INVITATION TO BID

FOR

TEMPLE WWTP GRIT REMOVAL SYSTEM & CONTROL PANEL REPLACEMENT

City of Temple

240 Carrollton Street Temple,
GA 30179

Job #: H21166
August 02, 2021

ENGINEERS | SURVEYORS
LANDSCAPE ARCHITECTS

6554 E. CHURCH ST DOUGLASVILLE, GA 30134
TEL: 770.942.0196 | FAX: 770.942.0152
www.HRCEngineers.com

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Section 00020
Invitation to Bid

Temple WWTP Grit Removal System Replacement

City of Temple, Georgia

Sealed Bids, for furnishing all materials, labor, tools, equipment and appurtenances necessary for the construction of the **Temple WWTP Grit Removal System and Associated Control Panel Replacement** will be received by the Owner at City Hall, 240 Carrollton Street, Temple, GA 30179, Attn: Bill Osborne, City Administrator, until **3:00 p.m.,** local time, on **Thursday, August 26, 2021**, and then at said office publicly opened and read aloud. You are invited to attend or submit your bid prior to the deadline.

The Project will include removal and replacement of the WWTP Grit Removal System Replacement.

A **Pre-Bid Meeting** will be held on **Tuesday, August 17, 2021 1:30 p.m.** at the **Temple WWTP** 574 Oak Shade Road, Temple, GA 30179. After the Pre-Bid meeting, a site visit will be held for all bidders to evaluate the on-site conditions. This will be the only site visit held by the Owner.

The work will be awarded in one Contract.

All questions regarding this bid shall be in writing either by mail, fax (770-942-0152), or email (HRay@HRCEngineers.com). No questions shall be received after **5:00 p.m., Thursday August 19, 2021.** Responses will be provided by **5:00 p.m., Monday August 23, 2021.** No other City staff or officials associated with this project should be contacted regarding this bid.
DOING SO MAY RESULT IN BIDDER'S DISQUALIFICATION.

The Instructions to Bidders, Bid, Contract Agreement, Drawings, Specifications and forms of Bid Bond, Performance Bond, Payment Bond and other Contract Documents may be downloaded on our website at **www.HRCEngineers.com** under the Contractor's Bid Opportunities tab located at the bottom of the main page or examined at one of the following locations listed below:

City of Temple
240 Carrollton Street
Temple, GA 30179
770.562.3369

HRC Engineers, Surveyors
& Landscape Architects
6554 E. Church Street
Douglasville, GA 30134
770.942.0196

1940 iSqFt®/AGC Builders Exchange
The Exchange, Suite 300
Atlanta, GA 30339
1.800.364.2059
www.isqft.com

Copies of Contract Documents may be obtained at the office of the Owner Representative, HRC Engineers, Surveyors and Landscape Architects, 6554 E. Church Street, Douglasville, GA 30134. The cost of the Contract Documents is $50.00, non-refundable, for each set. No partial sets will be sold. Shipment will be via delivery service – two-day delivery. Other shipping will be at the purchaser's additional expense. Street address must be provided to allow delivery.

By purchasing the Contract Documents, purchaser agrees to have their company information (company name, city, state, phone number, fax number) published on City of Temple's website as a "planholder". Planholders list will be available at **www.TempleGA.us.**

Each Bid must be accompanied by a Bid Bond, prepared on the form of Bid Bond attached to the Contract Documents or a Surety Company's Standard Bid Bond, duly executed by the Bidder as principal and having as surety thereon a surety company licensed to do business in the State of Georgia and listed in the latest issue of U.S. Treasury Circular 570, in the amount of **five (5) percent** of the Bid. Additionally documentation that meets the bid requirements for General Liability Insurance, Worker's Compensation, valid business license, and valid utility contractor's license shall be provided with the submitted bid.

Place one (1) original and three (3) copies of your response in a sealed envelope and clearly labeled "Bid For Temple WWTP Grit Removal System Replacement, as well as the Bidder's name, addressed to the City of Temple, **ATTENTION:** Bill Osborne, City Administrator, 240 Carrollton Street, Temple, Georgia, 30179.

Each Bid must be submitted in a sealed envelope, addressed to the Owner. Each sealed envelope containing a Bid must be plainly marked on the outside as, "Bid for Temple WWTP Grit Removal System Replacement" Additionally, the Bidder shall provide on the outside of the sealed envelope the Bidder's Name and the Bidder's Georgia Commercial Contractor's License number; otherwise the Bid will not be opened and will be returned to the Bidder.

Equal Employment Opportunity Clause: Bidders must comply with the Equal Employment Opportunity requirements specified in the Instructions to Bidders.

Employment of Local Businesses and Contractors: It is the wish of the Owner that local businesses, including contractors be given the opportunity to bid on the various parts of the work.

The desire on the part of the Owner to encourage participation of minority and locally owned businesses and contractors is not intended to restrict or limit competitive bidding or to increase the cost of the work. The Owner supports a healthy, free market system that seeks to include responsible local businesses and provide ample opportunities for local business growth and development.

The Owner will in no way be liable for any costs incurred by any bidder in the preparation of its Bid in response to this Invitation to Bid.

The successful Bidder for this Contract will be required to furnish a satisfactory Performance Bond and Payment Bond each in the amount of 100 percent of the Bid.

The Owner reserves the right to reject all Bids, to waive informalities and to re-advertise.

No Bid will be received or accepted after the above specified time and date of the Bid Opening. Bids submitted after the designated time and date will be deemed invalid and returned unopened to the Bidder. Bids may not be withdrawn for a period of ninety (90) days after the bid opening and all bids shall remain firm during this period.

CITY OF TEMPLE

END OF SECTION

1.01 Contract Documents

A. The Contract Documents include the Contract Agreement, Invitation to Bid, Instructions to Bidders, Contractor's Bid (including all documentation accompanying the Bid and any post-Bid documentation required by the Owner 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 Engineer's written interpretations and clarifications issued in accordance with the General Conditions on or after the date of the Contract Agreement.

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

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

1.02 Definitions

A. Where the following words or the pronouns used in their stead occur herein, they shall have the following meaning:

1. “Owner” shall mean the City of Temple, party of the first part to the Contract Agreement, or its authorized and legal representatives, including the City of Temple.

2. “Engineer” shall mean project engineer, project architect or owner’s representative.

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

4. “Work” and “Project” shall mean the entire completed construction required to be furnished under the Contract Documents.

5. "Contract Time" shall mean 300 consecutive calendar days as provided in the Contract Agreement for completion of the Project, to be computed from the date of the Notice to Proceed.

6. "Liquidated Damages" shall be $0 which the Bidder agrees to pay for each consecutive calendar day beyond the Contract time required to complete the Project. Liquidated Damages will end upon written notification from the Owner of Final Acceptance of the Project.

7. "Products" shall mean materials or equipment permanently incorporated into the Project.

8. "Provide" shall mean to furnish and install.

9. "Furnished by the Owner" shall mean that the Owner shall pre-purchase specific products and have them delivered to a place mutually agreed upon by the supplier, the Owner and the Contractor, at no cost to the Contractor.

10. Reserved.

11. "Balanced Bid" shall mean a Bid in which each of the unit prices and total amount bid for each of the listed items reasonably reflects the value of that item with regard to the entire job considering the prevailing cost of labor, material and equipment in the relevant market. A Bid is unbalanced when, in the opinion of the Owner, any unit prices or total amounts bid on any of the listed items do not reasonably reflect such values.

12. "Substantial completion of the work", solely for the purposes of Official Code of Georgia Annotated (O.C.G.A.) §13-10-80(b)(2)(c), shall be defined as occurring on the date of the written notification from the Engineer that the Project is ready for final inspection, as specified in Section 00800, Article 30, paragraph (g).

13. "Satisfactorily completed", solely for the purposes of O.C.G.A. §13-1081(b), shall mean the completion of all work, certifications and affidavits as specified in Section 00800, Article 30, Paragraph (g).

14. "Change Order" shall mean an alteration, addition, or deduction from the original scope of work as defined by the Contract Documents to address changes or unforeseen conditions necessary for Project completion.

1.03 Preparation and Execution of Bid

A. Each Bid must be prepared to represent that it is based solely upon the materials and equipment specified in the Contract Documents.

B. Each Bid must be submitted on the Bid forms which are attached to the Contract Documents. All blank spaces for Bid prices, both words and figures, must be filled in, in ink. In case of discrepancy, the amount shown in words will govern. All required enclosed certifications must be fully completed and executed when submitted.

C. Each Bid must be submitted in a sealed envelope, addressed to the Owner. Each sealed envelope containing a Bid must be plainly marked on the outside as, "Bid for Temple WWTP Grit Removal System Replacement" Additionally, the Bidder shall provide on the outside of the sealed envelope the Bidder's Name and the Bidder's Georgia Commercial Contractor's License number; otherwise the Bid will not be opened and will be returned to the Bidder.

D. If forwarded by mail, the sealed envelope containing the Bid must be enclosed in another envelope addressed to the Owner at City of Temple, 240 Carrollton Street, Temple, GA 30179, Attn: Bill Osborne, City Administrator.

E. Any and all Bids not meeting the aforementioned criteria for Bid submittal, may be declared non-responsive, and subsequently returned to the Bidder.

F. The Contractor, in signing a Bid on the whole or any portion of the Project, shall conform to the following requirements:

1. Bids which are not signed by individuals making them shall have attached thereto a power of attorney evidencing authority to sign the Bid in the name of the person for whom it is signed.

2. Bids which are signed for a partnership shall be signed by all of the partners or by an attorney-in-fact. If a Bid is signed by an attorney-in-fact, there should be attached to the Bid a power of attorney executed by the partners evidencing authority to sign the Bid.

3. Bids which are signed for a corporation shall have the correct corporate name thereof and the signature of the president or other authorized officer

of the corporation manually written below the corporate name following the wording "By ". Corporation seal shall also be affixed to the Bid.

4. The Bidder shall complete, execute and submit the following documents, which are attached to these Contract Documents:

   a. The Bid

   b. The Bid Bond

   c. Statement of Bidder's Qualifications

   d. Corporate Certificate, if the Bidder is a corporation

   e. Contractor's License Certification

   f. Non-Collusion Affidavit of Prime Bidder

   g. Certificates of Insurance demonstrating coverage of Bidder as required by Bid Requirements (Workers Compensation, Comprehensive General Liability, Owner's and Contractor's Protective Liability, Automobile Liability, Materials and Equipment Floater Insurance.)

   h. Certificates of Insurance: Certificates acceptable to the Owner shall be submitted with the Bid Documents. All Certificates of Insurance issued in conjunction with this Project shall contain the statement that "Coverages afforded under the policies shall not be cancelled unless at least 60 days prior to cancellation written notice has been given to the Owner, as evidenced by receipts of registered or certified mail". Other standard or preprinted cancellation statements shall be deleted from the certificates.

   i. Additional Insured: The Contractor shall name the City of Temple and HRC Engineers, Surveyors and Landscape Architects as an Additional Insured on all Certificates for Comprehensive General Liability, Owner's Protective Liability, Contractor's Protective Liability, Automobile Liability and Materials and

Equipment floater. The Contractor shall maintain such coverage for the full duration of the Project.

1.04 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 will be subject to rejection. Conditional Bids will not be accepted. 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.

1.05 Addenda and Interpretations

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

B. A Pre-Bid meeting will be held on Tuesday, June 1, 2021 at 11:00 a.m. at Temple WWTP 574 Oak Shade Road, Temple, GA 30179.

C. Every request for such interpretation should be made in writing and addressed to HRC Engineers, Surveyors and Landscape Architects, 6554 E. Church Street, Douglasville, GA 30134 (email: HRay@HRCEngineers.com) and to be given consideration must be received by 5:00 PM on Friday, June 18, 2021

C. 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.

D. 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.

1.06 Bid Security

A. Each Bid must be accompanied by a Bid Bond, prepared on the form of Bid Bond included herein or a Surety Company's Standard Bid Bond, duly executed by the Bidder as principal and having as surety thereon a surety company authorized to do business in the State of Georgia and listed in the latest issue of

U.S. Treasury Circular 570, in the amount of ten percent of the Bid. Attorneysin-fact who sign Bonds must file with each Bond a currently dated copy of their power of attorney.

B. If for any reason whatsoever the successful Bidder withdraws from the competition after opening of the Bids, or if Bidder refuses to execute and deliver the Contract and Bonds required within 10 days after receipt of Conformed Contract Documents for execution, the Owner may proceed to enforce the provisions of the Bid Bond. City reserves the right to disqualify bidder for any reason and move to the next responsible bidder without rebidding the project.

1.07 Receipt and Opening of Bids

A. The Owner may consider a minor irregularity any Bid not prepared and submitted in accordance with the provisions hereof and may waive any minor irregularities or reject any and all Bids. Any Bid may be withdrawn prior to the above scheduled time for the opening of Bids or authorized postponement thereof. Any Bid received after the time and date specified shall not be opened.

B. If a Bidder, after the Bid opening determines that its Bid contained a material mistake, the Bidder may withdraw its Bid, subject to the provisions of, and, if the mistake meets the criteria in O.C.G.A. § 36-91-52.

1.08 Subcontracts

The Bidder is specifically advised that any person, firm or other party to whom it is proposed to award a subcontract under this Contract must be acceptable to and approved by the Owner. A list of any sub-contractors must be provided in writing to the Owner prior to initiation of any work and must be approved in writing by the Owner.

1.09 Conditions of the Project

Each Bidder must be informed fully of the conditions relating to the construction of the Project and the employment of labor thereon. Failure to do so will not relieve a successful Bidder of the obligation to furnish all material and labor necessary to carry out the provisions of the Contract. Insofar as possible, the Contractor, in carrying out the work, must employ such methods or means as will not cause any interruption of or interference with the work of any other Contractor.

A. The Bidder is advised to examine the location of the Project and to be informed fully as to its conditions; the conformation of the ground; the character, quality and quantity of the products needed preliminary to and during the prosecution of the work; the general and local conditions and all other matters which can in any way affect the work to be done under the Contract. Failure to examine the site will not relieve the successful Bidder of an obligation to furnish all products and labor necessary to carry out the provisions of the Contract.

B. A Pre Bid meeting will be held on **Tuesday, August 17, 2021 at 1:30 p.m**. at Temple WWTP, 574 Oak Shade Road Temple, GA 30179. The Bidder shall confine examination to the specific areas designated for the proposed construction. If, due to some unforeseen reason, the Owner's proceedings for obtaining the proposed construction site have not been completed the Bidder may enter the site only with the express consent of the property owner. The Bidder is solely responsible for any damages caused by examination of the site.

