overturning moments may result.

The previously listed parameters may be used to estimate the lateral earth pressures that will be developed above the groundwater table. For the design of systems below the groundwater table, the hydrostatic pressures developed by the groundwater plus the buoyancy effect on the soil must also be considered. For design below the groundwater table, the buoyant unit weight of the soil (approximately 55 pounds per cubic foot) should be used to determine the lateral earth pressures, and hydrostatic pressures should be added to these earth pressures using the unit weight of water, 62.4 pounds per cubic foot. Finally, the influence of any surcharge loads should be added to the calculated earth pressures and hydrostatic pressures to determine the total lateral stress on the temporary bracing systems and permanent walls.

To calculate resistance to sliding, an ultimate value of 0.58 should be used as the coefficient of friction between concrete foundations and site residual or structural fill soils.

5.0 SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

For your convenience, the following lists the general findings and conclusions of this report. This summary should not be used as a separate document or in lieu of reading the entire report, including the appendices.

- Three soil test borings were advanced to termination depths between 30 and 45 ft-BGS. Three soil test borings were advance to auger refusal at depths ranging from 43 to 61 ft-BGS. No rock coring was advanced in the refusal materials.

- The subsurface conditions encountered in our borings generally indicate a subsurface profile consisting of residual soils, partially weathered rock (PWR), and rock. Some man-made fill materials were encountered.

- Groundwater was encountered at depths no less than 31 ft-BGS either during drilling or in those boreholes where a 24-hour measurement was taken. Groundwater is not expected to impact the construction or operation of the proposed tanks.

- Permanent slopes at the site should be limited to grades of 2(H):1.0(V) up to 20 feet in height and should be vegetated or otherwise surface-stabilized.

- Temporary construction slopes should be limited to grades of 1.5(H):1.0(V) up to 15 feet in height, with the provision that groundwater and surface water are controlled and provided that the slopes are actively observed during construction.

- All subgrade areas should be proof rolled with a minimum of a loaded 20-ton tandem wheeled dump truck, and observed by a geotechnical engineer. Any soft subgrade materials detected should be removed and replaced or treated in-place to meet the recommendations of Section 4.2.3.

- Structural fill placement more than 3 feet below foundations should be compacted to at least 95% of the maximum standard Proctor dry density (ASTM D698) within 2 % of the optimum moisture content. Structural fill placement within 3 feet of foundations, and the upper 12 inches of residual bearing soils should be compacted to at least 100% of the maximum

standard Proctor dry density or a density of not less than 95 pcf, whichever is greater, within 2 % of the optimum moisture content.

- Fill settlements are expected to vary based on the final grading plan and should be reviewed by a geotechnical engineer before the start of construction.
- Shallow foundations will not be suitable for the support of the proposed water tanks.
- Drilled shafts, driven piles, or micropiles are recommended for support of the proposed water tanks.
- Ground anchors are recommended if the selected foundation system cannot resist overturning loads.
- Additional subsurface exploration of the bedrock material is recommended should drilled shafts, micropiles, and / or ground anchors be specified.
- The Seismic Site Class Designation is "C".
- Construction of the selected deep foundation system should be observed and documented on a full time basis by a geotechnical engineer under contract with the owner.

This report summarizes the findings of the geotechnical exploration and analysis. These evaluations were conducted without the loading conditions and final site grading plan. After the design has been finalized, we recommend that we be allowed to determine if additional exploration and / or analyses should be conducted based on the final grading, loading conditions, and site layout.

6.0 LIMITATIONS

Our evaluation of subsurface and construction conditions has been based on our understanding of the site and project information and the data obtained during our field exploration and subsequent laboratory testing and engineering analysis. The nature and extent of variations between the borings may not become evident until construction. If such variations then appear evident, it will be necessary to re-evaluate any conclusions or recommendations made herein or based on the data herein. Regardless of the thoroughness of a subsurface exploration, there is the possibility that conditions between borings will differ from those at the boring locations; that conditions are not as anticipated by the designers; or that the construction process has altered soil conditions. Therefore, experienced geotechnical engineers should observe the earthwork and deep foundation construction to verify that conditions anticipated in design actually exist.

Our professional services have been performed, our findings derived, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and standards. Golder is not responsible for the conclusions, opinions, or recommendations of others based on these data.

Our exploration and testing did not include any assessment or evaluation of environmental conditions or contamination in the soil, groundwater, or surface water.

Very truly yours,

GOLDER ASSOCIATES INC.

11/15/07

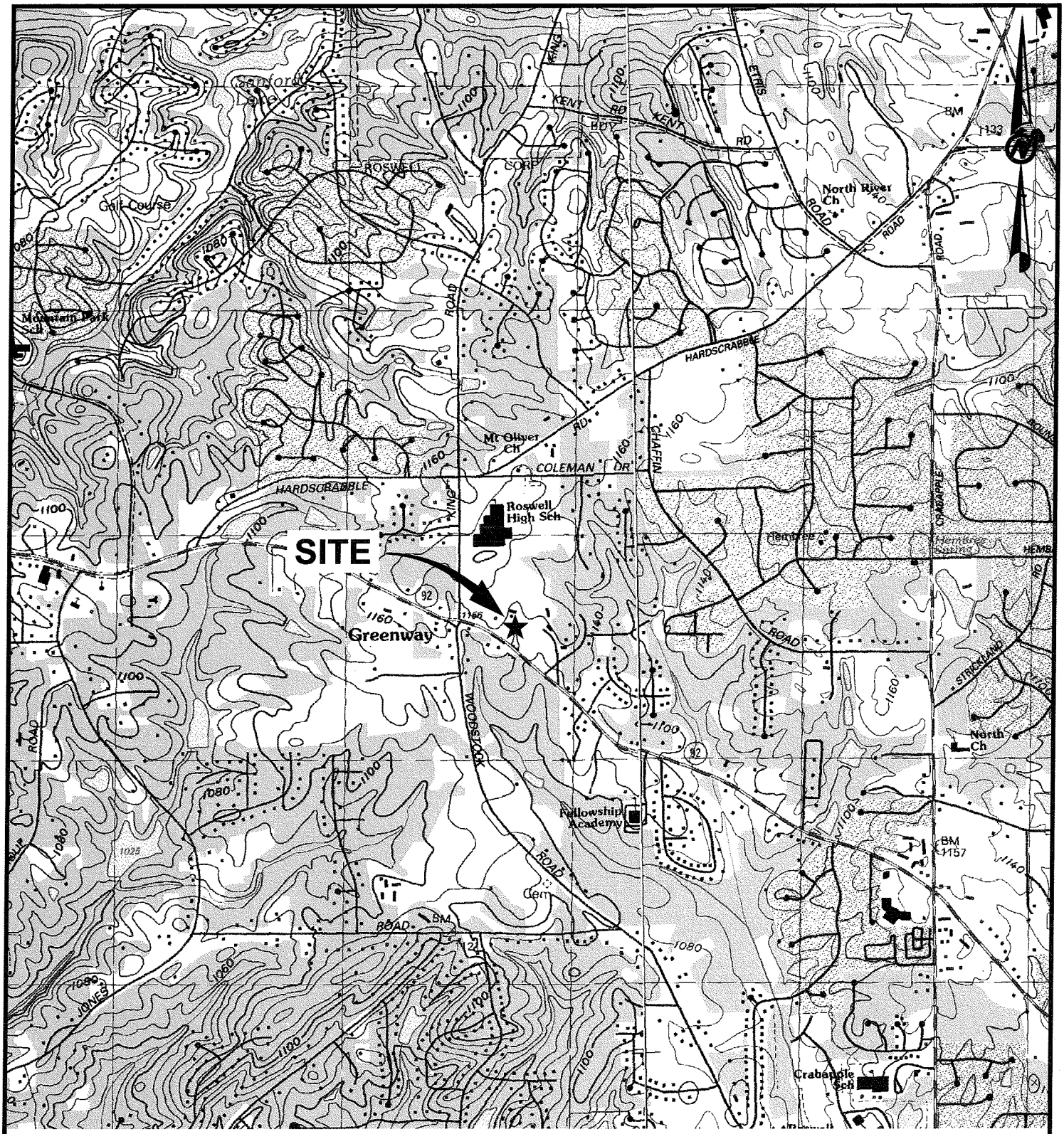
Anthony Sak, P.E.
Senior Geotechnical Engineer

FOR

Rafael I. Ospina, P.E.
Senior Consultant and Associate

AS/RIO/as

FIGURES



REFERENCES

USGS 7.5 MINUTE QUADRANGLES; MOUNTAIN PARK & ROSWELL, GA.

2000 0 2000
SCALE FEET

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
1	–	–	–	–		

PROJECT

KHAFRA / HACKETT ROAD WATER TANKS / GA

TITLE

SITE LOCATION

Golder Associates
Atlanta, Georgia

PROJECT No.	073-90270		FILE No.	07390270-001
DESIGN	–	–	SCALE AS SHOWN	REV. –
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REVIEW	[illegible]	11/07		

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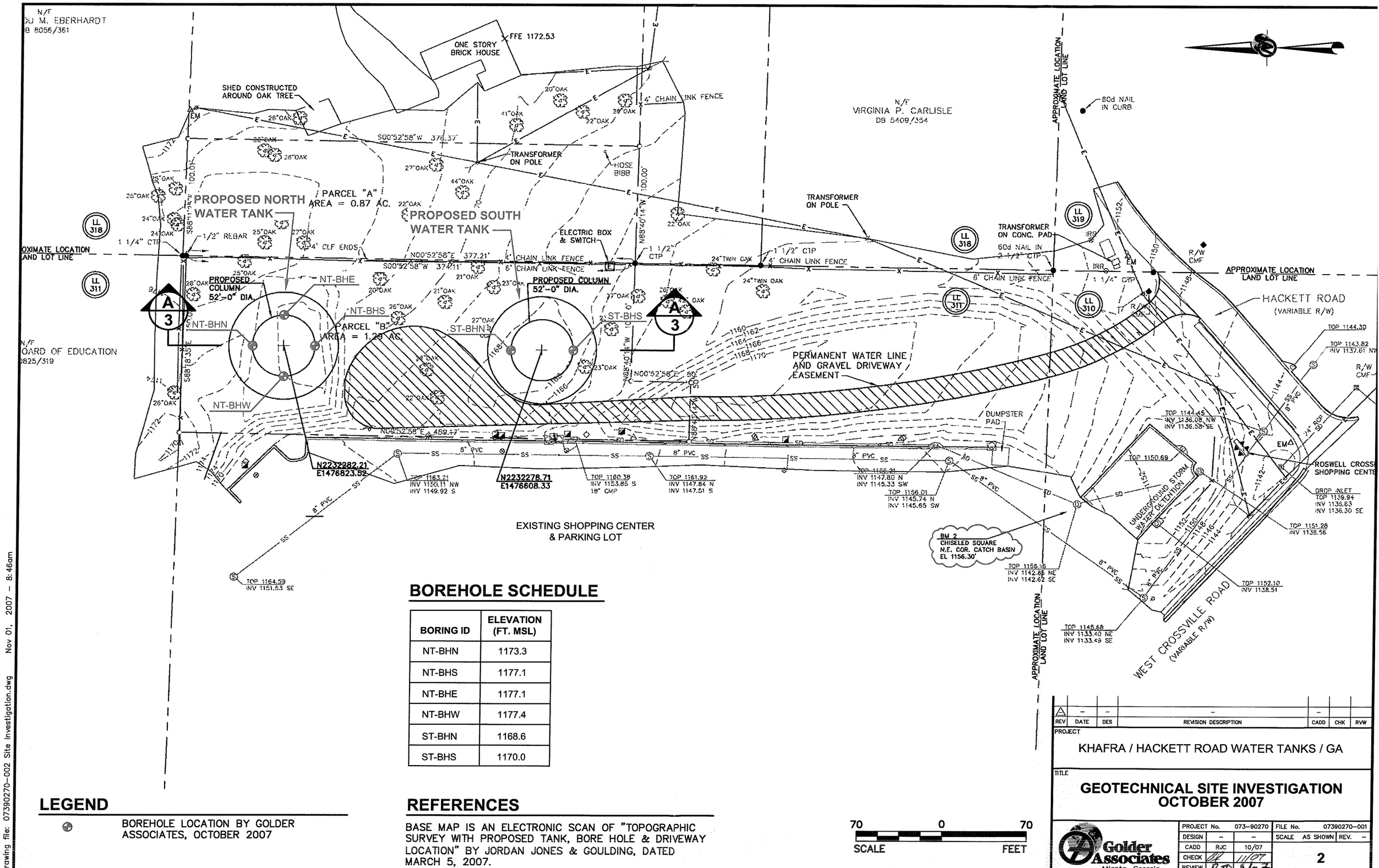

BOREHOLE SCHEDULE

BORING ID	ELEVATION (FT. MSL)
NT-BHN	1173.3
NT-BHS	1177.1
NT-BHE	1177.1
NT-BHW	1177.4
ST-BHN	1168.6
ST-BHS	1170.0

LEGEND

BOREHOLE LOCATION BY GOLDER ASSOCIATES, OCTOBER 2007

REFERENCES

BASE MAP IS AN ELECTRONIC SCAN OF "TOPOGRAPHIC SURVEY WITH PROPOSED TANK, BORE HOLE & DRIVEWAY LOCATION" BY JORDAN JONES & GOULDING, DATED MARCH 5, 2007.