1.10 Equal Employment Opportunity

A. During the performance of this Contract, the Contractor agrees as follows:

1. The Contractor shall not discriminate against any employee, or applicant for employment, because of race, religion, color, sex, or national origin. As used herein, the words “shall not discriminate” shall mean and include, without limitation, recruited, whether by advertising or other means; compensated, whether in the form of rates of pay, or other forms of compensation; selected for training including apprenticeship; promoted; upgraded; demoted; downgraded; transferred; laid-off; and terminated.

2. The Contractor shall in all solicitation or advertisement for employees, placed by or on behalf of the Contractor; state that all qualified applicants will receive

consideration for employment without regard to race, religion, color, sex or national origin.

3. The Contractor shall send to each labor union or representative of the workers, with which the Contractor has a collective bargaining agreement or other contract or understanding, a notice advising the labor union or worker's representative of the Contractor's commitments under the Equal Employment Opportunity Program of the City of Temple and under this Article and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

4. The Contractor and his subcontractors, if any, shall file compliance reports at reasonable times and intervals with the Owner in the form and to the extent prescribed by the City of Temple. Compliance reports filed at such times as directed shall contain information as to the employment practices, policies, programs and statistics of the Contractor and their subcontractors.

1.11 Notice of Special Conditions

If any special federal, state, county or city laws, municipal ordinances, and the rules and regulations of any authorities having jurisdiction over construction of the Project, herein referred to, or applicable by law to the Project, conflict with requirements of the Contract Documents, then the most stringent requirement prevails.

1.12 Obligation of Bidder

By submission of a Bid, each Bidder warrants that Bidder has inspected the site and has read and is thoroughly familiar with the Contract Documents (including all addenda). The failure or omission of any Bidder to examine any form, instrument or document shall in no way relieve any Bidder from any obligation in respect to the Bid.

1.13 Method of Award

A. The City is using the Competitive Sealed Bids method of source selection for this procurement. An award, if made, will be made to the responsible provider whose proposal is most advantageous to the City, and most responsible and responsive as required by law, taking into consideration the factors set forth in this RFP.

B. The Bidder to whom the award is made will be notified. The Owner reserves the right to reject all Bids and to waive any minor irregularities in Bids received whenever such rejection or waiver is in the Owner's interest.

C. A responsive Bidder shall be one who submits a Bid in the proper form without qualification or intent other than as called for in the Contract Documents, and who binds himself or herself on behalf of the Bid to the Owner with the proper Bid Bond completed and attached, and who properly completes all forms required to be completed and submitted at the time of the Bidding and who agrees to comply with all contract requirements relative to the Notice of Award. The Bidder shall furnish all data required by these Contract Documents. Failure to do so may result in the Bid being declared nonresponsive.

D. A responsible Bidder shall be one who can fulfill the following requirements:

1. The Bidder shall maintain a permanent place of business. This requirement applies to the Bidder where the Bidder is a division of a corporation, or where the Bidder is 50 percent or more owned by a person, corporation or firm.

2. The Bidder shall demonstrate adequate construction experience to properly perform the work under and in conformance with the Contract Documents. This evaluation will be based upon a list of completed or active projects completed within the last 5 years. The Owner may make such investigations as deemed necessary to determine the ability of the Bidder to perform the work, and the Bidder shall furnish to the Owner all such information and data for this purpose as the Owner may reasonably request. The Owner reserves the right to reject any Bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the obligations of the Contract and to complete the Project contemplated therein. Adequate WWTP construction experience shall be defined as the following: successful completion of work similar nature to this project with at least two (2) projects of $100,000 in construction value, within the last five years. Additionally, the Bidder can include project(s) currently under construction, but only the total amount paid by the Owner(s) as of three (3) months prior to the bid date on uncompleted project(s) can be included in construction volume for purposes of this certification. The Bidder is allowed to list up to a maximum of five

(5) projects of the types listed above, that combined, will add up to at least the cost in completed volume of work listed above.

3. The Bidder shall demonstrate financial resources of sufficient strength to meet the obligations incident to the performance of the work covered by these Contract Documents. The ability to obtain the required Performance and Payment Bonds will not alone demonstrate adequate financial capability.

4. Demonstration of Comprehensive General Liability insurance of at least $1,000,000.00 in aggregate per occurrence.

5. Demonstration of Worker's Compensation insurance.

6. Demonstration of a valid business license and Georgia Commercial Contractor's License.

E. Acceptance of the Bidder's documentation and substantiation or Contract Award by the Owner does not relieve the Bidder of liability for nonperformance as covered in the Contract Documents, nor will the Bidder be exempted from any other legal recourse the Owner may elect to pursue.

1.14 Employment of Local Labor

Preference in employment on the Project shall, insofar as practical, be given to qualified local labor.

1.15 Local Licenses, Taxes and Fees

Not Applicable. Bidder must have a valid business license and a Georgia Commercial Contractor's License.

1.17 Permits and Easements

A. The following permits are the responsibility of the owner, and their status is as follows:

1. All permits shall be procured by Contractor.

Should a required Permit be denied and therefore not approved, the City reserves the right to not award the project.

END OF SECTION

TO: CITY OF TEMPLE

FROM: _____

FOR: Temple WWTP Grit Removal System Replacement

Submitted: _____, 20_____

The undersigned Bidder, in compliance with your Invitation to Bid for the construction of this Project having examined the Contract Documents, the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed Project, including the availability of materials and labor, hereby proposes to construct the Project in accordance with the Contract Documents.

The Bidder proposes and agrees, if this Bid is accepted, to contract with City of Temple in the form of Contract Agreement specified, to furnish all necessary products, machinery, tools, apparatus, means of transportation and labor necessary to complete the construction of the Work in full and complete accordance with the reasonably intended requirements of the Contract Documents to the full and entire satisfaction of the City of Temple with a definite understanding that no money will be allowed for extra work except as set forth in the Contract Documents, for the following prices:

TO BE SUBMITTED BY 3:00 P.M. Thursday, August 26, 2021

Date:

Bidder's Name and Address

City of Temple

240 Carrollton Street

Temple, Georgia 30179

The undersigned ("Contractor") herein submits to CITY OF TEMPLE ("CITY") the following Bid for the construction of the TEMPLE WWTP Grit Removal System Replacement located at 574 Oak Shade Road, Carroll County, Temple, Georgia (the "Project"). This Bid is submitted in response to the Owner's Invitation to Bid.

This Bid is for the full and complete construction of the Project in conformity with all requirements of the Contract Documents. The submission of this Bid constitutes a representation by the Contractor that it has carefully studied and examined all of Invitation to bid requirements furnished by HRC Engineers, Surveyors and Landscape Architects (the "Architect/Engineer") and such other information as may have been furnished by the City of Temple or the Engineer including Addenda(um) No. ____ through __ ___ , Contractor further represents that it has no knowledge of any ambiguities, errors, omissions or other inaccuracies in any of the Contract Documents or other material furnished by the Owner or Architect in connection with the Project.

A. Base Bid

The Contractor proposes to fully and completely construct the Project in conformity with all requirements of the Contract Documents and furnish all necessary labor, material and equipment for such construction, and, furthermore, to fully, completely, and strictly perform all obligations of the Contractor as set forth in the Contract Documents for the proposed Contract Stipulated Sum of

_____DOLLARS

($_____)

B. Total Bid with Owner Allowance

The owner has elected to create a cash allowance for testing and inspections in the amount of $15,000.

_____ + **$15,000** _____ = **Total Bid**

C. Duration

Contractor proposes to fully and completely construct the Project in conformity with all requirements of the Contract Documents within a maximum of

____300_____CONSECUTIVE CALENDAR DAYS.
(The Commencement Date will be fixed in a Notice to Proceed Issued by the Owner)

D. Unit Prices (Not to Exceed) – Not Applicable

The Unit Prices set forth herein shall be binding and shall become a part of the Contract (they are not part of the proposed Stipulated Sum set forth in the Base Bid hereinabove). The Contractor declares that it understands that the Unit Price Items, are for the purposes of the Owner and should Owner elect to add work outside of Contract Documents or delete work from Contract Documents the Unit Prices would be utilized for pricing. The Contractor proposes to do the additional work at the Unit Prices stated herein, and should the Owner elect to delete work contained in the Contract Documents, the Contractor 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 the work, at which time adjustment will be made to the Contract Amount by direct increase or decrease.

E. Bid Security

Bid Security in the amount of Five Percent (5%) of the Base Bid is attached in the amount of _____ Dollars ($ _____), which is to become the property of the Owner in the event the Contract and Performance Bonds are not executed within the time set forth, as liquidated damages for the delay and additional cost caused the Owner.

The Contractor proposes and agrees to commence actual construction (ie., physical work) on site with adequate management, labor, materials and equipment within Ten (10) Days from the

Notice to Proceed and prosecute the Work diligently and faithfully to completion within the required Contract Time. The Contractor will execute the formal Contract and will deliver a Surety Bond for the faithful performance of this Contract and such other bonds and insurance as required by the specifications to the City of Temple.

Contractor herein acknowledges that this Bid shall constitute an offer by Contractor to contract with the City of Temple for construction of the Project in conformity with all requirements of the Contract Documents for the Lump Sum Contract Price as set forth hereinabove. Said offer by Contractor is irrevocable and subject to acceptance by the City of Temple until the expiration of Sixty (60) Days following the date set forth in the Invitation to Bid for receipt of Bids by the City of Temple.

A. If awarded a Contract, the Contractor's Surety will be

_____

Witness:_____

(Proprietorship or Partnership)

Business Name:_____

By:_____

Title:_____
(Owner, Partner, Corp. Pres. Or Vice Pres. Only)

Attest:_____

By:_____

Address:

_____

_____

_____

License No.

_____

Title:_____

(Corp. Sec. or Assist. Sec. Only)

Federal ID. No.

_____

(Corporate Seal)

END OF SECTION

STATE OF GEORGIA

COUNTY OF CARROLL

KNOW ALL MEN BY THESE PRESENTS, that we, _____ as Principal, and _____, as Surety, are held and firmly bound unto the City of Temple in the sum of **five (5)** percent of amount bid lawful money of the United States of America, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, personal representatives, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted to the Owner a Bid for construction of the Temple WWTP Grit Removal System Replacement.

NOW THEREFORE, the conditions of this obligation are such that if the Bid be accepted, the Principal shall, within ten days after receipt of conformed Contract Documents, execute a Contract in accordance with the Bid upon the terms, conditions and prices set forth therein, and in the form and manner required by the Contract Documents and execute sufficient and satisfactory separate Performance and Payment Bonds payable to the Owner, each in an amount of 100 percent of the total Contract Price, in form satisfactory to the Owner, then this obligation shall be void; otherwise, it shall be and remain in full force and effect 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 aforesaid Owner, upon demand, the amount hereof in good and lawful money of the United States of America, not as a penalty, but as liquidated damages. This bond is given pursuant to and in accordance with O.C.G.A. §36-91-1 et.seq. and all the provisions of the law referring to this character of bond as set forth in said Sections or as may be hereinafter enacted and these are hereby made a part hereof to the same extent as if set out herein in full.

IN WITNESS WHEREOF, the said Principal has hereunder affixed its signature and seal, and said Surety has hereunto caused to be affixed its corporate signature and seal, by its duly authorized officers, on this _____ day of _____, 20____.

CONTRACTOR – PRINCIPAL: _____
(name signed)

By: _____
(name printed or typed)

Title: _____

Address: _____

_____

Attest: _____
(name signed)

Title: _____
(name printed or typed)

(SEAL)

SURETY: _____
(name signed)

By: _____
(name printed or typed)

Title: _____

Address: _____

_____

Attest: _____
(name signed)

Title: _____
(name printed or typed)

(SEAL)

Note: 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 where the Project is located.

END OF SECTION

All questions must be answered and the data given must be clear and comprehensive. This statement must be notarized. If necessary, questions may be answered on separate attached sheets. The Bidder may submit any additional information desired. Attach all additional sheets to this statement. (Sample "Project Information Form" contained at the end of this Section.)

1. Name of Bidder: _____

2. Permanent main office address: _____

_____

3. When organized: _____

4. If a Corporation, where incorporated: _____

5. How many years have you been engaged in the contracting business under your present firm or trade name?

_____

6. General description of type of work performed by your company: _____

_____

7. Have you ever failed to complete any work awarded to you? If so, where and why?

_____

8. Have you ever defaulted on a contract? If so, where and why? _____

_____

9. Names, background and experience of the principal members of your organization, including officers and years of experience.

Name Position Experience

_____

_____

_____

_____

_____

10. The undersigned hereby authorizes and requests any person, firm, or corporation to furnish any information requested by the Owner in verification of the recitals comprising this Statement of Bidder's Qualifications.

I, _____, certify that I am

_____ of the Bidder, and that the answers to the foregoing
(Position held)
questions and statements contained therein are true and correct.

BIDDER: _____

By: _____

Title: _____

Date: _____

Subscribed and sworn to me this _____ day of _____, 20___.

NOTARY PUBLIC: _____

Commission Expires: _____

(SEAL)

CERTIFICATION OF BIDDER'S EXPERIENCE AND QUALIFICATIONS

(To Accompany Bid)

The undersigned Bidder certifies that it is, at the time of bidding, and shall be, throughout the period of the contract, licensed under the provisions of the Business and Professions Code of the State of Georgia, to do the type of work contemplated in the Contract Documents. Bidder further certifies that it is skilled and regularly engaged in the general class and type of work called for in the Contract Documents.

The Bidder represents that it is competent, knowledgeable, and has special skills concerning the nature, extent, and inherent conditions concerning the work to be performed. Bidder further acknowledges that there are certain inherent conditions existent in the construction of the particular facilities which may create, during the construction program, unsafe conditions hazardous to persons and property. Bidder expressly acknowledges that it is aware of such risks and that it has the skill and experience to foresee and to adopt protective measures to adequately and safely perform the construction work with respect to such hazards.

A. ESSENTIAL REQUIREMENTS FOR QUALIFICATION

If the answer to any of questions 1 through 3 is "no", or if the answer to any of questions 4 through 6 is "yes", the Bidder will be deemed ineligible or not responsible for purposes of the Contract.

1. Bidder possesses a valid and current Georgia Commercial Contractor's license as required for the project for which it intends to submit a bid.

□ Yes □ No

2. Bidder will comply with and provide all insurance as defined in Section 503.5, Insurance Requirements, and Section 503.6, Hold Harmless and Indemnification.

□ Yes □ No

3. Bidder has current Workers' Compensation insurance coverage as required by the Labor Code or is legally self-insured pursuant to Labor Code.

□ Yes □ No

4. Has your contractor's license been revoked at any time in the last five (5) years?

□ Yes □ No

5. Has a surety firm completed a contract on your behalf, or paid for completion because your firm was default terminated by the project owner within the last five (5) years?

□ Yes □ No

6. At any time during the last five (5) years, has your firm, or any of its owners or officers been convicted of a crime involving the awarding of a contract of a government construction project, or the bidding or performance of a government contract?

□ Yes □ No

B. COMPANY EXPERIENCE

The Bidder has been engaged in the contracting business, under the present business name for _____ years and has experience in work of a nature similar to this project which extends over a period of _____ years (Bidder must show at least five (5) years of related experience).

The Bidder, as a Contractor, has never failed to satisfactorily complete a contract awarded to it, except as follows:

For the City to consider the Bidder properly experienced in work of similar nature to this project with at least two (2) projects of $100,000 in construction value within the last five (5) years.

The Bidder can include project(s) currently under construction, but only the total amount paid by the Owner(s) as of three (3) months prior to the bid date on uncompleted project(s) can be included in construction volume for purposes of this certification. The Bidder is allowed to list up to a maximum of five (5) projects of the types listed above, that combined, will add up to at least the cost in completed volume of work listed above.

1. **Project Name: Owner:**
   Construction Cost: $
   Construction Time:_____Calendar Days
   Owner's Representative:
   Owner's Telephone No.:
   Date of Substantial Completion:

2. **Project Name: Owner:**
   Construction Cost: $
   Construction Time:_____Calendar Days
   Owner's Representative:
   Owner's Telephone No.:
   Date of Substantial Completion:

3. Project Name: Owner:
Construction Cost: $
Construction Time:_____ Calendar Days
Owner's Representative:
Owner's Telephone No.:
Date of Substantial Completion:

4. Project Name: Owner:
Construction Cost: $
Construction Time:_____Calendar Days
Owner's Representative:
Owner's Telephone No.:
Date of Substantial Completion:

5. Project Name: Owner:
Construction Cost: $
Construction Time:_____Calendar Days
Owner's Representative:
Owner's Telephone No.:
Date of Substantial Completion:

C. SAFETY QUALIFICATION CRITERIA

The following information will be used to determine satisfaction of the minimum safety requirements for this project. To qualify to bid and be awarded the project, the contractor's three year average Workers' Compensation Experience Modification Rate (EMR) must not be greater than 1.10 (110%). The Bidder shall list its Experience Modification Rate for the last three complete years (available from your insurance carrier).

Year EMR _____

Three Year Average =

To verify the above information, the City will contact the Bidder's Workers' Compensation Insurance carrier. The Bidder shall authorize its carrier to release this information. Failure to release this information will result in the bid being deemed nonresponsive and/or result in a determination that the Bidder is not eligible/responsible for purposes of the Project.

Worker's Compensation Insurance Company: Contact Person for
Insurance Company:
Telephone Number: Signed this_____ day of , 20__.
Name of Bidder _____
Contractor's License No. _____
Expiration Date _____
Signature of Bidder _____
Title of Signatory _____

END OF SECTION

Section 00422
Corporate Certificate

I, _____, certify that I am the Secretary of the Corporation named as Bidder in the foregoing Bid; that

_____, who signed said Bid on behalf of the

Contractor was then _____of said Corporation; that said Bid was duly signed for and on behalf of said Corporation by authority of its Board of Directors, and is within the scope of its corporate powers; that said Corporation is organized under the laws of the State of Georgia.

This _____ day of _____, 20___.

Corporate
Secretary: _____

(SEAL)

END OF SECTION

Section 00425
Contractor's License Certification

Bidder/Contractor’s Name: _____

Georgia Commercial Contractor’s License Number: _____

Expiration Date 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.

BIDDER: _____

By: _____

Title: _____

Date: _____

END OF SECTION

Section 00480
Non-Collusion Affidavit of Prime Bidder

STATE OF GEORGIA COUNTY OF CARROLL

I, _____, being first duly sworn, deposes and says that:

He/She is _____ of _____, the Bidder that has submitted the attached Bid;

He/She is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;

Such Bid is genuine and is not a collusive or sham Bid;

Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this Affidavit, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the City of Temple or any person interested in the proposed Contract; and

The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this Affiant.

BIDDER: _____

By: _____

Title: _____

Date: _____

Subscribed and sworn to me this _____ day of _____, 20____.

NOTARY PUBLIC: _____

Commission Expires: _____

(SEAL)

END OF SECTION

Section 00500
Contract Agreement

Owner will require Contractor to execute a Contract Agreement tailored to the winning bid proposal which shall include the provisions set forth in the Invitation to Bid package. In addition to the terms set forth in the Invitation to Bid package, Contractor will also be required to (1) indemnify and hold Owner harmless for any claims, suits, charges and causes of action of any kind arising from Contractor's work including, but not limited to, attorneys' fees and costs and (2) perform all work according to industry standards as well as the rules, regulations and laws applicable to such projects.

END OF SECTION

Section 00550
Pre-Award Oath

STATE OF GEORGIA COUNTY OF CARROLL

In accordance with O.C.G.A. §36-91-21(e), we, the undersigned of

_____

Being first duly sworn, deposes and says that:

We have not directly or indirectly violated O.C.G.A. §36-91-21 (d), and more specifically, we have not

- prevented or attempted to prevent competition in such bidding or proposals by any means whatever,
- prevented or endeavored to prevent anyone from making a bid or proposal thereof by any means whatever, nor
- Caused or induced another to withdraw a bid or proposal for the work.

We, the undersigned, to the best of our knowledge, affirm that no other officers, agents or other persons acted for or represented the Contractor in the bidding for and procurement of this Contract.

Signature Printed Name Title Date

_____

_____

_____

_____

_____My Commission Expires_____
(Notary Public)

(SEAL)

END OF SECTION

Georgia Security and Immigration Compliance Act Affidavits

City of Temple
SB 529 Georgia Security and Immigration Compliance Act of 2006
Federal Work Authorization Program
"EEV/Basic Pilot Program"
Effective July 1, 2007

PUBLIC EMPLOYERS, THEIR CONTRACTORS AND SUBCONTRACTORS ARE REQUIRED TO VERIFY NEW EMPLOYEE WORK ELIGIBILITY THROUGH A FEDERAL WORK AUTHORIZATION PROGRAM

All Contractors and Sub-Contractors providing services to public employers must register and participate in this Federal Work Authorization Program in accordance with the applicability provisions and deadlines established in O.C.G.A. 13-10-91. The EEV/Basic Pilot Program is operated by the Homeland Security Department. To register please log-on to the following website: https://www.vis-dhs.com/EmployerRegistration

This regulation shall apply as follows:

(A) On or after July 1, 2007, with respect to public employers, contractors, or subcontractors of 500 or more employees;

(B) On or after July 1, 2008, with respect to public employers, contractors, or subcontractors of 100 or more employees;

(C) On or after July 1, 2009, with respect to all public employers, contractors, or subcontractors

This Code shall be enforced without regard to race, religion, gender, ethnicity, or national origin.

Please check and initial the statutory number of employees the contractor has, i.e.

		CHECK ONE	INITIAL
(A)	500 or more employees	_____	_____
(B)	100 or more employees	_____	_____
(C)	fewer than 100 employees	_____	_____

THOSE CONTRACTORS WHO ARE SUBJECT TO THIS ACT MUST COMPLETE AFFIDAVITS (COPIES OF WHICH ARE ATTACHED) FOR THEMSELVES (AND ANY SUB-CONTRACTORS SUBJECT TO THE ACT) AS EVIDENCE OF COMPLIANCE WITH THE ACT. COMPLIANCE WITH THIS ACT IS A MANDATORY CONDITION OF ANY PHYSICAL SERVICES CONTRACT ENTERED INTO WITH THE CITY OF TEMPLE AFTER JULY 1, 2007. SUBCONTRACTOR AFFIDAVITS WILL BE PRESENTED TO THE OWNER ON OR BEFORE THE PRECONSTRUCTION CONFERENCE.

_____ _____
CONTRACTOR NAME **BY: Authorized Officer or Agent**

_____ _____
DATE **Printed Name of Authorized Officer or Agent**

Georgia Security and Immigration Compliance Act Affidavits

CITY OF TEMPLE
CONTRACTOR AFFIDAVIT AND AGREEMENT

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. 13-10-91, stating affirmatively that the individual, firm, or corporation which is contracting with the **City of Temple** 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 (ORCA), P.L. 99-603], in accordance with the applicability provisions and deadlines established in O.C.G.A. 13-10-91.

The undersigned further agrees that, should it employ or contract with any subcontractor(s) in connection with the physical performance of services pursuant to this contract with the **City of Temple,** contractor will secure from such subcontractor(s) similar verification of compliance with O.C.G.A. 13-10-91 on the Subcontractor Affidavit provided in Rule 300-10-01.08 or a substantially similar form. Contractor further agrees to maintain records of such compliance and provide a copy of each such verification to the (name of the public employer) at the time the subcontractor(s) is retained to perform such service.

_____
EEV / Basic Pilot Program* User Identification Number

_____ _____
BY: Authorized Officer or Agent Date

_____
Contractor Name

_____
Title of Authorized Officer or Agent of Contractor

_____
Printed Name of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME
ON THIS THE_____ DAY OF _____, 20___

_____
Notary Public
My Commission Expires:

*As of the effective date of O.C.G.A. 13-10-91, the applicable federal work authorization program is the "EEV I 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). Authority

O.C.G.A. 13-10-91

Georgia Security and Immigration Compliance Act Affidavits

CITY OF TEMPLE
SUB-CONTRACTOR AFFIDAVIT AND AGREEMENT

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. 13-10-91, stating affirmatively that the individual, firm, or corporation which is contracting with

_____ on behalf of the **City of Temple** 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 (ORCA), P.L. 99-603], in accordance with the applicability provisions and deadlines established in O.C.G.A. 13-10-91.

_____
EEV / Basic Pilot Program* User Identification Number

_____ _____
BY: Authorized Officer or Agent Date

_____
Contractor Name

_____
Title of Authorized Officer or Agent of Contractor

_____
Printed Name of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME
ON THIS THE_____ DAY OF _____, 20___

_____
Notary Public
My Commission Expires:

*As of the effective date of O.C.G.A. 13-10-91, the applicable federal work authorization program is the "EEV I 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). Authority

O.C.G.A. 13-10-91

Section 00610
Performance Bond

STATE OF GEORGIA BOND NO._____

COUNTY OF CARROLL

KNOW ALL MEN BY THESE PRESENTS, that we, _____, as _____, (hereinafter known as Contractor), and we,
(Office Held)
_____, as Surety, do hereby acknowledge ourselves indebted and firmly bound and held unto City of Temple for use and benefit of those entitled thereto, in the sum of _____ for the payment of which will and truly to be made, in lawful money of the United States of America, we do hereby bind ourselves, successors, assigns, heirs and personal representatives.

BUT THE CONDITION OF THE FOREGOING OBLIGATION OR BOND IS THIS:

WHEREAS, the Owner has engaged the said Contractor for the sum of _____ for construction of the Temple WWTP Grit Removal System Replacement as more fully appears in a written Contract Agreement bearing the date of _____, 20___, a copy of which Contract Agreement is by reference hereby made a part hereof.

NOW, THEREFORE, if said Contractor shall fully and faithfully perform all the undertakings and obligations under the said Contract Agreement hereinbefore referred to and shall fully indemnify and save harmless the said Owner from all costs and damage whatsoever which it may suffer by reason of any failure on the part of said Contractor to do so, and shall fully reimburse and repay the said Owner any and all outlay and expense which it may incur in making good any such default, and shall correct all defects in products and workmanship appearing within one year of the completion of all Work, then this obligation shall be null and void, otherwise, it shall remain in full force and effect.

And for value received it is hereby stipulated and agreed that no change, extension of time, alteration or addition to the terms of the said Contract Agreement, or in the Work to be performed thereunder, or the Specifications accompanying the same shall in any wise affect the obligations under this Contract Agreement or Bond, and notice is hereby waived of any such damage, extension of time, alteration or addition to the terms of the Contract Agreement or to the Work or to the Contract Documents.

This bond is given pursuant to and in accordance with the provisions of O.C.G.A. Section 36-91-1 *et.seq.* and all the provisions of the law referring to this character of Bond as set forth in said Sections or as may be hereinafter enacted, and these are hereby made a part hereof to the same extent as if set out herein in full.

IN WITNESS WHEREOF, the said Contractor has hereunder affixed its signature and seal, and said Surety has hereunto caused to be affixed its corporate signature and seal, by its duly authorized officers, on this _____ day of _____, 20___, executed in seven counterparts.

CONTRACTOR – PRINCIPAL: _____
(name signed)

By: _____
(name printed or typed)

Title: _____

Address: _____

_____

Attest: _____
(name signed)

Title: _____
(name printed or typed)

(SEAL)

SURETY: _____
(name signed)

By: _____
(name printed or typed)

Title: _____

Address: _____

_____

Attest: _____
(name signed)

Title: _____
(name printed or typed)

(SEAL)

Note: 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 where the Project is located.

END OF SECTION

Section 00620
Payment Bond

STATE OF GEORGIA BOND NO. _____

COUNTY OF CARROLL

KNOW ALL MEN BY THESE PRESENTS, that we, _____, as _____, (hereinafter known as Contractor), and we,
(Office Held)
_____, as Surety, are held and firmly bound unto the City of Temple (hereinafter called the Owner), in the penal sum of _____ lawful money of the United States of America, for the payment of which sum will and truly to be made, we bind ourselves, our heirs, personal representatives, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, said Contractor has entered into a certain Contract Agreement with said Owner, dated _____, 20___, for construction of the Temple WWTP Grit Removal System Replacement (hereinafter called the Contract), which Contract Agreement and the Contract Documents for said Work shall be deemed a part hereof as fully as if set out herein.

NOW, THEREFORE, the condition of this obligation is such, that if said Contractor and all subcontractors to whom any portion of the Work provided for in said Contract Agreement is sublet and all assignees of said Contractor and of such subcontractors shall promptly make payments to all persons supplying them with labor, products, services, or supplies for or in the prosecution of the Work provided for in such Contract Agreement, or in any amendment or extension of or addition to said Contract Agreement, and for the payment of reasonable attorney's fees, incurred by the claimant in suits on this Bond, then the above obligation shall be void; otherwise, it shall remain in full force and effect.

HOWEVER, this Bond is subject to the following conditions and limitations:

(a) Any person, firm or corporation that has furnished labor, products, or supplies for or in the prosecution of the Work provided for in said Contract Agreement shall have a direct right of action against the Contractor and Surety on this Bond, which right of action shall be asserted in a proceeding, instituted in the county in which the Work provided for in said Contract Agreement is to be performed or in any county in which Contractor or Surety does business. Such right of action shall be asserted in proceedings instituted in the name of the claimant or claimants for its use and benefit against said Contractor and Surety or either party (but not later than one year after the final settlement of said Contract Agreement) in which action such claim or claims shall be adjudicated and judgement rendered thereon.