70 0 70
SCALE FEET

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
△	–	–	–	–		

PROJECT
KHAFRA / HACKETT ROAD WATER TANKS / GA

TITLE
GEOTECHNICAL SITE INVESTIGATION OCTOBER 2007

Golder Associates Atlanta, Georgia

PROJECT No.	073-90270		FILE No.	07390270-001	
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CHECK		11/07	2		
REVIEW		11/07			

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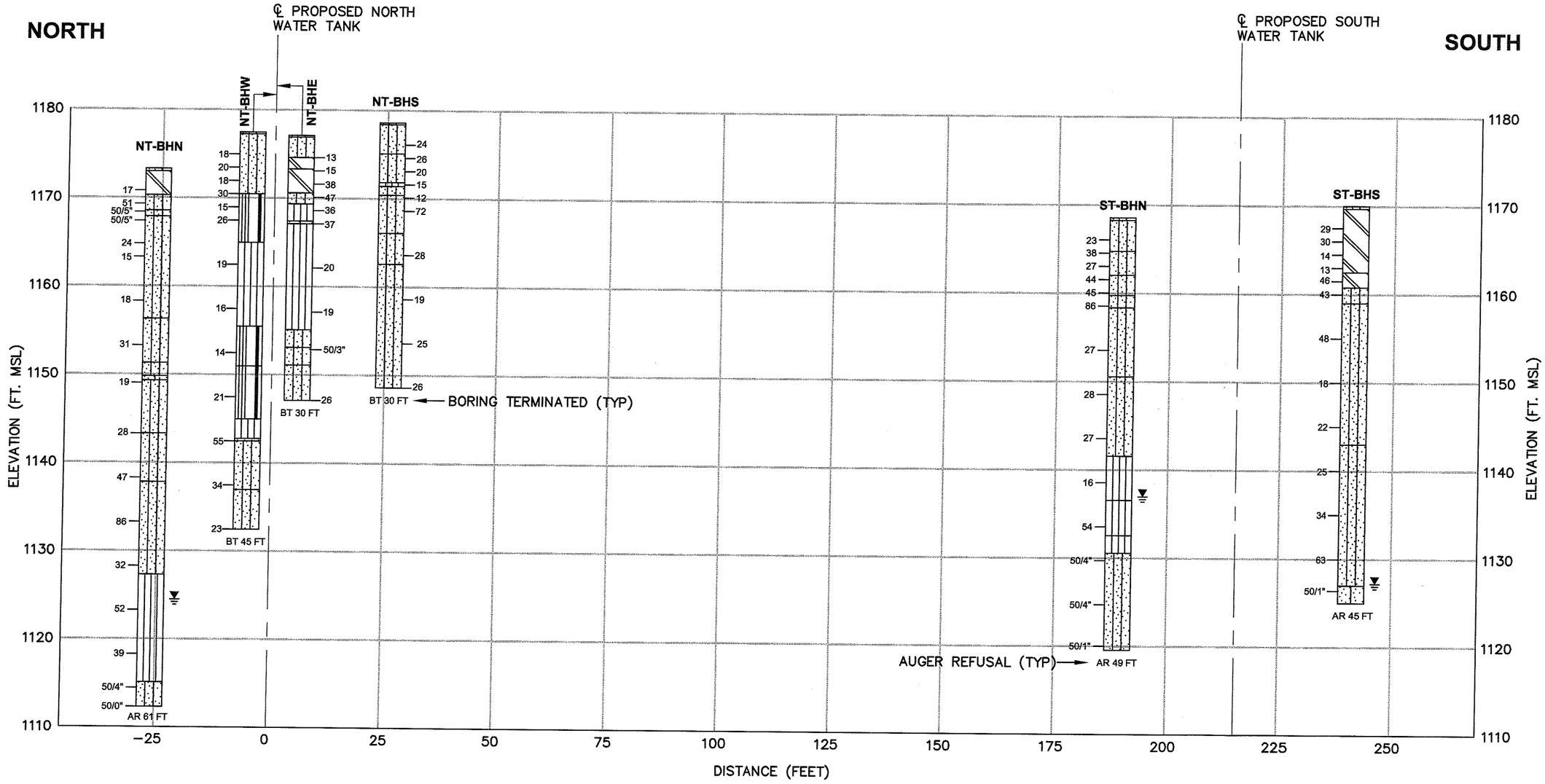

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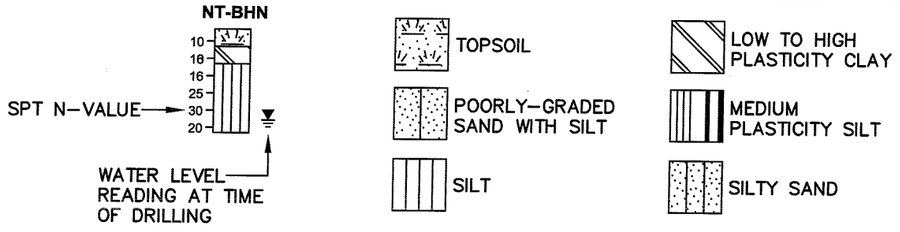

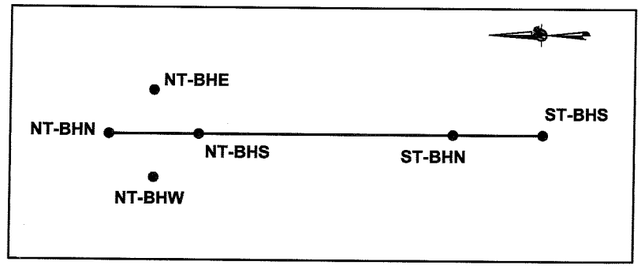

LOCATION MAP

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VERTICAL SCALE EXAGGERATED 2X

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
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PROJECT
KHAFRA / HACKETT ROAD WATER TANKS / GA

TITLE
SUBSURFACE PROFILE

Golder Associates Atlanta, Georgia

PROJECT No.	073−90270		FILE No.	07390270−002	
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CADD	RJC	10/07			
CHECK					3
REVIEW					

Drawing file: 07390270−003 Profile.dwg Nov 15, 2007 − 10:38am

Appendix A
Soil Test Boring Records

KEY TO SOIL CLASSIFICATION

TERMS AND DESCRIPTIONS

Soil Description	Range of Proportion
Trace	0 – 5 %
Little	5 – 12 %
Some	12 - 30 %
And	30 – 50 %

Relative Density of Cohesionless Soils	SPT N-value
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	Over 50

Consistency of Cohesive Soils	Undrained Shear Strength (psf)
Very soft	Less than 250
Soft	250 to 500
Firm	500 to 1,000
Stiff	1,000 to 2,000
Very stiff	2,000 to 4,000
Hard	Over 4,000

SAMPLE TYPES

AS	Auger Sample
DO	Drive Open
DS	Denison sample
PS	Pitcher sample
RC	Rock core
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

SOIL TESTS

Moisture Content	M
Atterberg Limits	A
Grain Size, Hydrometer	G, H
Unconfined Compression	U
Triaxial Shear (UU,CU,CD)	T
Direct Shear	D
Organic	O
pH	PH
Permeability	P
Consolidation	C
Specific Gravity	SG
Compaction	Com
Pinhole Dispersion	PD
Unit Weight	UW

PENETRATION RESISTANCE

Standard Penetration Resistance (ASTM D1586) "N" = the number of blows required to drive a 2 inch OD split spoon sampler one foot using a 140 lb. hammer falling 30 inches. WR = weight of rods and WH = weight of hammer.

Unified Soil Classification System

Criteria for Assigning Group Symbols and Names			Soil Classification Generalized Group Descriptions	
COARSE-GRAINED SOILS More than 50% retained on the No. 200 sieve	GRAVELS More than 50% of coarse fraction retained on No.4 Sieve	CLEAN GRAVELS Less than 5% fines	GW	Well-graded Gravels
			GP	Poorly-graded Gravels
		GRAVELS WITH FINES More than 12% fines	GM	Gravel and Silt Mixtures
			GC	Gravel and Clay Mixtures
	SANDS 50% or more of coarse fraction passes No.4 Sieve	CLEAN SANDS Less than 5% fines	SW	Well-graded Sands
			SP	Poorly-graded Sands
		SANDS WITH FINES More than 12% fines	SM	Sand and Silt Mixtures
			SC	Sand and Clay Mixtures
FINE-GRAINED SOILS 50% or more passes the No. 200 sieve	SILTS AND CLAYS Liquid limit less than 50	INORGANIC	CL	Low-plasticity Clays
			ML	Non-plastic and Low-Plasticity Silts
		ORGANIC	OL	Non-plastic and Low-Plasticity Organic Clays Non-plastic and Low-Plasticity Organic Silts
	SILTS AND CLAYS Liquid limit greater than 50	INORGANIC	CH	High-plasticity Clays
			MH	High-plasticity Silts
		ORGANIC	OH	High-plasticity Organic Silts and Clays
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT	Peat

RECORD OF BOREHOLE NT-BHE

PROJECT: Hackett Rd Water Tank
PROJECT NUMBER: 073-90270
LOCATION: Roswell, GA

DRILLING START: October 4, 2007 / 2:55:00 PM
DRILLING END: October 4, 2007 / 4:15:00 PM
DRILL RIG: CME 550 - Auto Hammer

DATUM: BM2 = 1156.3'
COORDS: S: 100 E: 26

SHEET 1 of 1
GS ELEVATION: 1177.1
TOC ELEVATION:

DEPTH (ft)	BORING METHOD	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in (ASTM D1586 140 lb hammer 30 inch drop (Cathead))	SPT N (bpf) (uncorr)	REC / ATT (inch) CORE REC (%)	PENETRATION RESISTANCE BLOWS / ft / RQD (%) / WATER CONTENT (PERCENT) W_p W W_l	NOTES WATER LEVELS
0	HSA - 2.25-Inch	0.0 - 0.2 [TOPSOIL] Orange organic SAND, with root mat.	OL		0.0							
		0.2 - 2.5 [RESIDUAL] Compact, brown, SAND (fine to medium), with some Clayey Silt (low plasticity), micaceous, slightly moist.	SM		1174.6 2.5	1	DO	11-7-6	13	12/18		
			CL-CH			2	DO	7-7-8	15	12/18		
5		2.5 - 3.8 [RESIDUAL] Firm to Stiff, red brown, SILTY CLAY (medium plasticity), with some Sand (fine), micaceous, moist.	CL-CH		1170.6 6.5	3	DO	6-15-23	38	18/18		
		3.8 - 6.5 As above, Very Stiff, some to and Sand (fine to medium).	SM			4	DO	33-30-17	47	16/18		
		6.5 - 7.8 [RESIDUAL] Dense, orange, SILT (non plastic) and SAND (fine to medium), slightly micaceous, slightly moist.	ML		1167.4 9.7	5	DO	6-14-22	36	18/18		
10		7.8 - 9.7 [SAPROLITE] Very Stiff to Stiff, purple and red brown speckled white and black, CLAYEY SILT (low plasticity), with some Sand (fine), micaceous, slightly moist.	SP-SM		10.0	6	DO	14-18-19	37	17/18		
		9.7 - 10.0 Seam of White SAND (coarse to medium), little Silt (non plastic), micaceous.										
		10.0 - 22.0 [SAPROLITE] As from 7.8 to 9.7 ft-bgs.	ML			7	DO	9-9-11	20	16/18		
15												
						8	DO	7-9-10	19	18/18		Dry Cave @ 18 ft-bgs after auger removal, and @ 24 hours.
20												
		22.0 - 24.0 [SAPROLITE] Dense to Very Stiff, orange brown SAND (fine) and SILT (non plastic), micaceous, slightly moist.	SM-ML		1155.1 22.0	9	DO	30-50/3"	50/3"	9/9		(24-26 ft-bgs) PWR inferred from Driller's observations and Sample DO-9.
		24.0 - 26.0 [PWR] Sampled as dark brown speckled white, tan, and black, SAND (medium to coarse), with some Silt (non plastic), micaceous, slightly moist.	SM		1153.1 24.0							
25					1151.1 26.0							
		26.0 - 30.0 [SAPROLITE] Stiff to Very Stiff, purple to red brown, SILT (no to low plasticity) and SAND (fine to medium), slightly micaceous, slightly moist.	SM			10	DO	9-11-15	26	18/18		GW Not encountered during drilling
30		Drilling terminated at 30 ft. BGS			1147.1							
35												
40												

1 in to 5 ft
DRILLING CONTRACTOR: Gable Drilling
DRILLER: Cliff Bryson

LOGGED: GLH
CHECKED: AEF

Golder Associates

BOREHOLE AND CORING LOG - JUNE 2007 HACKETT ROAD OCT-2007 LOGS.GPJ GINT-PLOG DATA TEMPLATE.GDT 11/15/07

RECORD OF BOREHOLE NT-BHN

SHEET 1 of 2

PROJECT: Hackett Rd Water Tank
PROJECT NUMBER: 073-90270
LOCATION: Roswell, GA

DRILLING START: October 4, 2007 / 10:00:00 AM
DRILLING END: October 4, 2007 / 2:30:00 PM
DRILL RIG: CME 550 - Auto Hammer

DATUM: BM2 = 1156.3'
COORDS: S: 126
E: 0

GS ELEVATION: 1173.3
TOC ELEVATION:

DEPTH (ft)	BORING METHOD	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in ASTM D1586 140 lb hammer 30 inch drop (Cathead)	SPT N (bpf) (uncorr)	REC / ATT (inch) CORE REC (%)	PENETRATION RESISTANCE BLOWS / ft ■ / RQD (%) / WATER CONTENT (PERCENT) W_p W W_l	NOTES WATER LEVELS
0	HSA - 2.25-Inch	0.0 - 0.3 [TOPSOIL] Orange, organic SAND, with root mat.	OL		0.0							
		0.3 - 3.0 [RESIDUAL] Firm to Stiff, red brown, SILTY CLAY (medium plasticity), with some SAND (fine to medium), slightly moist.	CL-CH		0.3 / 1170.3	1	DO	6-8-9	17	14/18		
			SM		1168.5	2	DO	20-25-26	51	15/18		
		3.0 - 4.8 [RESIDUAL / SAPROLITE] Dense to Very Dense, purple, red, white, and tan, SAND (fine to medium), with some Silt (no to low plasticity), micaceous, slightly moist.	SM		4.8 / 5.4	3	DO	30-50/5"	50/5"	11/11		
5						4	DO	50/5"	50/5"	5/5		
						5	DO	11-12-12	24	16/18		Lab: M
		4.8 - 5.4 [PWR] Sampled as white, purple, and red brown, SAND (fine to coarse), with some to little Silty Clay (low plasticity), trace Gravel (fine), micaceous, dry to slightly moist.				6	DO	8-8-7	15	15/18		
10			SM									
		5.4 - 17.0 [SAPROLITE] Medium Dense, purple, red brown, and white, SAND (fine to medium) and CLAYEY SILT (low plasticity), micaceous, slightly moist.				7	DO	6-9-9	18	18/18		Lab: M A
15					1156.3							
		17.0 - 22.0 [SAPROLITE] Medium Dense, purple and red brown, speckled orange and black, SAND (fine) and CLAYEY SILT (no to low plasticity), moist.	SM			8	DO	6-15-16	31	18/18		Lab: M A
20					1151.3							
		22.0 - 23.5 [SAPROLITE] Medium Dense, red brown speckled and veined white, purple, and black, SAND (fine, occasionally medium to coarse) and CLAYEY SILT (low plasticity), moist to slightly moist.	SM									
			SP-SM		23.5 / 24.0	9	DO	6-9-10	19	18/18		
25		23.5 - 24.0 Compact, gray-tan, SAND (fine to medium), little clayey silt (low plasticity), slightly micaceous, moist.	SM									
		24.0 - 30.0 [SAPROLITE] As from 22 to 23.5 ft-bgs.			1143.3	10	DO	8-12-16	28	18/18		Dry Cave @ 30 ft-bgs after auger removal, and at 24 hours.
30		30.0 - 35.5 Stiff, greater % Sand (fine to coarse)			30.0							Lab: M
			SM			11	DO	11-17-30	47	18/18		Driller notes harder drilling starting @ 30 ft-bgs.
35					1137.8							
		35.5 - 46.0 [SAPROLITE] Very Dense, orange brown speckled and veined white and black, SAND (fine to medium) and SILT (low to no plasticity), micaceous, slightly moist.	SM		35.5							
						12	DO	21-36-50	86	18/18		(26 to 45 ft-bgs) Occasional thin (5-20 mm) seams of White, SAND (coarse to fine), some Silt, trace
40		Log continued on next page										

1 in to 5 ft
DRILLING CONTRACTOR: Gable Drilling
DRILLER: Cliff Bryson

LOGGED: GLH
CHECKED: AEF

Golder Associates

BOREHOLE AND CORING LOG - JUNE 2007 HACKETT ROAD OCT-2007 LOGS.GPJ GINT-PLOG DATA TEMPLATE.GDT 11/15/07

RECORD OF BOREHOLE NT-BHN

SHEET 2 of 2

PROJECT: Hackett Rd Water Tank
PROJECT NUMBER: 073-90270
LOCATION: Roswell, GA

DRILLING START: October 4, 2007 / 10:00:00 AM
DRILLING END: October 4, 2007 / 2:30:00 PM
DRILL RIG: CME 550 - Auto Hammer

DATUM: BM2 = 1156.3'
COORDS: S: 126
E: 0

GS ELEVATION: 1173.3
TOC ELEVATION:

DEPTH (ft)	BORING METHOD	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in (ASTM D1586 140 lb hammer 30 inch drop (Cathead))	SPT N (bpf) (uncorr)	REC / ATT (inch) / CORE REC (%)	PENETRATION RESISTANCE BLOWS / ft ■ / RQD (%) / WATER CONTENT (PERCENT) W_p W W_l (20 40 60 80)	NOTES WATER LEVELS
40	HSA - 2.25-Inch	35.5 - 46.0 [SAPROLITE] Very Dense, orange brown speckled and veined white and black, SAND (fine to medium) and SILT (low to no plasticity), micaceous, slightly moist. *(Continued)*	SM									Gravel (fine).
45						13	DO	6-15-17	32	18/18	■	
					1127.3 / 46.0							
		46.0 - 58.2 [SAPROLITE] Stiff to Very Stiff, orange brown speckled and veined white and black, SILT (no to low plasticity) and SAND (fine occasionally medium to coarse), trace Gravel (fine), micaceous, slightly moist to moist.				14	DO	9-15-37	52	18/18	■	▽ 49 ft-bgs GW observed during drilling
50		Occasional seams (10-30 mm) of white SAND (coarse to medium), with some Gravel (fine), little Silt, moist to wet (Spacing @ ~ 200-500 mm).	ML									
55						15	DO	16-17-22	39	18/18	○ ■	Lab: M A
					1115.1 / 58.2							
		58.2 - 61.0 [PWR] Sampled as black and orange speckled white, SAND (fine to medium, occasionally coarse), with some Clayey Silt (low plasticity), trace Gravel (fine), micaceous, moist.	SM			16	DO	50/4"	50/4"	4/4		
60					1112.3							
		Refusal at 61 ft. BGS				17	DO		50/0"	0/0		
65												
70												
75												
80												

1 in to 5 ft

DRILLING CONTRACTOR: Gable Drilling
DRILLER: Cliff Bryson

LOGGED: GLH
CHECKED: AEF

Golder Associates

BOREHOLE AND CORING LOG - JUNE 2007 HACKETT ROAD OCT-2007 LOGS.GPJ GINT-PLOG DATA TEMPLATE.GDT 11/15/07

RECORD OF BOREHOLE NT-BHS

SHEET 1 of 1

PROJECT: Hackett Rd Water Tank
PROJECT NUMBER: 073-90270
LOCATION: Roswell, GA

DRILLING START: October 4, 2007 / 4:18:00 PM
DRILLING END: October 4, 2007 / 5:30:00 PM
DRILL RIG: CME 550 - Auto Hammer

DATUM: BM2 = 1156.3'
COORDS: S: 74
E: 0

GS ELEVATION: 1178.6
TOC ELEVATION:

DEPTH (ft)	BORING METHOD	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in (ASTM D1586, 140 lb hammer, 30 inch drop, Cathead)	SPT N (bpf) (uncorr)	REC ATT (inch) / CORE REC (%)	PENETRATION RESISTANCE BLOWS / ft ■ / RQD (%) / WATER CONTENT (PERCENT) W_p W_f W_l (20, 40, 60, 80)	NOTES WATER LEVELS
0	HSA - 2.25-Inch	0.0 - 0.2 [TOPSOIL] Orange, organic SAND, with root mat.	OL		0.0 / 0.2							
		0.2 - 3.5 [FILL] Compact, orange brown occasionally black, SAND (fine to medium) and SILT (no to low plasticity), trace to little Organics (moderate to strong organic odor), slightly moist.	SM			1	DO	9-10-14	24	14/18	■	
						2	DO	12-12-14	26	18/18	■	
5			SM		1175.1	3	DO	9-10-10	20	13/18	■	
		3.5 - 6.8 more black coloring, trace wood and root fragments.			1171.9	4	DO	10-8-7	15	18/18	■	
			ML									
		6.8 - 7.2 [FILL] Firm, red brown, CLAYEY SILT (low to medium plasticity) and SAND (fine), trace organics.	SM		7.2 / 8.2	5	DO	4-6-6	12	14/18	■	
		7.2 - 8.2 [FILL] As from 3.5 to 6.8				6	DO	10-29-43	72	16/18	■	
10		8.2 - 12.5 [RESIDUAL] Dense, speckled purple, white, and orange, SAND (fine to medium) and SILT (no to low plasticity), very micaceous, slightly moist.	SM		1166.1 / 12.5	7	DO	5-14-14	28	16/18	■	
15		12.5 - 16.0 [RESIDUAL] Stiff to Very Stiff, red brown speckled purple, white, and orange, CLAYEY SILT (low plasticity), with some to and Sand (fine), slightly micaceous, slightly moist to moist.			1162.6 / 16.0							
		16.0 - 30.0 [SAPROLITE] Stiff to Very Stiff, purple speckled white and tan, SILT (no to low plasticity), with some to and Sand (fine), micaceous, slightly moist.				8	DO	8-9-10	19	16/18	■	Dry Cave @ 18 ft-bgs after auger removal, and @ 24 hours.
20			SM			9	DO	6-10-15	25	16/18	■	Fine to Coarse Gravel sized quartz chips in bottom of DO-9 @ 25.0 ft-bgs
25												
		Thin (20-40 mm) seam of White, SAND (fine to coarse), little Silt.			1148.6	10	DO	8-12-14	26	18/18	■	GW Not encountered during drilling
30		Drilling terminated at 30 ft. BGS										
35												
40												

1 in to 5 ft

DRILLING CONTRACTOR: Gable Drilling
DRILLER: Cliff Bryson

LOGGED: GLH
CHECKED: AEF

Golder Associates

BOREHOLE AND CORING LOG - JUNE 2007 HACKETT ROAD OCT-2007 LOGS.GPJ GINT-PLOG DATA TEMPLATE.GDT 11/15/07

RECORD OF BOREHOLE NT-BHW

PROJECT: Hackett Rd Water Tank
PROJECT NUMBER: 073-90270
LOCATION: Roswell, GA

DRILLING START: October 5, 2007 / 9:00:00 AM
DRILLING END: October 5, 2007 / 10:55:00 AM
DRILL RIG: CME 550 - Auto Hammer

DATUM: BM2 = 1156.3'
COORDS: S: 100 W: 26

SHEET 1 of 2
GS ELEVATION: 1177.4
TOC ELEVATION:

DEPTH (ft)	BORING METHOD	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in ASTM D1586 140 lb hammer 30 inch drop (Cathead)	SPT N (bpf) (uncorr)	REC / ATT (inch) CORE REC (%)	PENETRATION RESISTANCE BLOWS / ft ■ / RQD (%) / WATER CONTENT (PERCENT) W_p W W_l	NOTES WATER LEVELS
0	HSA - 2.25-Inch	0.0 - 0.2 [TOPSOIL] Orange, organic SAND, with root mat.	OL		0.0							
		0.2 - 7.0 [FILL] Compact, orange brown occasionally black, SAND (fine to medium), with some Clayey Silt (low plasticity), little Organics (moderate to strong organic odor), slightly moist.	SM		0.2	1	DO	9-9-9	18	16/18		
						2	DO	7-9-11	20	18/18		
5						3	DO	6-8-10	18	18/18		
						4	DO	12-14-16	30	18/18		
					1170.4							
		7.0 - 12.5 [FILL] Compact, red brown with brown, CLAYEY SILT (medium plasticity) and SAND (fine to medium), little Organics (moderate to strong organic odor), trace rubbish (see notes), slightly moist.	ML-MH		7.0	5	DO	12-8-7	15	18/18		7 - 8.5 ft-bgs Metal Staple and 1" x 1/2" x 1/8" plastic chip in sample DO-5.
10						6	DO	7-11-15	26	18/18		
						1	AS					(8.5 to 13.5 ft-bgs) Bulk Auger Sample Collected (AS - 1).
					1164.9							
		12.5 - 22.0 [RESIDUAL] Stiff, purple speckled tan and white, CLAYEY SILT (low plasticity) and SAND (fine to medium occasionally coarse), micaceous, slightly moist.	ML-SM		12.5	7	DO	7-9-10	19	16/18		Lab: M A H Com
15												
						8	DO	5-7-9	16	18/18		
20					1155.4							
		22.0 - 26.5 [RESIDUAL to SAPROLITE] Stiff, purple speckled tan, black, and white, CLAYEY SILT (medium to low plasticity, varying), with some to and Sand (fine to medium), micaceous, slightly moist.	ML-MH		22.0	9	DO	3-5-9	14	18/18		
25												
					1150.9							
		26.5 - 32.5 [SAPROLITE] as above.	ML-MH		26.5	10	DO	4-10-11	21	18/18		
30												Dry cave @ 32 ft-bgs after auger removal, and @ 24 hours.
					1144.9							
		32.5 - 34.7 [SAPROLITE] Stiff to Very Stiff, orange brown speckled black and white, CLAYEY SILT (low plasticity) and SAND (fine to medium), micaceous, slightly moist.	ML-SM		1142.7	11	DO	8-19-36	55	18/18		
35		34.7 - 35.0 Seam of Quartz			34.7 35.0							Fine to coarse gravel sized quartz chips in bottom of DO-11 @ 35.0 ft-bgs.
		35.0 - 40.5 [SAPROLITE] as from 32.5 to 40.5, but with trace (2-5 mm) mica flakes and occasional seams with higher sand content.	ML-SM			12	DO	7-19-15	34	18/18		
40		Log continued on next page										