(b) The Principal and Surety hereby designate and appoint the _____, as the agent of each party to receive and accept service of process or other pleading issued or filed in any proceeding instituted on this Bond and hereby consent that such service shall be the same as personal service on the Contractor and/or Surety.

(c) In no event shall the Surety be liable for a greater sum than the penalty of this Bond, or subject to any suit, action or proceeding thereon that is instituted later than one year after the final settlement of said Contract Agreement.

(d) This Bond is given pursuant to and in accordance with provisions of O.C.G.A. Section 36-91-1 *et.seq* . hereinafter, and all the provisions of law referring to this character of Bond as set forth in said Sections or as may be hereinafter enacted, and these are hereby made a part hereof to the same extent as if set out herein in full.

IN WITNESS WHEREOF, the said Contractor has hereunder affixed its signature and seal, and said Surety has hereunto caused to be affixed its corporate signature and seal, by its duly authorized officers, on this _____ day of _____, 20___, executed in seven counterparts.

CONTRACTOR – PRINCIPAL: _____
(name signed)

By: _____
(name printed or typed)

Title: _____

Address: _____

_____

Attest: _____
(name signed)

Title: _____
(name printed or typed)

(SEAL)

SURETY: _____
(name signed)

By: _____
(name printed or typed)

Title: _____

Address: _____

_____

Attest: _____
(name signed)

Title: _____
(name printed or typed)

(SEAL)

Note: 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 where the Project is located.

END OF SECTION

TABLE OF CONTENTS

GENERAL: The provisions of these General Conditions are intended as, but are not limited to, providing general conditions of agreement and provisions toward the awarding of the Contract, the obligations of the successful Bidder and requirements for execution and administration of the Contract. IN ANY EVENT, PROVISIONS IN THIS SECTION ARE SUBJECT TO AND GOVERNED BY PROVISIONS IN THE SUPPLEMENTARY CONDITIONS, AS APPLICABLE.

Article 1 - Notice of Award of Contract

After receipt of Bids, the Owner shall notify the successful Bidder of the award of the Contract as stipulated in the Supplementary Conditions.

Article 2 - Execution of Contract Documents

Within 15 days of notification of Award of Contract, the Owner will furnish the Contractor with conformed copies of Contract Documents for execution by the Contractor and the surety.

Within 10 days after receipt, the Contractor shall return all the Documents properly executed by the Contractor and the 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.

Within 30 days after receipt of the conformed Documents executed by the Contractor and the surety with the power-of-attorney and certificates of insurance, the Owner will complete the execution of the Documents. Distribution of the completed Documents will be made upon execution by the Owner.

Should the Contractor and/or the surety fail to properly execute the Documents within the specified time, the Owner will 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 will have the right to withdraw the Bid without penalty. In such event the Owner will have no liability to the Contractor under these Documents or otherwise.

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

Article 3 - Contract Security

The Contractor shall furnish separate Performance and Payment Bonds each in a sum equal to the amount of the Contract Price, the Performance Bond conditioned upon the performance by the Contractor of all undertakings, covenants, terms, conditions and agreements of the Contract Documents, and the Payment Bond conditioned upon the prompt payment by the Contractor to all persons supplying labor and products in the prosecution of the Work provided by the Contract Documents. Such Bonds shall be executed by the Contractor and a single corporate bonding company licensed to transact such business in the State where the Project is located and named on the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Treasury Department Circular Number 570. The expense of these Bonds shall be borne by the Contractor. If at any time a surety on any such Bond is declared bankrupt or loses its right to do business in the State where the Project is located or is removed from the list of Surety Companies accepted on Federal Bonds, the Contractor shall, within 10 days after notice from the Owner to do

so, substitute an acceptable Bond (or Bonds) in such form and sum and signed by such other surety as may be satisfactory to the Owner. The premium on such Bond (or Bonds) shall be paid by the Contractor. No further progress payments shall be deemed due, nor shall be made, until the new surety furnishes an acceptable Bond to the Owner.

The person executing the Bond on behalf of the surety shall file with the Bond a general power of attorney, unlimited as to amount and type of Bond covered by such power of attorney and certified to by an official of said surety.

Article 4 - Insurance

The Contractor shall not commence any work under this Contract until all insurance, as stipulated in the Supplementary Conditions, has been obtained and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence any work on subcontractor's contract until all similar insurance required of the subcontractor has been so obtained and approved by the Contractor.

Article 5 - Indemnification

The Contractor shall indemnify and hold harmless the Owner, the Engineer and their agents and employees from and against all claims, damages, losses and expenses including claims for consultants' and attorneys' fees arising out of or resulting from the performance of the Work, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, including the loss of use resulting therefrom; and is caused in whole or in part by negligence, willful act or omission of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

In any and all claims against the Owner or the Engineer, or any of their agents or employees, by any employee of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any subcontractor under worker's compensation acts, disability benefit acts or other employee benefits acts.

This indemnification and hold harmless obligation shall extend to cover any and all claims not covered by the Owner's Protective Liability Insurance, the requirements of which are specified in Article 4 of the Supplementary Conditions.

Article 6 - Notice to Proceed

The Notice to Proceed will be issued, following the pre-construction conference, within 10 days of the execution of the Contract Agreement by the Owner. The time may be extended by mutual agreement between the Owner and the Contractor. If the Notice to Proceed has not been issued within the 10 day period or within the period mutually agreed upon, the Contractor may terminate the Contract Agreement without further liability on the part of either party.

Article 7 - Termination of Work for Default

(a) The Work may be terminated if:

(1) The Contractor is adjudged bankrupt or insolvent.

(2) The Contractor makes a general assignment for the benefit of creditors.

(3) A trustee or receiver is appointed for the Contractor or for any of Contractor's property.

(4) The Contractor files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or applicable laws.

(5) The Contractor repeatedly fails to supply sufficient skilled workmen, materials or equipment.

(6) The Contractor fails to make satisfactory progress toward timely completion of the Work.

(7) The Contractor repeatedly fails to make prompt payments to subcontractors or material suppliers for labor, materials or equipment.

(8) The Contractor disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction of the Work.

(9) The Contractor fails to comply with directives of the Engineer.

(10) The Contractor otherwise violates any provision of the Contract Documents.

(b) The Owner may, without prejudice to any other right or remedy and after giving the Contractor and surety a minimum of 10 days from delivery of a written notice, terminate the services of the Contractor and take possession of the Project and of all products thereon owned by the Contractor, and finish the Work by whatever method the Owner may deem expedient. In such case the Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds the direct and indirect costs of completing the Project, including compensation for additional professional services, such excess shall be paid to the Contractor. If such costs exceed such unpaid balance, the Contractor and/or surety shall pay the difference to the Owner. Such costs incurred by the Owner will be determined by the Engineer and incorporated in a Change Order.

(c) Where the Contractor's services have been so terminated by the Owner, said termination will not affect any right of the Owner against the Contractor then existing or which may thereafter accrue. Any retention or payment of monies by the Owner due the Contractor will not release the Contractor from compliance with the Contract Documents.

Article 8 - Termination for Convenience of The Owner

If, for any reason other than those provided for under Article 7, the Owner elects to discontinue, in whole or part, the Work under this Contract, the Owner may, after 10 days from delivery of a written notice to the Contractor and the Engineer, terminate, in whole or in part, the Contractor's performance of the Work under this Contract. The notice of termination shall specify the extent to which performance of the Work under the Contract is terminated.

In the event of such termination by the Owner, the Contractor shall be entitled to payment for the Work at the jobsite acceptably performed up to the time of the termination and reimbursement for such costs as are reasonably incurred by the Contractor due to the termination and not otherwise compensated. The Contractor shall also be entitled to profit on the amounts payable to the Contractor, but such profit shall be limited to 6 percent of such amounts. The Contractor will not be entitled to any payment, including any anticipated profit, on Work not performed and will not be entitled to any compensation for other economic loss arising out of or resulting from such compensation or damages of any nature.

Article 9 - Assignments

The Contractor shall not assign the whole or any part of this Contract or any monies due or to become due hereunder without written consent of the Owner. In case the Contractor assigns all or any part of any monies due or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to the Contractor shall be subject to prior liens of all persons, firms, and corporations for services rendered or materials supplied for the performance of the Work called for under this Contract.

Article 10 - Subcontracting

(a) The Contractor shall not subcontract the complete Work, or any part thereof, and shall not award any work to any subcontractor without prior written approval of the Owner. Owner approval will not be given except upon the basis of written statements containing such information as the Owner may require. At the pre-construction conference, the Contractor shall submit all subcontractors that the Contractor plans to use on the Project. Any changes or additional subcontractors should be submitted at least 14 days prior to the needed approval.

(b) The Contractor shall utilize the services of specialty subcontractors on those parts of the Work which, under normal contracting practices, are best performed by specialty subcontractors, as required by the Engineer in Engineer's sole discretion, at no additional cost to the Owner.

If the Contractor desires to perform specialty work, the Contractor shall submit a request to the Owner, accompanied by evidence that the Contractor's own organization has successfully performed the type of work in question, is presently competent to perform the type of work, and the performance of the work by specialty subcontractors will result in materially increased costs or inordinate delays.

(c) The Contractor shall be fully responsible to the Owner for the acts and omissions of the Contractor's subcontractors and of persons either directly or indirectly employed by the

Contractor. The Contractor shall be fully responsible to the Owner for the acts and omissions of independent contractors or independent subcontractors of the Contractor and of persons indirectly employed by the Contractor as the Contractor is for the acts and omissions of persons directly employed by the Contractor.

(d) The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind subcontractors to the Contractor by the terms of the General Conditions and other Contract Documents insofar as applicable to the work of subcontractors and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provision of the Contract Documents.

(e) Nothing contained in this Contract shall create any contractual relation between any subcontractor and the Owner.

Article 11 - Authority of the Engineer

The Engineer will act as the Owner's representative during the construction period. The Engineer will decide questions which may arise as to quality and acceptability of products furnished and Work performed. The Engineer will interpret the intent of the Contract Documents in a fair and unbiased manner. The Engineer will make visits to the site and determine if the Work is proceeding in accordance with the Contract Documents. The Engineer will judge as to the accuracy of quantities submitted by the Contractor in partial payment estimates and the acceptability of the Work which these quantities represent. The decisions of the Engineer will be final and conclusive.

Article 12 - Separate Contracts

(a) The Owner reserves the right to let other contracts in connection with this Project. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their products and the execution of their work, and the Contractor and other contractors shall properly connect and coordinate their work with each other. If the proper execution or results of any part of the Contractor's work depends upon the work of any other contractor, the Contractor shall inspect and promptly report to the Engineer any defects in such work that render it unsuitable for such proper execution and results.

(b) The Owner may perform additional work related to the Project with Owner's own forces. The Contractor shall afford the Owner reasonable opportunity for the introduction and storage of products and the execution of work, and shall properly connect and coordinate Contractor's work with work performed by Owner's own forces.

(c) If the performance of additional work by other contractors or the Owner is not noted in the Contract Documents prior to the execution of the Contract, written notice thereof will be given to the Contractor prior to starting any such additional work. If the Contractor believes that the performance of such additional work by the Owner or others involves the Contractor in additional expense or entitles the Contractor to an extension of the Contract Time, the Contractor may make a claim therefor as provided in Article 29.

Article 13 - Laws and Regulations

The Contractor's attention is directed to the fact that all applicable federal, state, county and city laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over

construction of the Project shall apply to the Contract throughout, and they will be deemed to be included in the Contract as though written out in full herein. The Contractor shall keep fully informed of all laws, ordinances and regulations of the federal, state, county, city and municipal governments or authorities in any manner affecting those engaged or employed in the Work or the materials used in the Work or in any way affecting the conduct of the Work and of all orders and decrees of bodies or tribunals having any jurisdiction or authority over same. If any discrepancy or inconsistency should be discovered in these Contract Documents herein referred to, in relation to any such law, ordinance, regulation, order or decree, the Contractor shall herewith report the same, in writing, to the Owner. The Contractor shall at all times observe and comply with all such existing and future laws, ordinances and regulations, and shall protect and indemnify the Owner, the Engineer and their agents against the violation of any such law, ordinance, regulation, order or decree, whether by the Contractor or by the Contractor's employees. This Contract shall be construed under the laws of Georgia.

Article 14 - Taxes

The Contractor shall pay all sales, consumer, use and other similar taxes required by the law of the place where the Work is performed. The Owner will be responsible for any sales or use tax due on products furnished by the Owner to the Contractor to be incorporated into the Work.

Article 15 - Notice and Service Thereof

(a) All notices, demands, requests, instructions, approvals, and claims shall be in writing.

(b) Any notice to or demand upon the Contractor will be sufficiently given if delivered at the office of the Contractor specified in the Bid (or at such other office as the Contractor may from time to time designate to the Owner in writing), or if delivered by the United States Mail in a sealed, postage-prepaid envelope, or delivered by facsimile transmission, followed by written confirmation, in each case addressed to such office.

(c) All papers required to be delivered to the Owner shall be delivered as stipulated in the Supplementary Conditions.

(d) Any such notice or demand shall be deemed to have been given to the Owner or made as of the time of actual delivery to Owner.

Article 16 - Patents

(a) The Contractor shall hold and save the Owner, the Engineer and their agents harmless from liability of any kind, including cost and expenses, reasonable attorney's fees, for, or on account of, any patented or unpatented invention, process, article, or appliance manufactured or used in the performance of the Work, including its use by the Owner.

(b) If the Contractor uses any design, process, device or materials covered by letters, trademarks, patent or copyright, the Contractor shall provide for such use by suitable agreement between the Owner and the holder of such patented or copyrighted design, device or material. The Contract prices shall include royalties or costs arising from the use of such design, device or materials, in any way involved in the Work. The Contractor and the Contractor's sureties shall indemnify and save harmless the Owner, the Engineer and their agents from claims for infringement by reason of the use of such

patented or copyrighted design, process, device or materials or any trademark or copyright in connection with Work agreed to be performed under this Contract, and shall indemnify the Owner, the Engineer and their agents for any cost, expense, damage and reasonable attorney's fees which it may be obliged to pay by reason of such infringement, at any time during the prosecution of the Work or after completion of the Work.

Article 17 - Land and Rights-of-Way

The Owner will provide, as indicated in the Contract Documents and prior to the Notice to Proceed, the lands upon which the Work is to be done, rights-of-way for access thereto, and such other lands which are designated for the use of the Contractor. The Contractor shall confine 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 and/or an equitable increase in the Contract Price to cover the Contractor's additional costs as a result thereof, provided the Owner is notified immediately of the claim. The Contractor's claim therefore shall be handled as provided for under Article 29.

Should additional temporary easements for ingress or egress be required by the Contractor for more suitable access to the Work, these easements shall be obtained by the Contractor, at no additional cost to the Owner.

Additional requirements shall be as stipulated in the Supplementary Conditions.

Article 18 - Products

(a) Products shall be so stored in accordance with the manufacturer's recommendations to insure the preservation of their quality and fitness for the Work. Stored products to be incorporated in the Work shall be located so as to facilitate prompt inspection.

(b) Manufactured products shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.

(c) Products shall be furnished in accordance with shop drawings and/or samples submitted by the Contractor and approved by the Engineer.

(d) Products to be incorporated into the Work shall not be purchased by the Contractor or the subcontractor subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

Article 19 - Supervision of Work

The Contractor shall supervise and direct the Work. The Contractor shall be solely responsible for the means, methods, techniques, sequences and procedures of construction. The Contractor shall employ and maintain on the Work a qualified supervisor or superintendent who shall have been designated in writing by the Contractor as the Contractor's representative at the site. The

supervisor shall be present on the site at all times as required to perform adequate supervision and coordination of the Work.

The supervisor shall have full authority to act on behalf of the Contractor and to execute the orders or directions of the Engineer without delay. The supervisor shall have full authority to promptly supply products, tools, plant equipment and labor as may be required. The supervisor's authority shall be such that all communication given to the supervisor shall be as binding as if given to the Contractor.

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

Article 20 - Interruption of Facility Operations

The Contractor shall provide the Owner with written notice at least five days prior to any interruption in facility operations required by construction activity. The notice shall include the date and time of the scheduled interruption; the length of time the interruption will be in effect; the procedures to be followed in effecting the interruption; a complete identification of all those processes, equipment and operations to be affected; and all other information the Owner may require. The Contractor shall provide any equipment, piping, auxiliary power or other means necessary to sustain facility operations or function for interruptions which have not been identified by the Specifications, or when interruptions must exceed the time allowed by the Specifications.

Additional requirements, if any, shall be as stipulated in the Supplementary Conditions.

Article 21 - Protection of Work, Property and Persons

(a) The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. The Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to all employees on the Work and other persons who may be affected thereby, all the Work and all products to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

(b) The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction, promulgated under the Occupational Safety and Health Act of 1970 (PL 91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL 91-54). The Contractor shall erect and maintain, as required by the conditions and progress of the Work, all necessary safeguards for safety and protection.

(c) The Contractor shall remedy all damage, injury or loss to any property, improvements or facilities caused, directly or indirectly, in whole or in part, by the Contractor or any of the Contractor's subcontractors or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable. The property, improvements or facilities shall be replaced or restored to a condition as good as when the Contractor entered upon the Work. In case of failure on the part of the Contractor to restore such property, or make good such damages or injury, the Owner may, after 48 hours written

notice, proceed to repair, rebuild, or otherwise restore such property, improvements or facilities as may be deemed necessary. The cost thereof will be deducted from any monies due or which may become due the Contractor under this Contract.

(d) In emergencies affecting the safety of persons or the Work or property at the site or adjacent thereto, the Contractor, without special instruction or authorization from the Engineer or Owner, shall act to prevent threatened damage, injury or loss.

(e) Completed Work and stored products shall be suitably protected during unseasonable weather, to allow Work to proceed in a timely fashion. Work planned, or in progress, should be performed to minimize impact of adverse weather.

Article 22 - Protection of the Environment

(a) The Contractor shall be responsible for taking all measures required to minimize all types of pollution associated with the undertaking of the proposed Work, and shall abide by the requirements of all governmental agencies having jurisdiction over the Work or Contractor's Project operations.

(b) Any area used or involved in the Project that is disturbed by the Contractor, shall be restored to original or better condition, even though such area is outside the limits of that specified for grading, grassing or landscaping.

Article 23 - Protection, Location and Relocation of Utilities

The Contractor shall notify owners of adjacent utilities when prosecution of the Work may affect them. The Contractor shall protect from damage all existing improvements or utilities at, or in proximity to, the site of the Work, and shall repair or restore any damage to such facilities resulting from failure to exercise reasonable care in the performance of Work. If the Contractor fails or refuses to repair any such damage promptly, the Owner may have the Work performed and charge the cost thereof to the Contractor.

Prior to the construction or installation of any proposed facility or pipeline, the Contractor shall expose all existing utilities true to their vertical and horizontal location, within the vicinity of the Work. In order to avoid conflicts between existing and proposed facilities or utilities, the Contractor shall either relocate the existing or proposed utility on a temporary or permanent basis, or shall take whatever means necessary to protect the existing facilities or utilities during the installation of proposed utilities, as approved by the Engineer. No separate payment will be made for the relocation of existing utilities or for any work associated with the protection of existing facilities or utilities.

Article 24 - Schedules, Reports and Records

The Contractor shall submit to the Owner progress schedules, payrolls, reports, estimates, records and other data as the Owner may request concerning work performed or to be performed as stipulated in the Supplementary Conditions.

Article 25 - 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.

The Engineer will furnish the Contractor five copies of the Contract Documents, one copy of which the Contractor shall have available at all times on the Project site. Any additional copies will be furnished at additional cost.

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

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

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 Engineer, in writing, prior to the commencement of Work at the site. Failure of the Contractor to notify the Engineer, 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 Article 29.

Any ambiguities or need for clarification of the Drawings or Specifications shall be immediately reported in writing to the Engineer. Any such ambiguity or need for clarification will be handled by the Engineer, in writing, as authorized by Article 11. No clarification of the Drawings and Specifications hereunder by the Engineer will entitle the Contractor to any additional monies unless a Change Order has been processed as provided by Article 29 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 Engineer, shall not entitle the Contractor to additional monies and shall be done at the Contractor's risk.

Article 26 - Surveys

The Owner will furnish a land survey to establish a base line for locating the principal component parts of the Work, as shown in the Contract Documents. A bench mark will be established adjacent to the Work. From this information, unless otherwise specified in the Contract Documents, the Contractor shall develop and make all detailed surveys needed for construction, such as alignment, slope stakes, batter boards, stakes for pile locations and other working points, lines, elevations and cut sheets.

Article 27 - Testing, Inspection and Rejection of Work

(a) Testing of Materials: Unless otherwise specifically provided for in the Specifications, the inspection and testing of products to be incorporated in the Work at the site shall be made by bureaus, laboratories, or agencies approved by the Owner; the cost of such inspection and testing shall be paid by the Contractor. The Contractor shall furnish evidence, satisfactory to the Owner, that the products have passed the required tests

prior to their incorporation into the Work. The Contractor shall promptly segregate and remove rejected products from the site of the Work.

(b) Inspection: The Contractor shall furnish the Engineer with every reasonable facility for ascertaining whether or not the Work performed and products used are in accordance with the requirements and intent of the Specifications and Contract Documents. No Work shall be done or products used without suitable inspection by the Engineer or Engineer's representative. Failure to reject any defective Work or product shall not in any way prevent later rejection when such defect is discovered, or obligate the Owner to final acceptance.

(c) Authority and Duties of the Resident Inspector: The Resident Inspector will be authorized to inspect all Work done and all products furnished, including preparation, fabrication and manufacture of the products to be used, but the Resident Inspector will not be authorized to alter or waive any requirements of the Contract Documents. The Resident Inspector may reject products or suspend the Work until any question at issue can be referred to and decided by the Engineer. The responsibility of the Contractor is not lessened by the presence of the Resident Inspector. The Resident Inspector will be identified at the Pre-Construction Conference.

(d) Rejection of Work and Materials: All products furnished and all Work done that is not in accordance with the Drawings or Specifications or that is defective will be rejected. All rejected products or Work shall be removed immediately. If rejected products or Work is not removed within 48 hours, the Engineer will have the right and authority to stop the Work immediately and will have the right to arrange for the removal of said rejected products or Work at the cost and expense of the Contractor. All rejected products or Work shall be replaced with other products or Work which conforms with the Drawings and Specifications.

(e) Contractor's Responsibilities: Inspection of the Work will not relieve the Contractor of any obligations to fulfill the Contract and defective Work shall be made good regardless of whether such Work has been previously inspected by the Engineer and accepted or estimated for payment. The failure of the Engineer to reject improper Work shall not be considered a waiver of any defect which may be discovered later, or for Work actually defective.

Article 28 - Contract Time and Liquidated Damages

The Contract Time and Liquidated Damages shall be defined in the Instructions to Bidders.

The Contractor shall proceed with the Work at a rate of progress which will ensure completion within the Contract Time. It is expressly understood and agreed by and between the Contractor and the Owner, that the Contract Time for the Work described herein is a reasonable time, taking into consideration the average climatic and economic conditions, and other factors prevailing in the locality of the Work.

If the Contractor shall fail to perform the Work required within the Contract Time, or extended Contract Time if authorized by Change Order, then the Contractor shall pay to the Owner the full amount of liquidated damages specified in the Contract Documents for each calendar day that the Contractor shall be in default after the time stipulated in the Contract Documents.

The Contractor shall not be charged with liquidated damages or any excess cost when the delay in performance of the Work is due to the following and the Contractor has promptly given written notice of such delay to the Owner and Engineer:

(a) To any preference, priority or allocation order duly issued by the Owner.

(b) To unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including but not restricted to, acts of God or of the public enemy, acts of the Owner, acts of another contractor in the performance of a contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and,

(c) To any delays of subcontractors occasioned by any of the causes specified in paragraphs (a) and (b).

Article 29 - Changes in the Contract

(a) Changes in the Work: The Owner may at any time, as the need arises, order changes within the scope of the Work without invalidating the Contract Agreement. If such changes increase or decrease the amount due under the Contract Documents, or in the time required for performance of the Work, an equitable adjustment will be authorized by Change Order.

The Engineer, also, may at any time, by issuing a field order, make changes in the details of the Work. These changes by field order will not affect Contract Time or Contract Price. The Contractor shall proceed with the performance of any changes in the Work so ordered by the Engineer, unless the Contractor believes that such field order entitles Contractor to a change in Contract Price or Contract Time or both, in which event Contractor shall give the Engineer immediate, written notice thereof and if required by the Owner, an immediate estimate of the direct cost of Work as outlined in (b) below, after the receipt of the ordered change, and the Contractor shall not execute such changes pending the receipt of an executed Change Order or further written instruction from the Owner.

Should the Contractor encounter, or the Owner discover, during the progress of the Work, subsurface or latent conditions at the site materially differing from those shown on the Drawings or indicated in the Specifications, or unknown conditions of an unusual nature differing materially from those ordinarily encountered and generally recognized as inherent in Work of the character provided for in the Drawings and Specifications, the Owner shall immediately be notified in writing of such conditions before they are disturbed. The Owner will thereupon promptly investigate the conditions. If the Owner finds that conditions do so materially differ, or are of an unusual nature, and upon written request of the Contractor, an equitable adjustment will be authorized by Change Order.

If the Contractor does not immediately notify the Owner in writing of the belief that a field order, additional work by other contractors or the Owner, or subsurface, latent or unusual unknown conditions entitles the Contractor to a Change Order, no consideration for time or money will be given the Contractor.

The Owner may, with the Contractor's concurrence, elect to postpone the issuance of a Change Order until such time that a single Change Order of substantial importance can be issued incorporating several changes. In such cases, the Owner will indicate this intent for each change in the Contract in a written response to the Contractor's request for a change, following agreement by the Owner and Contractor on the change's scope, price and time.

(b) Changes in Contract Price: The Contract Price may be changed only by a Change Order. The value of any Work covered by a Change Order for increase or decrease in the Contract Price will be determined by one or more of the following methods, in the order of precedence listed below:

(1) By estimating the number of unit quantities of each part of the Work which is changed (either increased or decreased) and then multiplying the estimated number of such unit quantities by the price Bid (which price shall include the Contractor's overhead and profit) for a unit quantity thereof.

(2) The Owner will fix the total lump sum value of the change in the Work of the Contractor following the Contractor's submittal, within a reasonable time, of an estimate of the direct cost of the Work. The direct cost estimate will be added to, or deducted from, the Contract Price (which price will include the Contractor's overhead and profit as outlined below). If the Contractor does not submit a cost estimate of the Work in a reasonable time or if the Owner and Contractor do not reach agreement on the cost, the Owner may fix the total lump sum value at a reasonable amount. On any lump sum change which involves a net credit to the Owner, no allowance for overhead and profit will be figured.

(3) By ordering the Contractor to proceed with the Work and to keep and present, in such form as the Owner may direct, a correct account of the cost of the change together with all vouchers therefore. The cost hereunder will only include an allowance for overhead and profit as outlined below.

For the Work performed in item (2) or (3) above, payment will be made for the documented actual direct cost of the following:

(aa) Labor, including foremen, for those hours they are assigned and participating in the Work covered by the change order (actual direct payroll cost of wages). The Contractor shall furnish, if required by the Owner, certified payrolls to verify wages. All labor related costs will be included in a 30 percent markup of the cost of direct payroll wages. This refers to the Contractor's specific labor wages.

(bb) Material delivered and used on the designated Work, including sales tax, if paid for by the Contractor and as verified by original invoices or otherwise verifiable to the Owner's acceptance.

(cc) Rental, or ownership cost of equipment, including necessary transportation of equipment, having a purchase value in excess of $300.00. Rental or ownership cost will be allowed for only those hours during which the

equipment is required on the project site. Cost allowances will not exceed the rates defined as follows: the hourly rate, for equipment not used exclusively in the change to the scope of work, will be the monthly rate, as printed in the current Rental Blue Book for Construction Equipment published by Dataquest, divided by 176; the rate, for equipment used exclusively for those tasks identified in the change to the scope of work, will be the daily, weekly or monthly rate, used singularly or in combination, which will provide the lowest total cost. The rates will be modified by the Rate Adjustment Table factors to reflect a depreciation allowance indexed to the year a machine was originally manufactured and sold. The rates will be adjusted to account for regional differences in annual use hours, cost of labor, freight, taxes, etc. The amount by which basic rates will be increased or decreased is shown on the adjustment maps included in the "Blue Book".

The equipment use period will begin only at the time equipment is unloaded at the site of the changed work, will include each day that the equipment is required at the site of the changed work and will terminate at the end of the day on which the use of such equipment becomes unnecessary, plus reasonable transportation time. The maximum time to be paid per day will not exceed eight hours unless the equipment is in operation for a longer time. The time which will be paid for per day, for equipment not used exclusively in the change to the scope of work, will be the hours which the equipment was actually in operation on the changed work.

In addition to the actual costs in items (aa) through (cc) above, there will be, for the Contractor actually performing the work, a fixed fee of 16 percent for bond, insurance, overhead and profit added to the cost of Items (aa), (bb) and (cc), above.