1 in to 5 ft
DRILLING CONTRACTOR: Gable Drilling
DRILLER: Cliff Bryson

LOGGED: GLH
CHECKED: AEF

Golder Associates

BOREHOLE AND CORING LOG - JUNE 2007 HACKETT ROAD 0CT-2007 LOGS.GPJ GINT-PLOG DATA TEMPLATE.GDT 11/15/07

RECORD OF BOREHOLE NT-BHW

SHEET 2 of 2

PROJECT: Hackett Rd Water Tank
PROJECT NUMBER: 073-90270
LOCATION: Roswell, GA

DRILLING START: October 5, 2007 / 9:00:00 AM
DRILLING END: October 5, 2007 / 10:55:00 AM
DRILL RIG: CME 550 - Auto Hammer

DATUM: BM2 = 1156.3'
COORDS: S: 100 W: 26

GS ELEVATION: 1177.4
TOC ELEVATION:

DEPTH (ft)	SOIL PROFILE: BORING METHOD	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLE / RUN: NUMBER	TYPE	BLOWS per 6 in (ASTM D1586, 140 lb hammer, 30 inch drop, Cathead)	SPT N (bpf) (uncorr)	REC / ATT (inch) CORE REC (%)	PENETRATION RESISTANCE BLOWS / ft ■ / RQD (%) / WATER CONTENT (PERCENT) W_p W_n W_l	NOTES WATER LEVELS
40	HSA - 2.25-Inch	40.5 - 45.0 [SAPROLITE] As above, with purple as main color	ML-SM		40.5							
						13	DO	6-11-12	23	18/18	■	GW Not encountered during drilling
45		Drilling terminated at 45 ft. BGS			1132.4							
50												
55												
60												
65												
70												
75												
80												

1 in to 5 ft
DRILLING CONTRACTOR: Gable Drilling
DRILLER: Cliff Bryson

LOGGED: GLH
CHECKED: AEF

Golder Associates

BOREHOLE AND CORING LOG - JUNE 2007 HACKETT ROAD 0CT-2007 LOGS.GPJ GINT-PLOG DATA TEMPLATE.GDT 11/15/07

RECORD OF BOREHOLE ST-BHN

SHEET 1 of 2

PROJECT: Hackett Rd Water Tank
PROJECT NUMBER: 073-90270
LOCATION: Roswell, GA

DRILLING START: October 5, 2007 / 1:05:00 PM
DRILLING END: October 5, 2007 / 3:25:00 PM
DRILL RIG: CME 550 - Auto Hammer

DATUM: BM2 = 1156.3'
COORDS: N: 74
E: 0

GS ELEVATION: 1168.6
TOC ELEVATION:

DEPTH (ft)	BORING METHOD	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in (ASTM D1586 140 lb hammer 30 inch drop (Cathead))	SPT N (bpf) (uncorr)	REC / ATT (inch) CORE REC (%)	PENETRATION RESISTANCE BLOWS / ft ■ / RQD (%) / WATER CONTENT (PERCENT) W_p W W_l	NOTES WATER LEVELS
0	HSA - 2.25-Inch	0.0 - 0.3 [TOPSOIL] Orange, organic SAND, with root mat.	OL		0.0 / 0.3							
		0.3 - 3.8 [FILL] Compact, orange and red brown, SAND (fine to medium occasionally coarse), with some Clayey Silt (low plasticity), trace Organics (moderate organic odor) and fine root fibers, slightly moist.	SM			1	DO	7-11-12	23	18/18		
						2	DO	16-22-16	38	5/18		Gravel / Crushed Stone pieces in sample DO-3
5			SM		1164.8 / 3.8	3	DO	6-12-15	27	18/18		
		3.8 - 6.5 [FILL / RESIDUAL] Medium Dense, red brown, SAND (fine to medium) and CLAYEY SILT (low plasticity), trace Organics (slight organic odor), trace fine root fibers, slightly moist.			1162.1	4	DO	14-20-24	44	18/18		6 ft-bgs Trace fine root fragments slight organic odor.
			SM			5	DO	24-28-17	45	16/18		
					1159.8 / 8.8	6	DO	20-40-46	86	18/18		
		6.5 - 8.8 [RESIDUAL] Dense, orange and red brown, SAND (fine to medium occasionally coarse), with some Silt (no to low plasticity), micaceous, slightly moist.	SM		10.2	1	AS				O H	9.5 - 10.2 ft-bgs Very Hard Drilling
												(8.5 to 13.5 ft-bgs) Bulk Auger Sample Collected (AS - 1).
		8.8 - 10.2 [SAPROLITE] Very Dense, gray orange speckled black, tan, and white, SAND (fine to medium occasionally coarse), with some Silt (no to low plasticity), micaceous, slightly moist.				7	DO	7-12-15	27	17/18	O ■	Lab: M A H Com
15												
		10.2 - 18.0 [SAPROLITE] Compact, orange and yellow brown, SAND (fine to medium occasionally coarse), and CLAYEY SILT (low plasticity), micaceous, slightly moist.			1150.6 / 18.0							Lab: M
						8	DO	8-14-14	28	18/18	O ■	Lab: M A
20		18.0 - 27.0 [SAPROLITE] Medium Dense, orange brown and red brown speckled and veined black, white, and tan, SAND (fine to medium occasionally coarse) and CLAYEY SILT (no to low plasticity), very micaceous, slightly moist.	SM									
						9	DO	10-10-17	27	18/18	■	
25					1141.6 / 27.0							
		27.0 - 32.0 [SAPROLITE] Firm, yellow brown speckled black, white, and orange, SILT (no to low plasticity) and SAND (fine occasionally medium), very micaceous, moist.	ML-SM			10	DO	3-7-9	16	18/18	■ O	Lab: M
30					1136.6 / 32.0							▽ GW measured at 31.8' inside Augers during drilling.
		32.0 - 36.0 Stiff to Very Stiff	ML-SM			11	DO	14-26-28	54	18/18	O ■	
35					1132.6 / 36.0							35 - 36 ft-bgs Alternating moderately hard and softer drilling
		36.0 - 38.0 Hard	ML-SM		1130.6 / 38.0							
			SM			12	DO	50/4"	50/4"	4/4		Lab: M A
40		Log continued on next page										

1 in to 5 ft

DRILLING CONTRACTOR: Gable Drilling
DRILLER: Cliff Bryson

LOGGED: GLH
CHECKED: AEF

Golder Associates

BOREHOLE AND CORING LOG - JUNE 2007 HACKETT ROAD OCT-2007 LOGS.GPJ GINT-PLOG DATA TEMPLATE.GDT 11/15/07

RECORD OF BOREHOLE ST-BHN

PROJECT: Hackett Rd Water Tank
PROJECT NUMBER: 073-90270
LOCATION: Roswell, GA

DRILLING START: October 5, 2007 / 1:05:00 PM
DRILLING END: October 5, 2007 / 3:25:00 PM
DRILL RIG: CME 550 - Auto Hammer

DATUM: BM2 = 1156.3'
COORDS: N: 74
E: 0

SHEET 2 of 2
GS ELEVATION: 1168.6
TOC ELEVATION:

DEPTH (ft)	BORING METHOD	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in (ASTM D1586, 140 lb hammer, 30 inch drop, Cathead)	SPT N (bpf) (uncorr)	REC / ATT (inch) CORE REC (%)	PENETRATION RESISTANCE BLOWS / ft ■ / RQD (%) / WATER CONTENT (PERCENT) W_p W_n W_l	NOTES WATER LEVELS
40	HSA - 2.25-Inch	38.0 - 49.0 [PWR of Biotite Gneiss] Sampled as black, gray, white, and tan weathered ROCK CHIPS and SAND (coarse to fine), some Clayey Silt (low plasticity), micaceous, slightly moist. *(Continued)*	SM			13	DO	50/4"	50/4"	4/4		36 ft-bgs Hard drilling 38 -49 ft-bgs Alternating PWR and slightly softer layers.
45						14	DO	50/1"	50/1"	0/1		
					1119.6							
		Refusal at 49 ft. BGS										
50												
55												
60												
65												
70												
75												
80												

1 in to 5 ft
DRILLING CONTRACTOR: Gable Drilling
DRILLER: Cliff Bryson

LOGGED: GLH
CHECKED: AEF

Golder Associates

BOREHOLE AND CORING LOG - JUNE 2007 HACKETT ROAD OCT-2007 LOGS.GPJ GINT-PLOG DATA TEMPLATE.GDT 11/15/07

RECORD OF BOREHOLE ST-BHS

SHEET 1 of 2

PROJECT: Hackett Rd Water Tank
PROJECT NUMBER: 073-90270
LOCATION: Roswell, GA

DRILLING START: October 5, 2007 / 11:05:00 AM DATUM: BM2 = 1156.3'
DRILLING END: October 5, 2007 / 1:00:00 PM COORDS: N: 126
DRILL RIG: CME 550 - Auto Hammer E: 0

GS ELEVATION: 1170.0
TOC ELEVATION:

DEPTH (ft)	BORING METHOD	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in (ASTM D1586 140 lb hammer 30 inch drop (Cathead))	SPT N (bpf) (uncorr)	REC / ATT (inch) CORE REC (%)	PENETRATION RESISTANCE BLOWS / ft ■ / RQD (%) / WATER CONTENT (PERCENT) w_p w w_l (20 40 60 80)	NOTES WATER LEVELS
0	HSA - 2.25-Inch	0.0 - 0.3 [TOPSOIL] Orange, organic SAND, with root mat.	OL		0.0 / 0.3							
		0.3 - 7.5 [FILL] Very Stiff to Stiff, red brown with occasional brown and black, SILTY CLAY (medium plasticity), with some Sand (fine to medium), trace burned wood, fine roots, and Organics (moderate organic odor), slightly moist to moist.	CL-CH			1	DO	9-16-13	29	16/18	■	
						2	DO	15-15-15	30	18/18	■	
5						3	DO	4-6-8	14	18/18	■	4.8 ft-bgs small (2" x 1/4" x 1/4") burnt wood piece
						4	DO	6-6-7	13	16/18	■	
					1162.5 / 7.5	5	DO	10-15-31	46	18/18	■	7 ft-bgs Fine root fragments slight organic odor.
		7.5 - 9.2 [RESIDUAL] Stiff, red brown, SILTY CLAY (medium plasticity), with some to and Sand (fine), micaceous, slightly moist to moist.	CL-CH		1160.8 / 9.2	6	DO	12-23-20	43	18/18	■	
10		9.2 - 11.0 [RESIDUAL] Compact, white and purple, SAND (coarse to fine, poorly graded), with some to little Silt (non plastic), little fine gravel sized quartz chips, micaceous, slightly moist.	SM		1159.0 / 11.0							
		11.0 - 27.0 [SAPROLITE] Medium Dense, purple and brown speckled black, white, and tan, SAND (fine occasionally coarse) and CLAYEY SILT (no to low plasticity), trace Gravel (fine), very micaceous, slightly moist.				7	DO	9-24-24	48	18/18	■	
15												
						8	DO	5-8-10	18	18/18	■	
20												
						9	DO	6-8-14	22	18/18	■	
25					1143.0 / 27.0							
		27.0 - 43.0 [SAPROLITE] as above but orange gray with less sand, moist. Occasional seams (20-40 mm thick) of White or purple SAND (fine to medium occasionally coarse), with little to some Silt (non plastic), micaceous, moist (spacing @ ~ 150 mm.)	SM			10	DO	4-9-16	25	18/18	■	
30												
						11	DO	10-17-17	34	18/18	■	
35												
						12	DO	17-28-35	63	18/18	C ■	38.8 ft-bgs Approximately 20 mm seam of quartz
40		Log continued on next page										

1 in to 5 ft
DRILLING CONTRACTOR: Gable Drilling
DRILLER: Cliff Bryson

LOGGED: GLH
CHECKED: AEF

Golder Associates

BOREHOLE AND CORING LOG - JUNE 2007 HACKETT ROAD OCT-2007 LOGS.GPJ GINT-PLOG DATA TEMPLATE.GDT 11/15/07

RECORD OF BOREHOLE ST-BHS

PROJECT: Hackett Rd Water Tank
PROJECT NUMBER: 073-90270
LOCATION: Roswell, GA

DRILLING START: October 5, 2007 / 11:05:00 AM DATUM: BM2 = 1156.3'
DRILLING END: October 5, 2007 / 1:00:00 PM COORDS: N: 126
DRILL RIG: CME 550 - Auto Hammer E: 0

SHEET 2 of 2
GS ELEVATION: 1170.0
TOC ELEVATION:

DEPTH (ft)	BORING METHOD	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in (ASTM D1586, 140 lb hammer, 30 inch drop, Cathead)	SPT N (bpf) (uncorr)	REC / ATT (inch) CORE REC (%)	PENETRATION RESISTANCE BLOWS / ft ■ / RQD (%) / WATER CONTENT (PERCENT) W_p W_n W_l	NOTES WATER LEVELS
40	HSA - 2.25-Inch		SM		1127.0							Lab: M A
		43.0 - 45.0 [PWR of Biotite Gneiss] Sampled as black speckled white and tan weathered ROCK CHIPS and SAND (coarse to fine), little Silt (non plastic), little Gravel (fine), micaceous, slightly moist.	SP-SM		43.0	13	DO	50/1"	50/1"	1/1		▽ GW observed at 43' during drilling. Dry Cave @ 28.0 ft-bgs after auger removal.
45		Refusal at 45 ft. BGS			1125.0							
50												
55												
60												
65												
70												
75												
80												