If all or a portion of the Change Order is performed by a subcontractor, payment will be made for the documented actual direct cost as outlined in (aa), (bb) and (cc), above. A fixed fee of 16 percent for bond, insurance, overhead and profit will be added to the cost of (aa), (bb) and (cc) of the subcontractor's work only.

A fixed fee of 10 percent will be added to the subcontractor's Work for the Contractor's administrative handling of portions of the Work that are performed by an approved subcontractor. No additional fixed fee will be allowed for the Contractor's or a subcontractor's administrative handling of Work performed by a subcontractor's subcontractor, unless by written permission from the Owner. All other costs not specifically listed above are considered to be included in the fixed fee.

(4) The Contractor shall, when required by the Owner, furnish the Owner with an itemized breakdown of the quantities and prices used in computing the value of any change that might be ordered, in a printed format, and with sufficient detail as required by the Owner.

(c) Changes in Contract Time: The Contract Time may be changed only by a Change

Order. Changes in the Work described in (a) and any other claim made by the Contractor for a change in the Contract Time will be evaluated by the Owner with the assistance and input of the Engineer and if the conditions warrant, an appropriate adjustment of the Contract Time will be made.

The Owner, when making these evaluations will take into consideration the amount and scope of Work which has been changed and will evaluate if the change in Work has affected the critical path as currently accepted on the progress schedule such that it would delay the completion of the Project. If after these evaluations have been made and in the sole opinion of the Owner, the Contractor is due an extension of time, then it will be granted by a Change Order and the Owner will pay the associated cost due the Contractor for direct field costs, only as outlined under Changes in Contract Price (aa) and (cc), exclusive of Item (bb), based on any delays to the overall Project. Extensions of time granted as a result of weather will not result in a change in Contract Price.

Article 30 - Payments and Completion

(a) Contract Price: The Contract Price is either a lump sum or the sum of the unit prices, or a combination thereof, stated in the Contract Agreement, for each item multiplied by the actual quantities installed of each item, and is the total amount payable by the Owner to the Contractor for the performance of the Work set forth in the Contract Documents.

It is understood that the Contractor shall provide and pay for all products, labor (including labor performed after regular working hours, on Sundays, or on legal holidays), equipment, tools, water, light, power, sewer, transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, place into operation, and deliver the Work.

It is further understood that the Contractor's proposed construction schedule is based on a normal 40 hour, 5 day work week, less recognized holidays. If the Contractor desires to work in excess of this limit, the Contractor shall submit a written request to the Owner 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 will be deducted from the Contractor's monthly payment request.

(b) Breakdown of Cost: Before the first application for payment the Contractor shall submit to the Engineer a breakdown of cost for the various portions of the Work, including quantities if required by the Engineer, aggregating the total Contract Price prepared in such form as specified or as the Engineer and the Contractor may agree upon and supported by such data to substantiate its correctness as the Engineer may reasonably require. This schedule of values, when approved by the Engineer, will be used only as a basis for the Contractor's application for payment; however, the payment schedule will correlate directly with the Overall Project Schedule (OPS) cost information, when applicable.

(c) Progress Payments: At the end of each calendar month, the Contractor shall submit to the Engineer an itemized application for payment supported by such other

substantiating data as the Engineer may reasonably require covering Work completed through the 25th day of the month. Any progress payment submitted by the Contractor after the fifth of the month will be included in the following month's payment.

Application for payment may include, at the Contractor's option, the cost of products not yet incorporated into the Work which have been delivered to the site or to other storage locations authorized and approved by the Engineer. The Owner reserves the right to accept or reject pay requests for stored materials, and to limit payments to those stored materials which, in the Engineer's judgement, are necessary for continuing satisfactory Project progress.

Payment for stored products will be subject to the following conditions being met or satisfied:

(1) The products shall be received in a condition satisfactory for incorporation in the Work, including manufacturer's storage and installation instructions.

(2) The products shall be stored in accordance with the manufacturer's recommendations and in such manner that any and all manufacturer's warranties will be maintained and that they will not be damaged due to weather, construction operations or any other cause.

(3) An invoice from the manufacturer shall be furnished for each item on which payment is requested. The request may include reimbursement for cost of delivery, limited to common carrier rates, to the site, but will not include the Contractor handling, on or off site, or for storage expense.

(4) The Contractor shall, on request of the Engineer, furnish written proof from the supplier of payment (less retention equal in percentage to that being retained by the Owner) for the products no later than 30 days after receipt of payment for same from the Owner. The Owner will have the right to deduct from the next payment estimate an amount equal to the payment for the products if reasonable and adequate proof is not submitted.

(5) Shop drawings, product data and samples, showing "No Exceptions Taken", has been received from the Contractor for that specific equipment or material.

The Contractor warrants that title to all Work and products covered by an Application for Payment, whether incorporated into the Project or not, will pass to the Owner upon the receipt of such payment by the Contractor, free and clear of all liens, claims, security interests or encumbrances (except retention equal in percentage to that being retained by the Owner which may be withheld from suppliers and subcontractors to guarantee completion and performance).

(d) Certificate for Payment: If the Contractor has made application for payment as provided above, the Engineer will issue a Certificate for Payment to the Owner, with a copy to the Contractor, for such amount as the Engineer determines to be properly due, or the Engineer will state, in writing, itemized and specific reasons for withholding a Certificate as provided herein.

After the Engineer has issued a Certificate for Payment, the Owner will pay to the Contractor the amount covering Work completed plus stored products, less retention and less previous payments made.

No certificate for a progress payment, nor any progress payment, nor any partial or entire use of occupancy of the Project by the Owner, shall constitute an acceptance of any Work not in accordance with the Contract Documents.

(e) Retention: The Owner will retain the following amounts from each properly certified estimate:

(1) Until the value of the Work completed, including stored materials, is at least 50 percent of the Contract amount, 10 percent of the value of all Work satisfactorily completed, including stored materials.

(2) When the value of the completed Work totals at least 50 percent of the Contract amount, the Owner will discontinue retaining additional amounts provided the Work is progressing satisfactorily and there is no specific cause for retaining a larger sum. The total amount retained will be at least 5 percent of the Contract amount, adjusted for Change Orders, until the date of final payment.

(3) The Owner may elect to reinstate retention of 10 percent of the value of the Work completed if at any time the Contractor fails to make satisfactory progress or if there is other specific cause. Satisfactory progress is identified as conforming to the construction progress schedule as required in Article 24, as modified by the Supplementary Conditions.

No form of collateral in lieu of cash will be acceptable as retainage.

Amounts retained by the Contractor from payments due to suppliers and subcontractors (expressed as a percentage) shall not exceed that being retained by the Owner.

(f) Payments Withheld: The Engineer may decline to approve an Application for Payment and may withhold certificate, in whole or in part, as may be necessary to protect the Owner from loss because of:

(1) Failure of the Contractor to make payments properly to subcontractors or for labor or products.

(2) Unsatisfactory prosecution of the Work by the Contractor either due to quality of the Work or if the Contractor is behind the currently approved construction schedule.

When the above reasons for nonpayment are corrected, then payment will be made for amounts withheld because of such reasons, not later than the next payment.

Completion and Final Acceptance shall be as stipulated in the Supplementary Conditions.

END OF SECTION

Section 00800
Supplementary Conditions

General

The provisions in this Section of the Specifications shall govern in the event of any conflict between this Section and the General Conditions.

Article 1 - Notice of Award of Contract

Article 1 - Notice of Award of Contract, of the General Conditions, is hereby modified to include the following:

Should the Owner require additional time to award a Contract, the time may be extended by the mutual agreement between the Owner and the successful Bidder. If an award of Contract has not been made within 90 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.

Article 4 - Insurance

Article 4 - Insurance, of the General Conditions, is hereby modified to include the following:

First paragraph, delete the word "...similar..."

(a) Worker's Compensation: The Contractor shall procure and shall maintain during the life of the Contract Agreement, Worker's Compensation Insurance for all of Contractor's employees to be engaged in work on the Project under this Contract, and in case any such Work is sublet, the Contractor shall require the subcontractor similarly to provide Worker's Compensation Insurance for all of the latter's employees to be engaged in such Work unless such employees are covered by the protection afforded by the Contractor's Worker's Compensation Insurance. Worker's Compensation Insurance shall include Broad Form All States Endorsement and Voluntary Compensation. The amount of insurance shall not be less than the following:

Each Accident $100,000.00
Disease - Policy Limit $500,000.00
Disease - Each Employee $100,000.00

(b) Comprehensive General Liability: The Contractor shall procure and shall maintain during the life of the Contract Agreement, such Comprehensive General Liability and Broad Form Property Damage Insurance as shall protect Contractor and any subcontractor performing Work covered by this Contract from claims for damages for bodily injury, including accidental death, as well as from claims for property damages, which may arise from operations under the Contract Agreement, whether such operations are by

the Contractor or by any subcontractor or by anyone directly or indirectly employed by either of them. The amount of insurance shall not be less than the following:

General Aggregate $1,000,000.00
Products Comp/Ops Aggregate $1,000,000.00
Personal and Advertising Injury $1,000,000.00
Each Occurrence $1,000,000.00
Fire Damage (Any one fire) $50,000.00
Medical Expenses (Any one person) $100,000.00
Additional Umbrella Aggregate $1,000,000.00

The insurance shall include coverage of the following hazards:

Underground
Explosion/Collapse

NOTE: For the purpose of insurance coverage, each detonation of blasting is a single occurrence.

(c) Owner's and Contractor's Protective Liability: The Contractor shall procure and shall maintain during the life of the Contract Agreement, Owner's and Contractor's Protective Liability Insurance with the same limits as the Comprehensive General Liability.

(d) Automobile Liability: The Contractor shall procure and shall maintain during the life of the Contract Agreement, Comprehensive Automobile Liability Insurance. The insurance shall include coverage for owned, non-owned and hired vehicles. Amounts shall not be less than the following:

Comprehensive Single Limits (CSL) $1,000,000.00

(e) Materials and Equipment Floater: The Contractor shall procure and shall maintain during the life of the Contract Agreement Materials and Equipment Floater Insurance to protect the interests of the Owner, the Contractor, and subcontractors against loss by vandalism, malicious mischief, and all hazards included in a standard All Risk Endorsement. The amount of the insurance shall at all times equal or exceed the full amount of the Contract. The policies shall be in the names of the Owner and the Contractor.

(f) Railroad Insurance- Not Applicable

(h) Certificates of Insurance: Certificates acceptable to the Owner shall be submitted with the Bid Documents. All Certificates of Insurance issued in conjunction with this Project shall contain the statement that ”Coverages afforded under the policies shall not be cancelled unless at least 60 days prior to cancellation written notice has been given to the Owner, as evidenced by receipts of registered or certified mail”. Other standard or preprinted cancellation statements shall be deleted from the certificates.

(h) Additional Insured: The Contractor shall name the City of Temple and HRC Engineers, Surveyors and Landscape Architects as an Additional Insured on all Certificates for Comprehensive General Liability, Owner's Protective Liability, Contractor's Protective Liability, Automobile Liability and Materials and Equipment floater. The Contractor shall maintain such coverage for the full duration of the Project.

Article 7 - Termination of Work for Default

Article 7 - Termination of Work for Default, of the General Conditions, is hereby modified as follows:

Add the following,

"(d) Any termination of the Contractor for alleged default under Article 7 that is ultimately held unjustified is automatically deemed a termination for the convenience of the Owner, Article 8."

Article 8 - Termination for the Convenience of the Owner

Article 8 - Termination for the Convenience of the Owner, of the General Conditions is hereby modified to include the following:

First sentence,

Delete, " ...other than those provided for under Article 7..."

Article 10 - Subcontracting

Article 10 - Subcontracting, of the General Conditions is hereby deleted.

Article 15 - Notice and Service Thereof

Article 15 - Notice and Service Thereof, of the General Conditions is hereby modified to include the following:

(c) All papers required to be delivered to the Owner shall, unless otherwise specified in writing to the Contractor, be delivered to City of Temple, 240 Carrollton Street, Temple, GA 30179, Attn: Mr. Bill Osborne, City Administrator, and copied to the Engineer, HRC Engineers, Surveyors and Landscape Architects, 6554 E. Church Street, Douglasville, GA 30134, Attn: Howard B. Ray, PE.

Any notice to or demand upon the Owner shall be sufficiently given if delivered to the Office of said City Administrator or if delivered by the United States Mail in a sealed, postage-prepaid envelope, or delivered by facsimile transmission, followed by written confirmation, in each case addressed to said City Administrator or to such other representative of the Owner or to such other address as the Owner may subsequently specify in writing to the Contractor for such purposes.

(e) The Contractor shall file all "Notices of Commencement" required for this Project in accordance with O.C.G.A. §44-14-361.5 et.seq. and §36-91-92 et.seq., as applicable. The Contractor shall respond to all requests for copies of a Notice of Commencement. Should the Owner or Engineer receive such a request, this request will be forwarded to the Contractor for further handling. The name and address of the Owner shall be as stated in paragraph (c) of this Article. The name and general description of the Project shall be as stated in the Invitation to Bid.

Article 20 - Interruption of Facility Operations

Article 20 - Interruption of Facility Operations, of the General Conditions, is hereby modified to include the following:

The Contractor shall conduct operations in a manner and sequence which will provide for the continued transportation of wastewater flows during construction of this Project. The Contractor shall take all actions required to prevent discharge of sewer flow from the system to the ground or stream. Any construction actions that impede or interrupt flow shall be carefully executed and monitored to prevent surcharging and overflow.

Any damages resulting from surcharging, overflow or back-up caused by the Contractor's operations shall be the Contractor's responsibility. Fines charged the Owner for overflows caused by the Contractor shall be paid for by the Contractor within 10 calendar days of presentment of such charges to Contractor.

Article 21 - Reserved

Article 22 - Reserved

Article 23 - Protection, Location and Relocation of Utilities

Article 23 - Protection, Location and Relocation of Utilities, of the General Conditions, is hereby modified to include the following:

Second Paragraph, delete last sentence in its entirety and replace with the following,

"No consideration as a differing site condition will be given for the relocation of known or unknown existing utilities, for any work associated

with the protection of existing utilities, nor for any and all impact caused by the presence of existing utilities. Existing utilities shall include all piping, conduits, conductors and duct banks and their appurtenances, regardless of product or service being conveyed through such existing utility."

Article 24 - Schedules, Reports and Records

Article 24 - Schedules, Reports and Records, of the General Conditions, is hereby modified to include the following:

(a) The Contractor shall submit to the Owner progress schedules, payrolls, reports, estimates, records and other data as the Owner may request concerning work performed or to be performed as stipulated in the various sections of these Specifications.

(b) Immediately after execution of the Contract by the Owner, and before the first partial payment is made, the Contractor shall deliver to the Owner a construction progress schedule in form satisfactory to the Owner, showing the proposed dates of commencement and completion of each of the various subdivisions of work required under the Contract Documents and the anticipated amount of each payment that will become due the Contractor in accordance with the Progress Schedule.

(c) An updated schedule and an updated Schedule of Submittals shall be presented with each partial payment request. Lack of an updated schedule and/or an updated Schedule of Submittals will delay processing of the pay request until receipt of the updated schedule and/or an updated Schedule of Submittals.

(d) If the schedule reflects a completion date prior to the completion date established by the Contract Agreement, this shall afford no basis to claim for delay should the Contractor not complete the Work prior to the projected completion date. Instead all “float” between the completion date in the Contractor's schedule and the completion date established in the Contract Agreement shall belong to and be exclusively available to the Owner. Should a change order be executed with a revised completion date, the progress schedule shall be revised to reflect the new completion date.

(e) The Contractor shall maintain on the Project site, a complete set of up-to-date Record Documents.

(f) Project Coordination Meetings: The General Contractor shall participate in Project Coordination Meetings to be held on the site bi-weekly, or more often if conditions warrant, to establish the current state of completion and revise the schedule as necessary. The Project Coordination Meeting will be conducted by the Owner and the Engineer.

(g) Contractor's Responsibilities

(1) Implement the detailed Near Term Schedule of activities to the fullest extent possible between Project Coordination Meetings.

(2) The Contractor shall prepare the Contractor's Daily Report by 10:00 a.m. of the day following the Report date. This Daily Report will contain, as a minimum, the weather conditions; number of workers by craft, including supervision and management personnel on site; active and inactive equipment on site; work accomplished by CPM activity item; problems; and visitors to the jobsite.

(3) If a current activity or series of activities on the OPS is behind schedule and if the late status is not due to an excusable delay for which a time extension would be forthcoming, the Contractor shall attempt to reschedule the activity to be consistent with the Overall Project Schedule so as not to delay any of the Contract milestones. The Contractor agrees that:

a. The Contractor shall attempt to expedite the activity completion so as to have it agree with the OPS. Such measures as the Contractor may choose shall be made explicit during the Project Coordination Meeting.

b. If, within two weeks of identification of such behind-schedule activity, the Contractor is not successful in restoring the activity to an on schedule status, the Contractor shall:

1. Carry out the activity with the scheduled crew on an overtime basis until the activity is complete or back on schedule.

2. Increase the crew size or add shifts so the activity can be completed as scheduled.

3. Commit to overtime or increased crew sizes for subsequent activities, or some combination of the above as deemed suitable by the Owner Representative.

These actions shall be taken at no increase in the Contract amount.

(4) Maintain a current copy of all construction schedules on prominent display in the Contractor's field office at the Project site, or make available on site, or at the City of Temple’s Director of Public Works office.

(5) Cooperate with the Owner or Owner's representative in all aspects of the Project Scheduling System. Failure to implement the Project Scheduling System or to provide specified schedules, diagrams and reports, or to implement actions to re-establish progress consistent with the OPS may be causes for withholding of payment.

Article 25 –Reserved

Article 26 –Reserved

Article 27 –Reserved

Article 28 - Contract Time and Liquidated Damages

Article 28 - Contract Time and Liquidated Damages, of the General Conditions is hereby modified to include the following:

Paragraph (b),

Delete, "...strikes,"

Article 29 - Reserved

Article 30 - Payments and Completion

Article 30 - Payments and Completion, of the General Conditions, is hereby modified to include the following:

Paragraph (a), third paragraph, following last sentence, add,

"The cost associated with resident inspection overtime will be in the range of $100.00/hour, depending upon individuals assigned to the project and the date of the invoice, i.e., allowing for salary escalation. No overtime pay shall be charged to the Contractor for work performed within 10-hour days occurring Monday through Friday, excluding holidays. Additionally, no overtime pay will be charged to the Contractor for work performed at night or on weekends, when, due to operational conditions of the Owner's facilities, the work must be performed during these non-standard work hours ."

Paragraph (c), first sentence,

Change, "...25th day..." to "...20th day..."

Paragraph (c), second sentence,

Change, "...fifth..." to "...first..."

Add to Paragraph (e),

(4) If the Contractor shall fail to complete the work within the Contract Time or extended Contract Time if authorized by change orders, the Owner shall retain an amount for liquidated damages in addition to the retention as defined above.

Add

(g) Completion: ALL WORK REQUIRED BY THE CONTRACT DOCUMENTS, CONTRACT DRAWINGS AND SPECIFICATIONS MUST BE COMPLETED BEFORE THE FINAL INSPECTION IS PERFORMED. This includes, but is not limited to, the following:

(1) Performing all tests as described in the detailed Specifications.

(2) Grassing and restoration of the work area.

Upon completion of all work required, the Contractor shall submit Mark -up Drawings for completion of Record Drawings to the Engineer and request, in writing, that the final inspection be performed. If the Engineer finds the work of the Contractor complete and acceptable in accordance with the provisions of the Contract Documents and that the Record Drawings accurately depict the complete work, Engineer will recommend to the Owner that the job be accepted and that final payment be made.

In the event that the final inspection reveals deficiencies in meeting the Contract requirements, the Contractor shall complete all remaining items of work, and make adjustments found to be necessary. Upon receipt of written notice from the Contractor that the work is complete and ready for re-inspection, the Engineer will make a final inspection.

The Contractor will be notified, in writing, by the Owner of the final acceptance of the work. The date of final acceptance shall be the termination date for the Contractor's liability for the physical properties of the facilities and the beginning of the warranty period.

Before final payment can be made, the Contractor must certify, in writing, to the Owner that all payrolls, materials bills, and other indebtedness connected with the work have been paid.

Final payment will not be made if there is disputed indebtedness or if there are liens upon the property.

If upon completion of all work there is disputed indebtedness or there are liens

upon the property, semi-final payment may, be made, at the Owner's option, in accordance with the following provisions:

(1) The Owner will retain an amount equal to the disputed indebtedness and/or liens upon the property including all related cost and interest in connections with said disputed indebtedness and liens which the Owner may be compelled to pay upon and subsequent adjudication.

(2) The Contractor shall certify to those items of work not disputed that all payables, materials bills and other indebtedness connected with the work have been paid or otherwise satisfied.

The making of the final payment shall constitute a waiver of all claims by the Owner, other than those for faulty work covered by and appearing within the warranty period.

The acceptance of final payment shall constitute a waiver of all claims by the Contractor, except those previously made, in writing, and still unsettled.

(h) Prompt Payment Clause

(1) Owner and Contractor agree that all partial payments and final payments shall be subject to the Georgia Prompt Pay Act, as originally enacted and amended, and as set forth in O.C.G.A. §§13-11-1 through 13-11-11, except as provided below to the extent authorized by law:

a. Interest Rate: For purposes of computing interest on late payments, the rate of interest shall be one-half percent per month or a pro-rata fraction thereof on the unpaid balance as may be due. No interest will be paid on retainage by the Owner.

b. Payment Periods:

1. When the Contractor has performed in accordance with the provisions of these Contract Documents, the Owner shall pay the Contractor within 60 days of receipt by the Owner or the Owner's representative of any properly completed Application for Payment, based upon work completed or service provided pursuant to the terms of these Contract Documents.

2. When a subcontractor has performed in accordance with the provisions of its subcontract and the subcontract conditions precedent to payment have been satisfied, the Contractor shall pay to that subcontractor and each subcontractor shall pay to its subcontractor, within ten days of receipt by the Contractor or subcontractor of each periodic or final payment, the full amount received for such subcontractors work and materials based on work completed or service provided under the subcontract, less retainage expressed as a percentage, but such retainage shall not exceed that retainage being held by the Owner, provided that the subcontractor has provided or provides such satisfactory reasonable assurances of continued performance and financial responsibility to complete its work as the Contractor in its reasonable discretion may require, including but not limited to a payment and performance bond.

c. Interest on Late Payment: Except as otherwise provided in these Contract Documents and/or in O.C.G.A. §13-11-5, if a periodic or final payment to the Contractor is delayed by more than the time allotted in Paragraph b. of this Prompt Payment Clause or if a periodic or final payment to a subcontractor is delayed more than ten days after receipt of periodic or final payment by the Contractor or subcontractor, the Owner, Contractor, or subcontractor, as the case may be, shall pay interest to its Contractor, or subcontractor beginning on the day following the due dates as provided in Paragraph b. of this Prompt Payment Clause at the rate of interest as provided herein. Interest shall be computed per month or a pro-rata fraction thereof on the unpaid balance. There shall be no compounded interest. No interest is due unless the person or entity being charged interest receives “Notice" as provided in Paragraph d. of this Prompt Payment Clause. Acceptance of progress payments or final payment shall release all claims for interest on said payments.

d. Notice of Late Payment and Request for Interest: Any person or entity asserting entitlement to interest on any periodic or final payment pursuant to the provisions of this Prompt Payment Clause shall provide “Notice” to the person or entity being charged interest of the charging party's claim to interest on late payment. “Notice” shall be in writing, served by U.S. Certified Mail - Return Receipt Requested at the time the properly completed Application for Payment is received by the Owner or Owner's representative, and shall set forth the following:

1. A short and concise statement that interest is due pursuant to the provisions of the Georgia Prompt Pay Act and this Prompt Payment Clause;

2. The principal amount of the periodic or final payment which is allegedly due to the charging party; and

3. The first day and date upon which the charging party alleges that said interest will begin to accrue, pursuant to the provisions of the Georgia Prompt Pay Act and this Prompt Payment Clause.

These "Notice" provisions are of the essence; therefore, failure to comply with any requirement as set forth in this Prompt Payment Clause precludes the right to interest on any alleged late payment to which said "Notice" would otherwise apply.

(2) Integration with the Georgia Prompt Pay Act: Unless otherwise provided in these Contract Documents, the parties hereto agree that these provisions of this Prompt Payment Clause supersede and control all provisions of the Georgia Prompt Pay Act (O.C.G.A. §§13-11-1 through 13-11-11 (1994)), as originally enacted and as amended, and that any dispute arising between the parties hereto as to whether or not the provisions of this contract or the Georgia Prompt Pay Act control will be resolved in favor of these Contract Documents and its terms.

END OF SECTION

SECTION NO. 01010

SUMMARY OF WORK

1.01 LOCATION

A. The work described by the Invitation to Bid is located in the City of Temple, Carroll County, Georgia at the Temple WWTP.

1.02 WORK INCLUDED

A. The work to be done under this Contract consists of furnishing all labor, equipment and materials required for the Temple WWTP Grit Removal System Replacement and Associated Control Panel. All work shall be performed according to the requirements of the selected vendors/manufacturers information and all City, State, and Federal Codes.

1.03 WORK COORDINATION

A. The Contractor shall coordinate his work with third parties (such as public utilities and telephone company) in areas where such parties may have rights to underground property or facilities, and request maps or other descriptive information as to the nature and location of such underground facilities or property.

B. The Contractor shall also coordinate his work with owners of private and public property where access is required for the performance of the work. Legal access will be acquired and provided by the Owner.

1.04 CONDITIONS AT THE SITES

A. The Contractor shall make all necessary investigations to determine the existence and location of underground utilities.

B. The Contractor will be held responsible for any damage to and for maintenance and protection of existing utilities and structures.

C. Nothing in these Contract Documents or associated Drawings shall be construed as a guarantee that such utilities are in the location indicated or that they actually exist, or that other utilities are not within the area of the operations.

1.05 Quantities

A. The Owner reserves the right to alter the quantities of work to be performed or to extend or shorten the improvements at any time when and as found necessary, and the Contractor shall perform the work as altered, increased or decreased. Payment for such increased or decreased quantity will be made in accordance with the Instructions to Bidders. No allowance will be made for any change in anticipated profits nor shall such changes be considered as waiving or invalidating any conditions or provisions of the Contract and Bond.

END OF SECTION

SECTION NO. 01016

OCCUPANCY

PART 1 - GENERAL

1.01 PARTIAL OCCUPANCY BY OWNER

A. Whenever, in the opinion of the Owner, any section or portion of the Work is in suitable condition, it may be put into use upon the written order of the Owner and such usage will not be held in any way as an acceptance of said work, 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. Permits and Responsibilities: The Contractor shall, without additional expense to the Owner, be responsible for obtaining all necessary licenses and permits, including but not limited to, building permits, EPD permits electrical 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 organization's 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
- HEI Heat Exchange Institute
- IIAR International Institute of Ammonia Refrigeration
- NB National Board of Boilers and Pressure Vessel Inspectors
- PFMA Power Fan 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

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
- 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 Owner:

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 Owner 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, paydate and retainage.
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

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

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

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

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

1. Owner.
2. Engineer/ Architect.
3. Contractor and superintendent.
4. Major subcontractors as pertinent to the agenda.
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

Section 01340
Shop Drawings, Product Data, and Samples

Part 1 General

1.01 Scope

A. The work under this Section includes submittal to the Owner 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 Owner.

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:

(1) Assembly Drawings Sheet, Scale: 1-inch = 30 feet.

(2) 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 Owner’s selection is required. Prepare samples to match the Owner’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 Owner. Owner 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) include warranties, maintenance agreements, workmanship bonds, project photographs, 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 Owner in writing, at time of submissions, of any deviations on the submittals from requirements of the Contract Documents. The notification of deviation shall be clearly marked by the Contractor in the body of the submittal and stated in text in the Contractor's remarks on the transmittal document of the submittal. Indicate the reasons for the deviations and the benefits to the Project.

10. Identification of revisions on resubmittals.

11. An 8 x 3-inch blank space for Contractor and Owner 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 Owner and Engineer/ Architect

3. Owner to Engineer/ Architect

4. Engineer/ Architects to Contractor

5. Contractor to Supplier

Part 2 Products

2.01 Shop Drawings

A. Unless otherwise specifically directed by the Owner, 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 assembly drawings, larger than 11 x 17-inches, in the form of one reproducible transparency with two opaque prints or bluelines.

C. Submit all shop drawings, 11 x 17-inches and smaller, in the form of six opaque prints or bluelines.

D. 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 Owner’s review.

B. Submit the number of copies which are required to be returned (not to exceed three) plus six copies which will be retained by the Owner.

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 Owner, 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 Owner.

Part 3 Execution

3.01 Contractor's Coordination of Submittals

A. Prior to submittal for the Owner'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 Owner without the Contractor's stamp will be returned to the Contractor for conformance with this requirement.

C. The Owner may backcharge 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 Owner, 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 Owner 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 Owner's review following the receipt of the submittal.