1 in to 5 ft
DRILLING CONTRACTOR: Gable Drilling
DRILLER: Cliff Bryson

LOGGED: GLH
CHECKED: AEF

Golder Associates

BOREHOLE AND CORING LOG - JUNE 2007 HACKETT ROAD 0CT-2007 LOGS.GPJ GINT-PLOG DATA TEMPLATE.GDT 11/15/07

Appendix B
Laboratory Testing Results

KHAFRA/ROSWELL-HACKETT RD WATER/GA
SUMMARY OF SOIL DATA

Sample Identification		Sample Type	Sample Depth	Soil Classi-fication	Natural Moisture %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Unit Weight		Permeability (cm/sec)	Additional Tests Conducted (See Notes)
Boring	Sample No.					L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %		Moisture %	Dry (lb/cuft)		
NT-BHW	A.S. #1	Bulk	8.5-13.5'	ML	22.4	49	31	18	-0.48	99.3	62.5	39.5	101.5	21.5	-	-	-	-	-
NT-BHN	DO-5	Bag	7.0-8.5'	-	17.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NT-BHN	DO-7	Bag	13.5-15.0'	SM	17.4	NP	NP	NP	NP	100.0	39.1	5.0	-	-	-	-	-	-	-
NT-BHN	DO-8	Bag	18.5-20.0'	SM	20.1	NP	NP	NP	NP	100.0	39.5	6.0	-	-	-	-	-	-	-
NT-BHN	DO-10	Bag	28.5-30.0'	-	24.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NT-BHN	DO-15	Bag	53.5-55.0'	SM	27.4	NP	NP	NP	NP	99.1	33.0	4.0	-	-	-	-	-	-	-
ST-BHN	A.S. #1	Bulk	8.5-13.5'	SM	9.9	29	25	4	-4.01	91.7	33.4	9.0	114.0	14.7	-	-	-	-	-
ST-BHN	DO-7	Bag	13.5-15.0'	-	15.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ST-BHN	DO-8	Bag	18.5-20.0'	SM	20.0	NP	NP	NP	NP	99.8	41.6	8.0	-	-	-	-	-	-	-
ST-BHN	DO-10	Bag	28.5-30.0'	-	32.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ST-BHN	DO-11	Bag	33.5-35.0'	SM	18.1	NP	NP	NP	NP	97.3	30.6	3.0	-	-	-	-	-	-	-
ST-BHS	DO-12	Bag	38.5-40.0'	SM	17.6	NP	NP	NP	NP	99.8	37.1	6.0	-	-	-	-	-	-	-

ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)
MOISTURE (Mc)

NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
O = ORGANIC CONTENT
P = pH

WATER CONTENT DETERMINATION
ASTM D 2216

PROJECT TITLE	KHAFRA/ROSWELL-HACKETT RD WATER/GA
PROJECT NUMBER	073-90270
REMARKS	

Sample Type	Bag	Bag	Bag	Bag	
Borehole Number	NT-BHN	NT-BHN	ST-BHN	ST-BHN	
Sample Number	DO-5	DO-10	DO-10	DO-7	
Depth of Sample (ft)	7.0-8.5'	28.5-30.0'	28.5-30.0'	13.5-15.0'	
Tare Number	-	-	-	-	
Weight of Wet Soil + Tare (gm)	211.69	241.21	226.06	251.43	
Weight of Dry Soil + Tare (gm)	181.49	195.86	172.92	219.40	
Weight of Tare (gm)	8.46	8.34	8.53	8.43	
Weight of Water (gm)	30.20	45.35	53.14	32.03	
Weight of Dry Soil (gm)	173.03	187.52	164.39	210.97	
Water Content (%)	17.45	24.18	32.33	15.18	

Sample Type					
Borehole Number					
Sample Number					
Depth of Sample (ft)					
Tare Number					
Weight of Wet Soil + Tare (gm)					
Weight of Dry Soil + Tare (gm)					
Weight of Tare (gm)					
Weight of Water (gm)					
Weight of Dry Soil (gm)					
Water Content (%)					

Sample Type					
Borehole Number					
Sample Number					
Depth of Sample (ft)					
Tare Number					
Weight of Wet Soil + Tare (gm)					
Weight of Dry Soil + Tare (gm)					
Weight of Tare (gm)					
Weight of Water (gm)					
Weight of Dry Soil (gm)					
Water Content (%)					

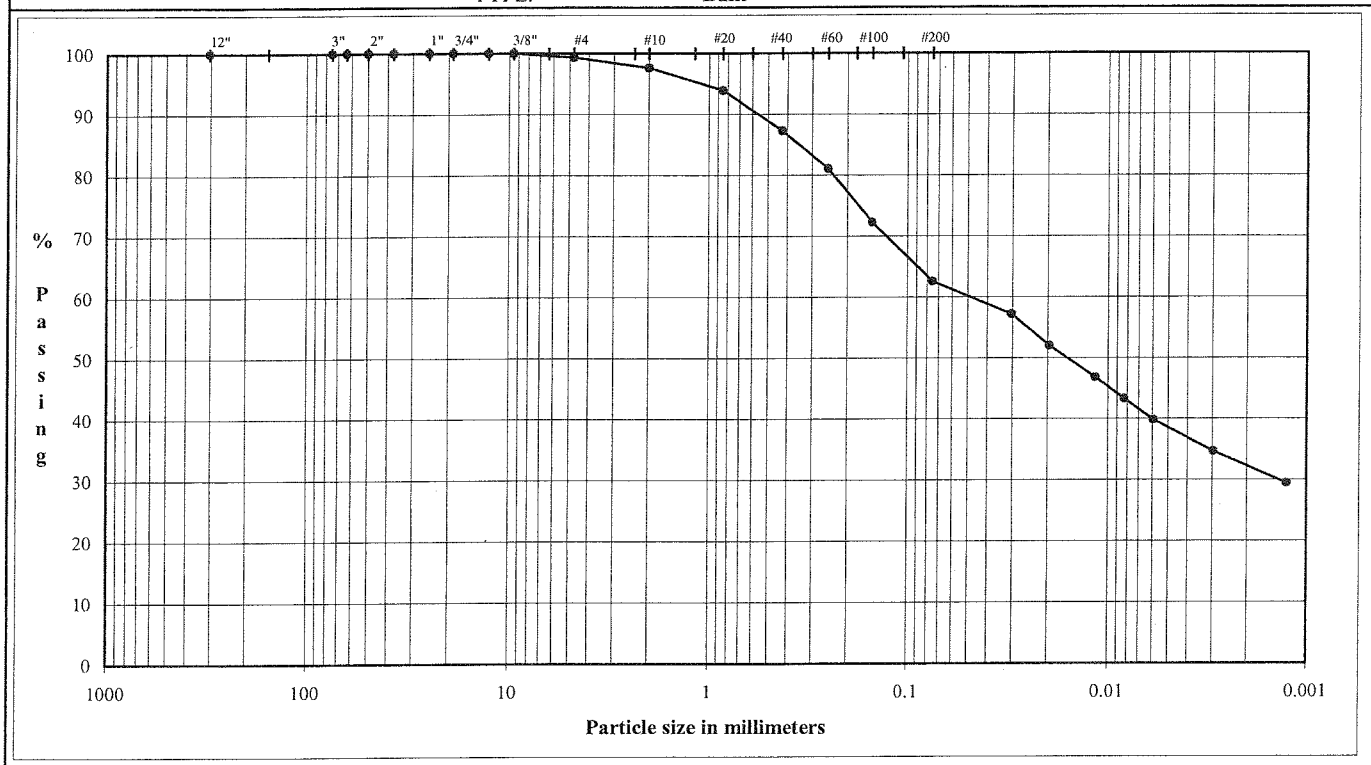
TECH	JD
DATE	10/10/2007
CHECK	DA
REVIEW	AK

OCTOBER 2007 073-90270

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **KHAFRA/ROSWELL-HACKETT RD WATER/GA**
SAMPLE ID: **NT-BHW A.S #1** Depth: **8.5-13.5'**
TYPE: **Bulk**



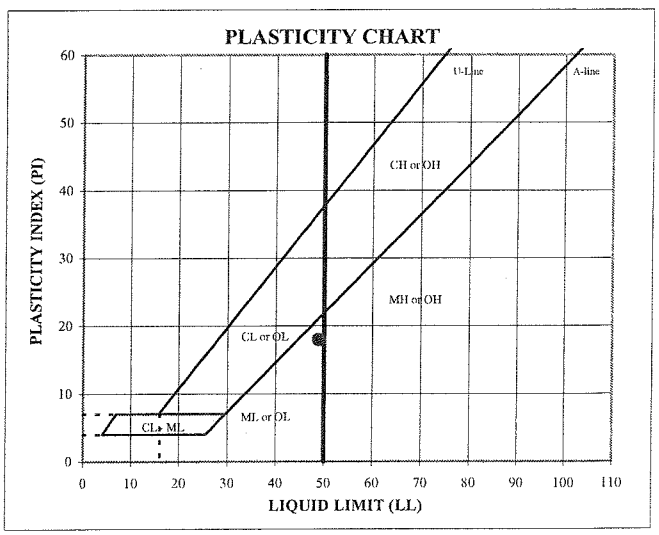
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**99.3**	Fine Gravel	**0.68**
#10	2.00	**97.6**	Coarse Sand	**1.73**
#20	0.85	**93.9**		
#40	0.43	**87.3**	Medium Sand	**10.30**
#60	0.25	**81.0**		
#100	0.15	**72.2**		
#200	0.075	**62.5**	Fine Sand	**24.76**

Hydrometer Analysis

(mm)	%Finer		
0.030	**57.1**		
0.020	**51.9**		
0.012	**46.8**	Fines	
0.0083	**43.3**	Silt or Clay	**62.52**
0.0059	**39.8**		
0.0030	**34.6**		
0.0013	**29.4**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
22.4	**49**	**31**	**18**	**-0.48**

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

DESCRIPTION: Reddish Brown, (Micaceous) CLAYEY SILT, and medium to fine sand, trace fine gravel.

USCS: ML

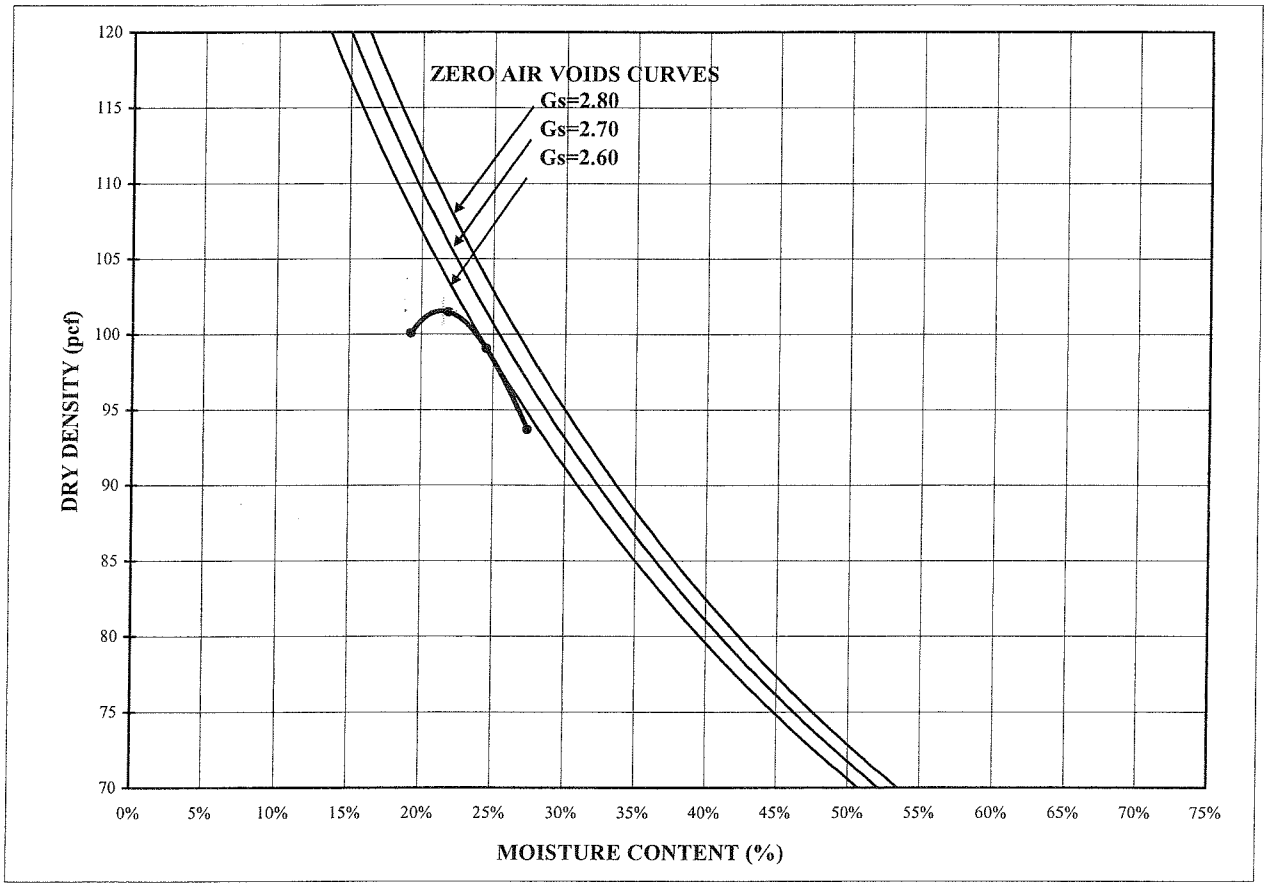
TECH	TJ
DATE	10/22/07
CHECK	AK
REVIEW	PWM

Golder Associates Inc.

MOISTURE / DRY DENSITY CURVE
ASTM D 698 Method A

Mechanical	Standard	Wet Method

PROJECT NAME: KHAFRA/ROSWELL-HACKETT RD WATER/GA
PROJECT NUMBER: 073-90270
SAMPLE ID: NT-BHW A.S #1 DEPTH: 8.5-13.5' SAMPLE TYPE: Bulk



COMPACTION POINTS		
Specimen Number	Dry Density (pcf)	Moisture Content (%)
1	100.1	19.3%
2	101.5	21.9%
3	99.1	24.5%
4	93.7	27.4%

Maximum Dry Density (pcf)	101.5
Optimum Moisture (%)	21.5
Corrected Maximum Dry Density (pcf)	
Corrected Optimum Moisture (%)	
As-Received Moisture Content	22.4%
% Retained on # 4 sieve	0.7%
% Retained on 3/8" sieve	
% Retained on 3/4" sieve	

DESCRIPTION: Reddish Brown, (Micaceous) CLAYEY SILT, and medium to fine sand, trace fine gravel.

USCS: ML

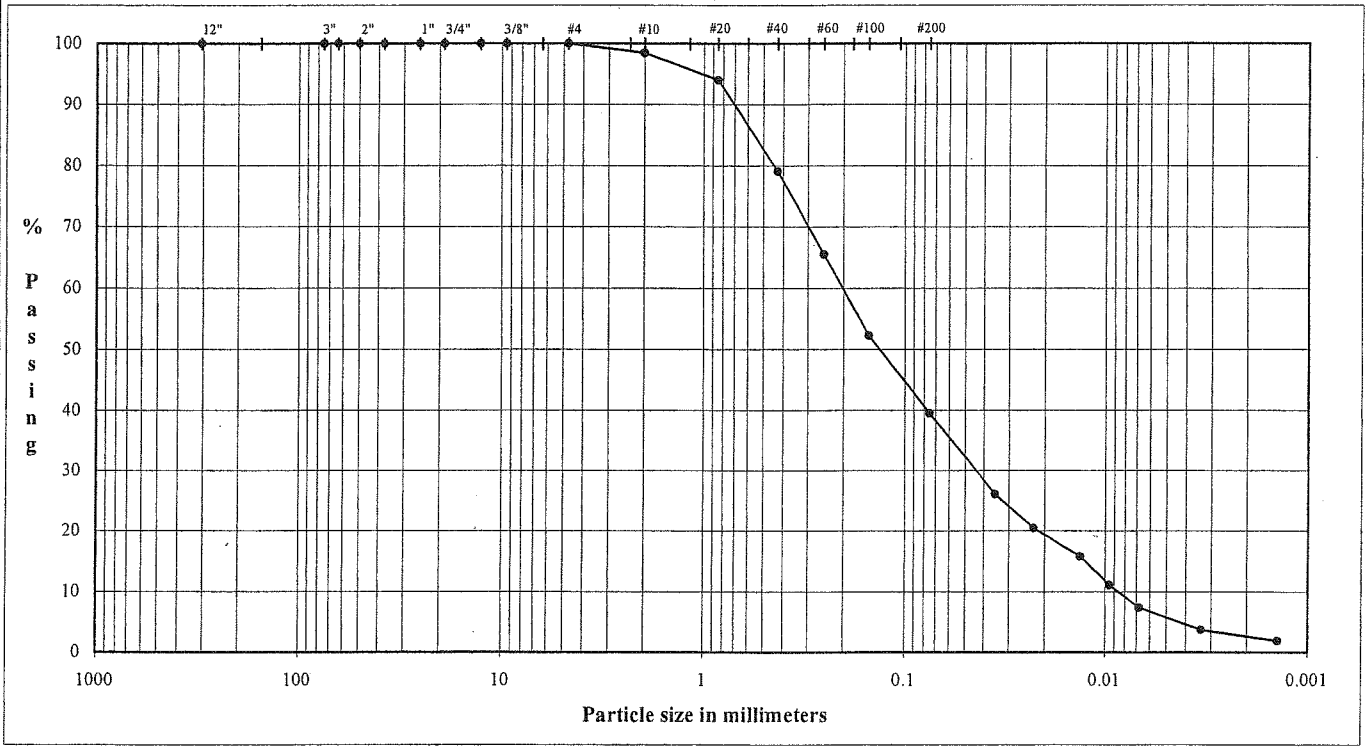
CHECK: AK
REVIEW: [illegible]

OCTOBER 2007 073-90270

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **KHAFRA/ROSWELL-HACKETT RD WATER/GA**
SAMPLE ID: **NT-BHN DO-8** Depth: **18.5-20.0'**
TYPE: **Bag**



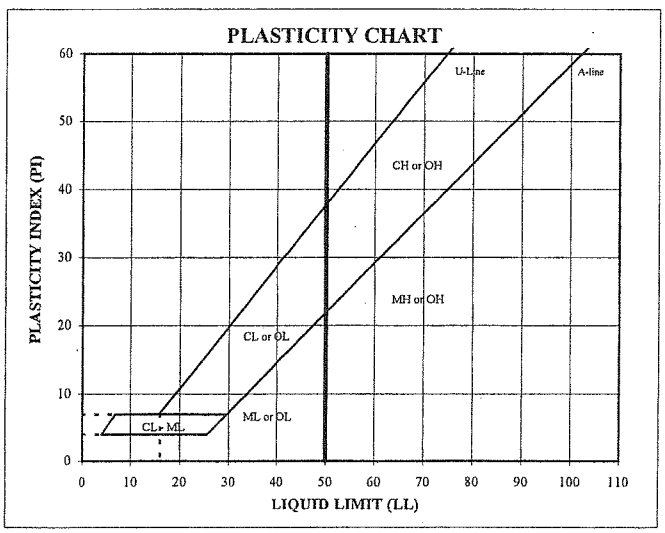
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.00
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.00
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.00
#10	2.00	98.5	Coarse Sand	1.53
#20	0.85	94.0		
#40	0.43	79.1	Medium Sand	19.41
#60	0.25	65.6		
#100	0.15	52.3		
#200	0.075	39.5	Fine Sand	39.54

Hydrometer Analysis

(mm)	%Finer		
0.035	26.1		
0.023	20.5		
0.013	15.8	Fines	
0.0095	11.2	Silt or Clay	39.52
0.0068	7.5		
0.0034	3.7		
0.0014	1.9		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
20.1	NP	NP	NP	NP

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

DESCRIPTION: Brown, MEDIUM TO FINE SAND, and clayey silty.

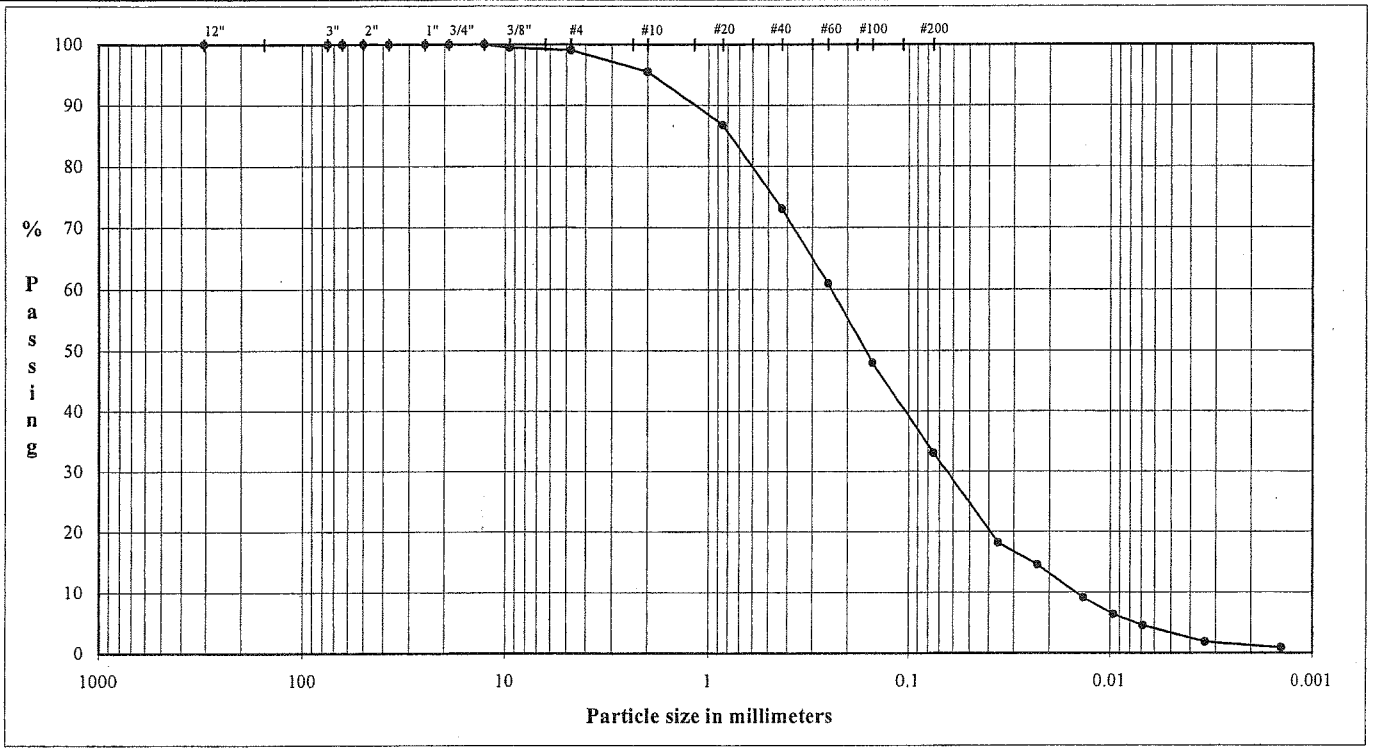
USCS: SM

TECH AK/WB/CA
DATE 10/11/07
CHECK DR
REVIEW AK

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **KHAFRA/ROSWELL-HACKETT RD WATER/GA**
SAMPLE ID: **NT-BHN DO-15** Depth: **53.5-55.0'**
TYPE: **Bag**



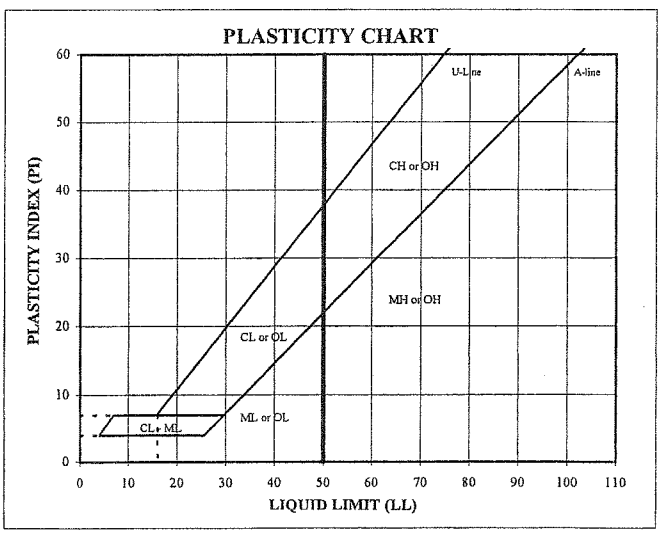
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.00
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.00
0.50"	12.7	100.0		
0.375"	9.5	99.5		
#4	4.8	99.1	Fine Gravel	0.93
#10	2.00	95.5	Coarse Sand	3.54
#20	0.85	86.7		
#40	0.43	73.1	Medium Sand	22.45
#60	0.25	61.0		
#100	0.15	48.0		
#200	0.075	33.0	Fine Sand	40.03

Hydrometer Analysis

(mm)	%Finer		
0.036	18.3		
0.023	14.6		
0.014	9.1	Fines	
0.0097	6.4	Silt or Clay	33.05
0.0069	4.6		
0.0034	1.8		
0.0014	0.9		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
27.4	NP	NP	NP	NP

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

DESCRIPTION: Brown, (Micaceous) MEDIUM TO FINE SAND, and clayey silt, trace fine gravel.

USCS: SM

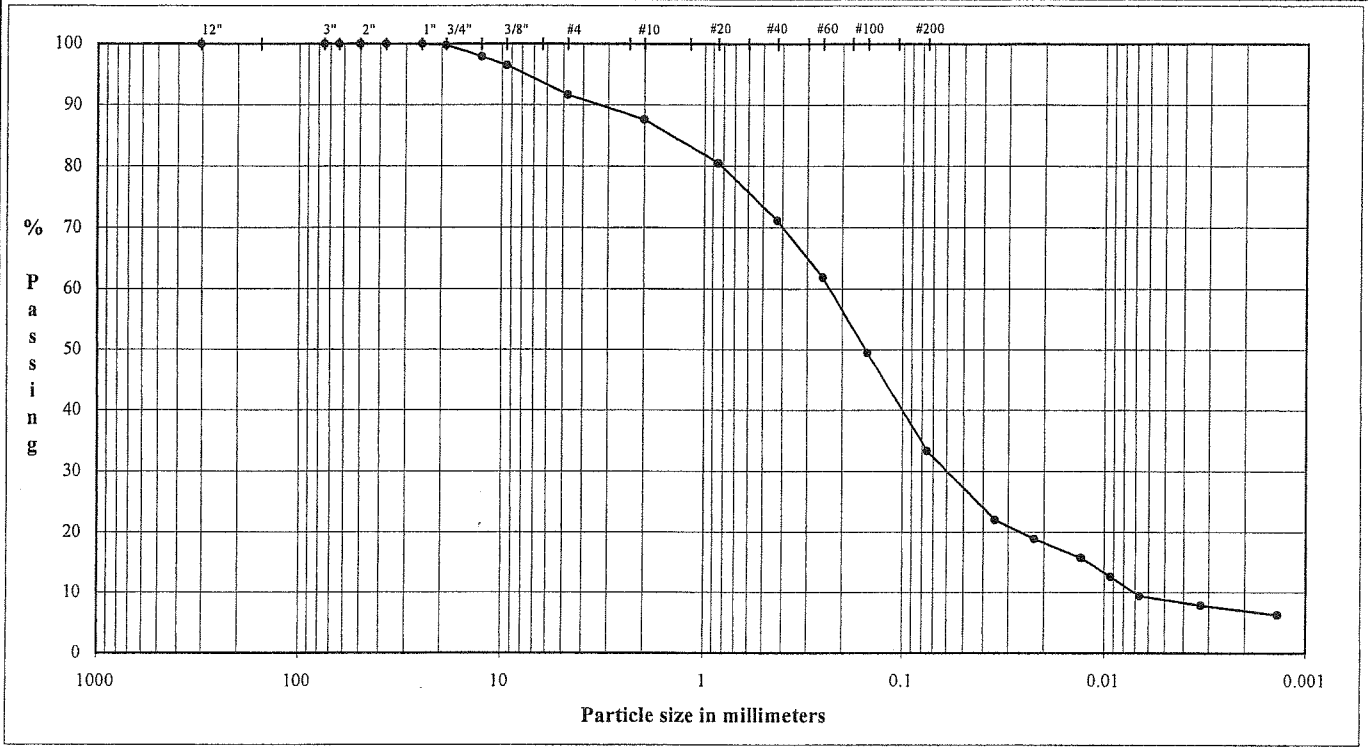
TECH AK/WB/CA
DATE 10/11/07
CHECK
REVIEW

OCTOBER 2007 073-90270

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **KHAFRA/ROSWELL-HACKETT RD WATER/GA**
SAMPLE ID: **ST-BHN A.S #1** Depth: **8.5-13.5'**
TYPE: **Bulk**



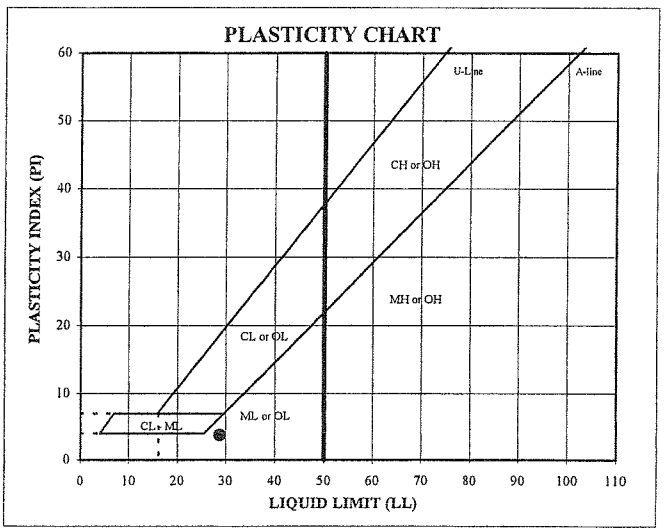
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.00
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	99.8	Coarse Gravel	0.18
0.50"	12.7	97.9		
0.375"	9.5	96.5		
#4	4.8	91.7	Fine Gravel	8.15
#10	2.00	87.6	Coarse Sand	4.02
#20	0.85	80.5		
#40	0.43	71.2	Medium Sand	16.46
#60	0.25	61.9		
#100	0.15	49.5		
#200	0.075	33.4	Fine Sand	37.84

Hydrometer Analysis

(mm)	%Finer		
0.035	22.1		
0.022	18.9		
0.013	15.8	Fines	
0.0093	12.6	Silt or Clay	33.35
0.0067	9.5		
0.0033	7.9		
0.0014	6.3		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
9.9	29	25	4	-4.01

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

DESCRIPTION: Reddish Brown, MEDIUM TO FINE SAND, and clayey silt, little fine gravel.

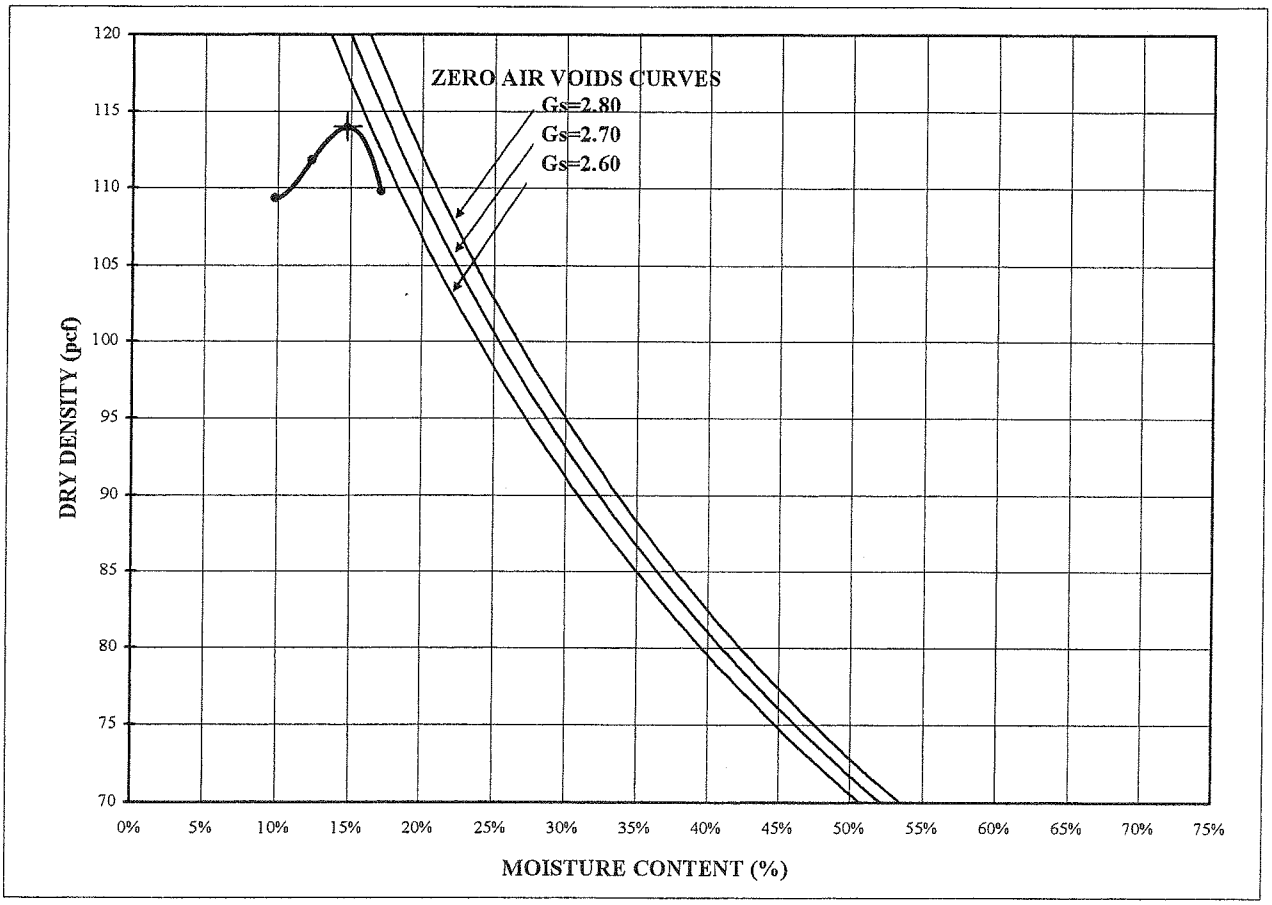
USCS: SM

TECH TJ
DATE 10/10/07
CHECK AK
REVIEW

MOISTURE / DRY DENSITY CURVE
ASTM D 698 Method A

Mechanical	Standard	Wet Method

PROJECT NAME: KHAFRA/ROSWELL-HACKETT RD WATER/GA
PROJECT NUMBER: 073-90270
SAMPLE ID: ST-BHN A.S #1 DEPTH: 8.5-13.5' SAMPLE TYPE: Bulk



COMPACTION POINTS		
Specimen Number	Dry Density (pcf)	Moisture Content (%)
1	109.3	9.8%
2	111.8	12.4%
3	113.9	14.7%
4	109.8	17.1%

Maximum Dry Density (pcf)	114.0
Optimum Moisture (%)	14.7
Corrected Maximum Dry Density (pcf)	
Corrected Optimum Moisture (%)	
As-Received Moisture Content	9.9%
% Retained on # 4 sieve	8.3%
% Retained on 3/8" sieve	
% Retained on 3/4" sieve	

DESCRIPTION: Reddish Brown, MEDIUM TO FINE SAND, and clayey silt, little fine gravel.
USCS: SM

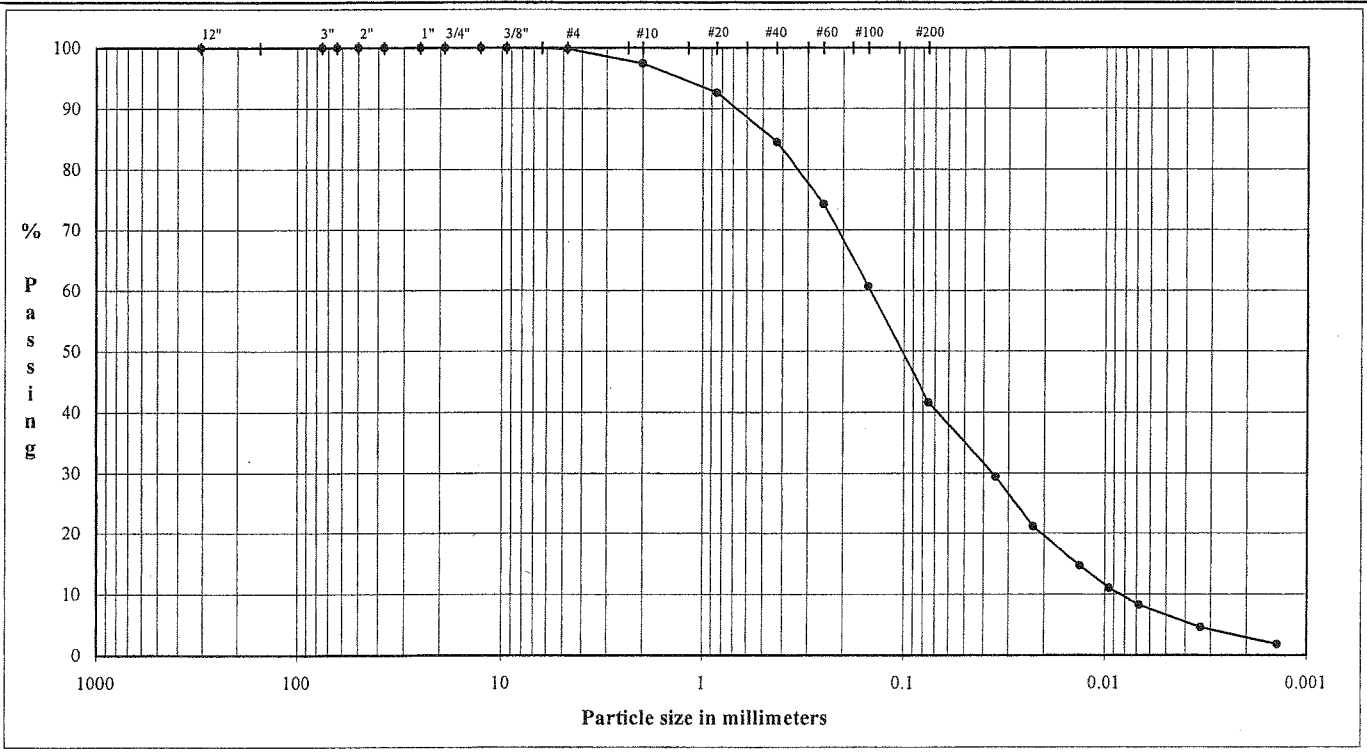
CHECK: AL
REVIEW: [illegible]

OCTOBER 2007 073-90270

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **KHAFRA/ROSWELL-HACKETT RD WATER/GA**
SAMPLE ID: **ST-BHN DO-8** Depth: **18.5-20.0'**
TYPE: **Bag**



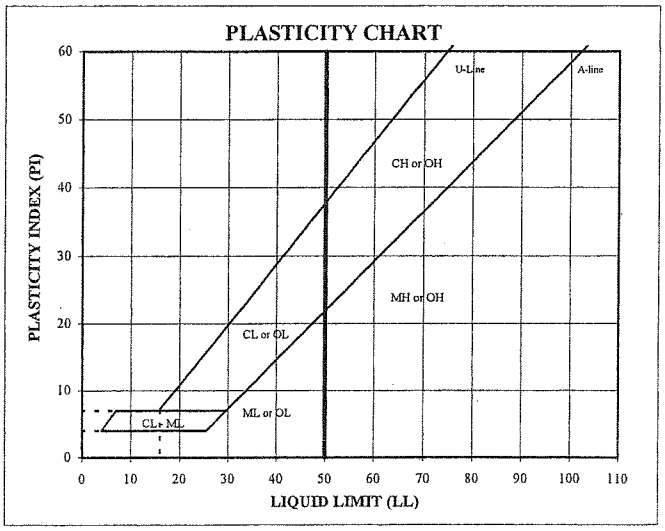
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**99.8**	Fine Gravel	**0.18**
#10	2.00	**97.4**	Coarse Sand	**2.39**
#20	0.85	**92.7**		
#40	0.43	**84.5**	Medium Sand	**12.94**
#60	0.25	**74.3**		
#100	0.15	**60.7**		
#200	0.075	**41.6**	Fine Sand	**42.87**

Hydrometer Analysis

(mm)	%Finer		
0.035	**29.5**		
0.023	**21.2**		
0.013	**14.7**	Fines	
0.0095	**11.0**	Silt or Clay	**41.61**
0.0068	**8.3**		
0.0034	**4.6**		
0.0014	**1.8**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
20.0	NP	NP	NP	NP

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

DESCRIPTION: Brown, MEDIUM TO FINE SAND, and clayey silt, trace fine gravel.

USCS: SM

TECH AK/WB/CA
DATE 10/11/07
CHECK DA
REVIEW AK

OCTOBER 2007

073-90270

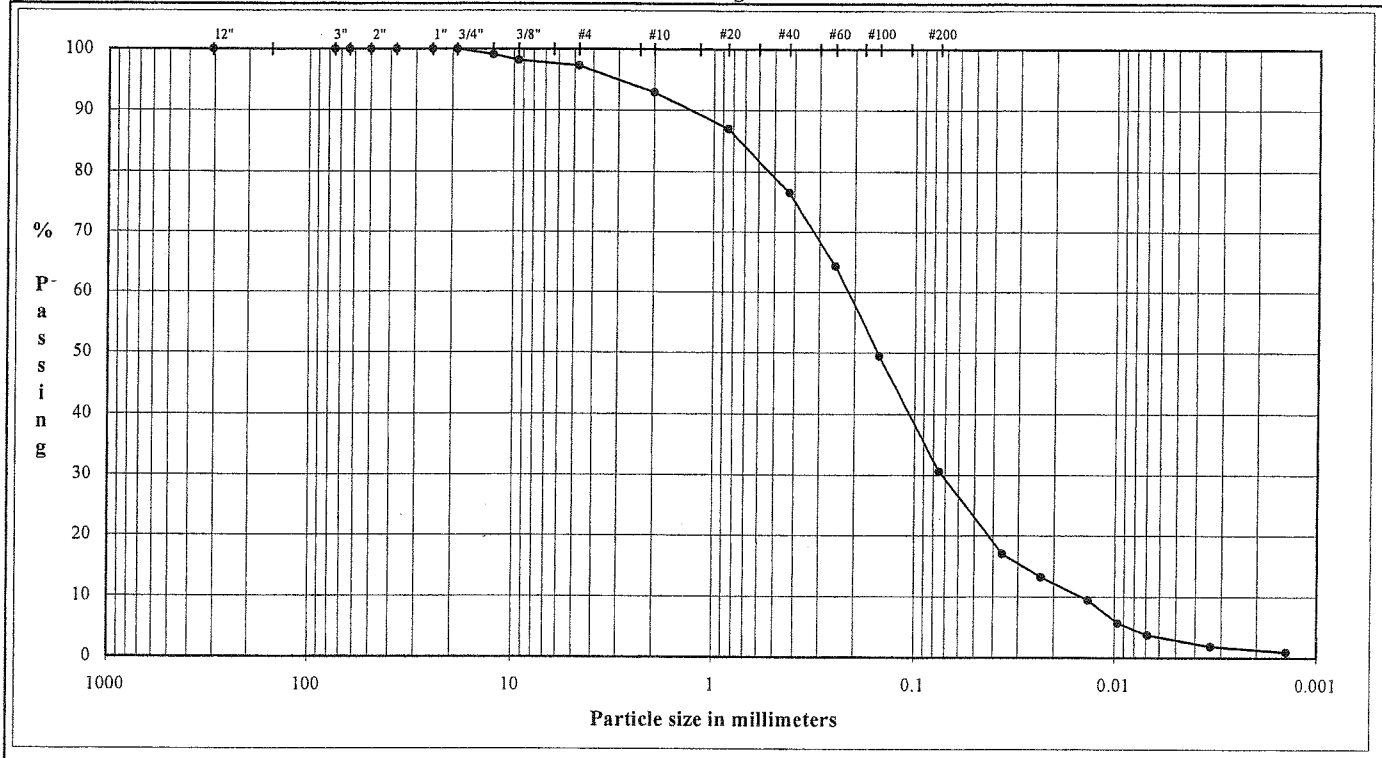
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **KHAFRA/ROSWELL-HACKETT RD WATER/GA**

SAMPLE ID: **ST-BHN DO-11** Depth: **33.5-35.0'**

TYPE: **Bag**



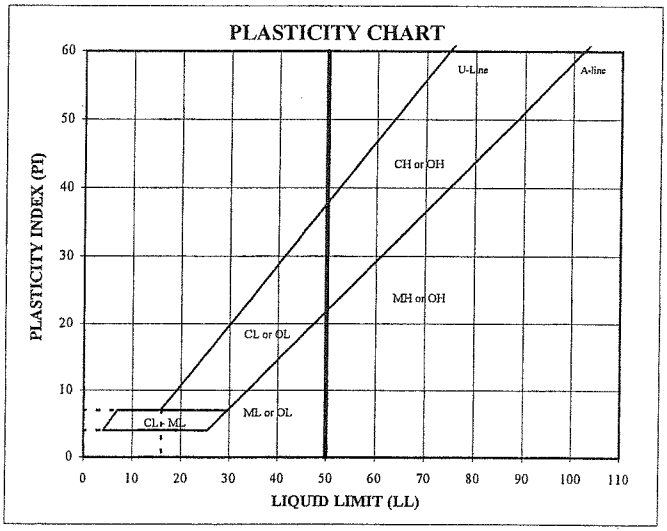
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**99.1**		
0.375"	9.5	**98.1**		
#4	4.8	**97.3**	Fine Gravel	**2.73**
#10	2.00	**92.9**	Coarse Sand	**4.36**
#20	0.85	**87.0**		
#40	0.43	**76.6**	Medium Sand	**16.35**
#60	0.25	**64.4**		
#100	0.15	**49.5**		
#200	0.075	**30.6**	Fine Sand	**45.95**

Hydrometer Analysis

(mm)	%Finer		
0.036	**17.1**		
0.023	**13.3**		
0.014	**9.5**	Fines	
0.0097	**5.7**	Silt or Clay	**30.61**
0.0069	**3.8**		
0.0034	**1.9**		
0.0014	**0.9**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
18.1	NP	NP	NP	NP

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

DESCRIPTION: Dark Brown, (Micaceous) MEDIUM TO FINE SAND, and clayey silt, trace fine gravel.

USCS: SM

TECH AK/WB/CA

DATE 10/11/07

CHECK DJA

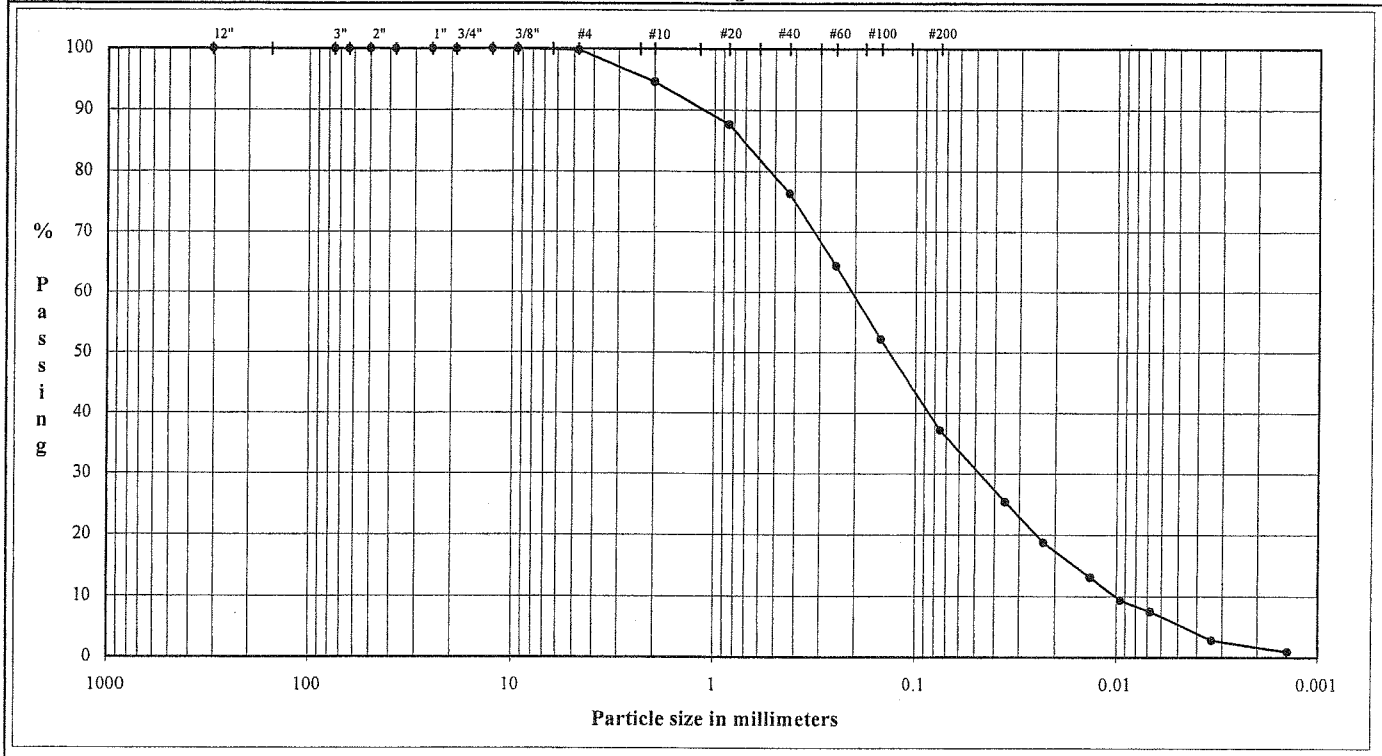
REVIEW AK

OCTOBER 2007 073-90270

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **KHAFRA/ROSWELL-HACKETT RD WATER/GA**
SAMPLE ID: **ST-BHN DO-12** Depth: **38.5-40.0'**
TYPE: **Bag**



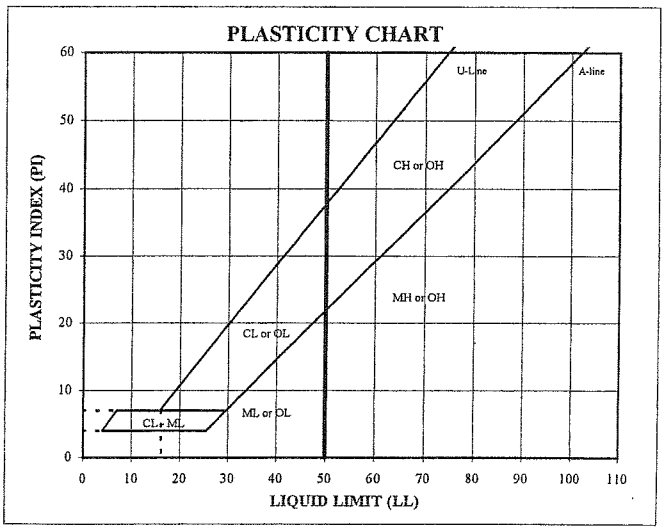
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.00
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.00
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	99.8	Fine Gravel	0.22
#10	2.00	94.6	Coarse Sand	5.19
#20	0.85	87.7		
#40	0.43	76.4	Medium Sand	18.21
#60	0.25	64.4		
#100	0.15	52.2		
#200	0.075	37.1	Fine Sand	39.24

Hydrometer Analysis

(mm)	%Finer		
0.035	25.4		
0.023	18.8		
0.013	13.2	Fines	
0.0096	9.4	Silt or Clay	37.15
0.0068	7.5		
0.0034	2.8		
0.0014	0.9		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_r	LL	PL	PI	LI
17.6	NP	NP	NP	NP

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

DESCRIPTION: Dark Brown, MEDIUM TO FINE SAND, and clayey silt, trace fine gravel.

USCS: SM

TECH AK/WB/CA
DATE 10/11/07
CHECK DA
REVIEW AK