3.03 Reviewed Shop Drawings

A. Owner Review

1. Allow a minimum of 5 business days for the Owner'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 Owner will advise the Contractor promptly when it is determined that a submittal being processed must be delayed for coordination. Allow a minimum of 5 business days for reprocessing each submittal. Advise the Owner 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 Owner for his 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 Owner 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 Owner’s stamp.

C. Substitutions: In the event the Contractor obtains the Owner’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 Owner, 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 Owner’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 Owner.

B. Project Data and Samples: Resubmit new data and samples as specified for initial submittal, with the resubmittal number shown.

END OF SECTION

Section 01510
Temporary Facilities

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.

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 Owner’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 Owner’s review and maintenance of same must be satisfactory to the Owner 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 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

Section 01540
Job Site Security

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.

C. Traffic control devices shall comply with the latest edition of the Manual on Uniform Traffic Control Devices for Streets and Highways.

END OF SECTION

Part 1 General

1.01 Scope

A. The Contractor shall provide transportation of all equipment, materials and products furnished under these Contract Documents to the Work site. In addition, the Contractor shall provide preparation for shipment, loading, unloading, handling and preparation for installation and all other work and incidental items necessary or convenient to the Contractor for the satisfactory prosecution and completion of the Work.

B. All equipment, materials and products damaged during transportation or handling shall be repaired or replaced by the Contractor at no additional cost to the Owner prior to being incorporated into the Work.

1.02 Transportation

A. All equipment shall be suitably boxed, crated or otherwise protected during transportation.

B. Where equipment will be installed using existing cranes or hoisting equipment, the Contractor shall ensure that the weights of the assembled sections do not exceed the capacity of the cranes or hoisting equipment.

C. Small items and appurtenances such as gauges, valves, switches, instruments and probes which could be damaged during shipment shall be removed from the equipment prior to shipment, packaged and shipped separately. All openings shall be plugged or sealed to prevent the entrance of water or dirt.

1.03 Handling

A. All equipment, materials and products shall be carefully handled to prevent damage or excessive deflections during unloading or transportation.

B. Lifting and handling drawings and instructions furnished by the manufacturer or supplier shall be strictly followed. Eyebolts or lifting lugs furnished on the equipment shall be used in handling the equipment. Spreader bars or lifting beams shall be used when the distance between lifting points exceeds that permitted by standard industry practice.

C. Under no circumstances shall equipment or products such as pipe, structural steel, castings, reinforcement, lumber, piles, poles, etc., be thrown or rolled off of trucks onto the ground.

D. Slings and chains shall be padded as required to prevent damage to protective coatings and finishes.

END OF SECTION

Part 1 General

1.01 Scope

The work under this Section includes, but is not necessarily limited to, the furnishing of all labor, tools and materials necessary to properly store and protect all materials, equipment, products and the like, as necessary for the proper and complete performance of the Work.

1.02 Storage and Protection

A. Storage

1. Maintain ample way for foot traffic at all times, except as otherwise approved by the Owner.

2. All property damaged by reason of storing of material shall be properly replaced at no additional cost to the Owner.

3. Packaged materials shall be delivered in original unopened containers and so stored until ready for use.

4. All materials shall meet the requirements of these Specifications at the time that they are used in the Work.

5. Store products in accordance with manufacturer's instructions.

B. Protection

1. Use all means necessary to protect the materials, equipment and products of every section before, during and after installation and to protect the installed work and materials of all other trades.

2. All materials shall be delivered, stored and handled to prevent the inclusion of foreign materials and damage by water, breakage, vandalism or other causes.

3. Substantially constructed weathertight storage sheds, with raised floors, shall be provided and maintained as may be required to adequately protect those materials and products stored on the site which may require protection from damage by the elements.

C. Replacements: In the event of damage, immediately make all repairs and replacements necessary for the approval of the Owner and at no additional cost to the Owner. Equipment and products stored outdoors shall be supported above the ground on suitable wooden blocks or braces arranged to prevent excessive deflection or bending between supports. Items such as pipe, structural steel and sheet construction products shall be stored with one end elevated to facilitate drainage.

D. Unless otherwise permitted in writing by the Owner, building products and materials such as cement, grout, plaster, gypsum board, particleboard, resilient flooring, acoustical tile, paneling, finish lumber, insulation, wiring, etc., shall be stored indoors in a dry location. Building products such as rough lumber, plywood, concrete block and structural tile may be stored outdoors under a properly secured waterproof covering.

E. Tarps and other coverings shall be supported above the stored equipment or materials on wooden strips to provide ventilation under the cover and minimize condensation. Tarps and covers shall be arranged to prevent ponding of water.

1.03 Extended Storage

In the event that certain items of major equipment such as air compressors, pumps and mechanical aerators have to be stored for an extended period of time, the Contractor shall provide satisfactory long-term storage facilities which are acceptable to the Owner. The Contractor shall provide all special packaging, protective coverings, protective coatings, power, nitrogen purge, desiccants, lubricants and exercising necessary or recommended by the manufacturer to properly maintain and protect the equipment during the period of extended storage.

END OF SECTION

Section 01630
Substitutions and Options

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/ Architect, if any, to accommodate the item.

E. Whenever a product specification includes minimum experience requirements which the manufacturer selected by the Contractor cannot meet, the manufacturer shall furnish the Owner with a cash deposit, or bond acceptable to the Owner in an amount equal to the cost of the product, which shall remain in effect until the experience requirement has been met.

1.04 Approvals

A. Approval, of a substitution as an acceptable manufacturer, of the Engineer/ Architect is dependent on determination that the product offered:

1. 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

2. 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.

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 above in Article 1.03, Paragraph A, 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 1.03, 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.

END OF SECTION

Part 1 General

1.01 Scope

These general equipment stipulations apply, in general, to all equipment and piping. They supplement the detailed equipment Specifications, but in case of conflict, the detailed equipment Specifications shall govern.

1.02 Coordination

The Contractor shall assume full responsibility for the coordination of the installation of all equipment, materials and products furnished under these Contract Documents. The Contractor shall be completely responsible for verification that all structures, piping and equipment components furnished by the Contractor and/or subcontractors and suppliers are compatible. The Contractor shall start-up each equipment system and shall make all necessary alterations. All such alterations shall be made at the Contractor's expense.

1.03 Unit Responsibility

Equipment manufacturers assigned unit responsibility for systems comprised of several components shall be responsible for furnishing a complete system in accordance with the requirements of these Specifications. The manufacturer shall be responsible for all coordination between component manufacturers and shall provide all submittals, installation and start-up services and certifications on the system as a unit.

1.04 Adaptation and Location of Equipment

A. No responsibility for alteration of a planned structure to accommodate other types of equipment will be assumed by the Owner. Equipment which requires alteration of the structures will be considered only if the Contractor assumes all responsibility for making and coordinating all necessary alterations. All such alterations shall be made at the Contractor's expense.

B. The Contractor shall install the work in such manner that the equipment, piping, vents, conduit, panels, ductwork and appurtenances be as neatly installed with adequate space for maintenance and passage of personnel.

1.05 Equipment Warranty

The Contractor shall warrant all equipment against faulty or inadequate design, improper assembly or erection, defective materials, breakage or other failure. The warranty period shall be defined in Section 01740 of these Specifications.

1.06 Workmanship and Materials

A. All equipment shall be designed, fabricated and assembled in accordance with the most modern engineering and shop practice. Individual parts shall be manufactured to standard sizes and gauges so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall be new and shall not have been in service at any time prior to delivery, except as required by tests.

B. Materials shall be suitable for service conditions. Iron castings shall be tough, close grained, gray iron free from blowholes, flaws or excessive shrinkage and shall conform to ASTM A 48, Class 30 minimum. Plugging of defective castings shall not be permitted. Castings shall be annealed to remove internal stresses prior to machining and shall have the mark number and heat number cast on them.

C. Except where otherwise specified, structural and miscellaneous fabricated steel used in items of equipment shall conform to the Standards of the American Institute of Steel Construction. All structural members shall be considered as subject to shock or vibratory loads.

D. All replaceable or expendable elements such as filters, screens, drive belts, fuses and lamps shall be easily accessible and replaceable without need of dismantling equipment or piping. All such items shall be of a standard type that is readily available from multiple suppliers.

E. Threaded openings for drains or vents in pump volutes, compressor or fan scrolls, air receivers, and heat exchangers which are plugged during normal operation shall be provided with stainless steel plugs.

F. All equipment delivered to the Project site shall include detailed installation instructions and a parts list.

1.07 Equipment Specifications

The use of singular or plural terminology in the Specifications is not intended to define the number of units required to fulfill Contract requirements. Bidders must consult the Drawings and Specifications to determine how many units of a particular piece of equipment are required. This does not relieve the Contractor of the responsibility to provide all equipment specified when multiple units are specifically required in the Specifications.

1.08 Seal Water Requirements

Where seal water is provided for flushing of mechanical shaft sleeves or sealing of shaft seal packing, provide equipment with drip pans fitted with drains to contain the leakage and convey it to the nearest suitable floor drain. Route drain piping to minimize obstructions to the movement of personnel.

1.09 Operating Fluids and Gases

All operating fluids and gases recommended by the manufacturer and required for operation of the equipment shall be provided in sufficient quantity by the Contractor to fill all equipment and to replace all fluids and gases consumed during testing and start-up.

1.10 Lubrication and Lubrication Fittings

A. Equipment shall be adequately lubricated by systems which require attention no more frequently than weekly during continuous operation. Lubrication systems shall not require attention during start-up or shutdown and shall not waste lubricants.

B. Lubricants of the type recommended by the equipment manufacturer shall be provided in sufficient quantity by the Contractor to fill all lubricant reservoirs and to replace all lubricants consumed during testing, start-up and initial operation. The Contractor shall provide sufficient quantities of lubricants to lubricate all equipment for one year of normal service before final acceptance of the equipment will be made by the Owner.

C. Where special run-in oil or storage lubricants are used, they shall be flushed out and replaced with the required service lubricant by Contractor.

D. Flushed out and replaced with the required service lubricant by the Contractor.

E. Tag each piece of equipment with a cloth tag showing proper type lubricant, period between lubrications, date of lubrication and worker's initials. Have space for 10 lubrication notations.

F. Except for rotating shaft couplings, all lubrication fittings shall be brought to the outside of all equipment so that they are readily accessible from the outside without the necessity of removing covers, plates, housings or guards. Fittings shall be accessible from safe, permanent platforms or walk areas. Fittings shall be of the bull-neck, check type for use with a portable high pressure grease gun. Connection from a remote fitting to the point of use shall be with minimum 3/16-inch stainless steel tubing, securely mounted parallel to equipment lines and protected where exposed to damage.

1.11 Safety Guards

All belt or chain drives, fan blades, couplings and other moving or rotating parts shall be covered on all sides by a safety guard. Safety guards shall be fabricated from 16 USS gauge or heavier galvanized or aluminum-clad sheet steel or 1/2-inch mesh galvanized expanded metal. Expanded metal safety guards shall be banded to eliminate sharp edges. Each guard shall be designed for easy installation and removal. All necessary supports and accessories shall be provided for each guard. Supports and accessories, including bolts, shall be galvanized. All safety guards in outdoor locations shall be designed to prevent the entrance of rain and dripping water. All safety guards shall comply with OSHA General Industry Standards, Part 1910, Subpart O, Machinery and Machine Guarding. Provide tachometer access on shaft ends.

1.12 Equipment Bases

A. Where shown on the Drawings, equipment shall be installed on a raised, reinforced concrete base. The base shall be a minimum of 4-inches in height and shall extend beyond the equipment baseplate approximately 2-inches on all sides.

B. The Engineer shall be consulted concerning electrical conduit locations prior to pouring the concrete base.

C. Unless otherwise specified, a cast iron or welded steel baseplate shall be provided for each pump, compressor and any other item of equipment which is to be installed on a concrete base. Each unit and drive assembly shall be supported on a single baseplate of neat design. Baseplates shall have pads for anchoring all components and adequate grout holes. Baseplates for pumps shall have a raised lip all around and a threaded drain connection. Baseplates shall be anchored to the concrete base with suitable anchor bolts and the space beneath filled with epoxy or non-shrink grout as specified in the grouting section.

D. On direct coupled equipment, motor and driven equipment shall be doweled to a common base with a minimum of two dowels each.

1.13 Alignment of Motors and Equipment

A. In every case where a drive motor is connected to a driven piece of equipment by a flexible coupling, the coupling halves shall be disconnected and the alignment between the motor and the equipment checked and corrected. Machinery shall first be properly aligned and leveled by means of steel wedges and shims or jacking screws near anchor bolts. Anchor bolts shall be tightened against the shims on wedges or jacking screws and the equipment shall again be checked for level and alignment before placing grout. Wedges shall not be placed between machined surfaces.

B. In general, checking and correcting the alignment shall follow the procedures set up in the Standards of the Hydraulic Institute, Instructions for Installation, Operation, and Maintenance of Centrifugal Pumps. Equipment shall be properly leveled and brought into angular and parallel alignment.

C. Equipment shall be installed in such a way that no strain is transmitted to the equipment by piping systems or adjacent equipment.

1.14 Grouting

A special epoxy, non-shrink, or sand-cement grout shall be used in the placement of all pump, motor and equipment baseplates or bedplates, column baseplates, other miscellaneous baseplates and other grouting applications as shown on the Drawings.

1.15 Welding and Brazing

A. All welds shall be sound and free from embedded scale and slag. All butt welds shall be continuous, and where exposed to view, shall be ground smooth. All continuous welds shall be gas and liquid-tight. Welds in piping shall have full penetration and shall be smooth on the inside of the pipe. Intermittent welds shall have an effective length of at least 2-inches and shall be spaced not more than 6-inches apart.

B. All welding of steel and aluminum, including materials, welding techniques, general safety practices, appearance and quality of welds, and methods of correcting defective work, shall conform to the latest requirements of AWS Specifications. Structural steel welding shall conform to the requirements of the AWS Structural Welding Code. The general recommendations and requirements of the AWS Structural Welding Code shall also apply to welded aluminum structures. The welding process and welding operators shall meet qualification tests and welding performance tests in accordance with the latest provisions of ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing Qualifications. Welding process and qualification procedures for welding of pipe shall conform to the latest requirements of ANSI B31.1, Section 327, Welding, and Section 328, Brazing and Soldering.

All welding qualification tests shall be witnessed by the Engineer, except as provided herein. All costs associated with the qualification or testing of welders and welding operators shall be borne by the Contractor.

C. Reports certifying that the welding procedures, welders and welding operators that the Contractor intends to use meet the requirements specified above. These reports shall be submitted to the Engineer prior to beginning the Work. In the case of welder qualifications for shop welding and for carbon steel field welding, welders presenting certified qualification papers validated within the preceding 6-month period will not be required to take the qualification tests. In the case of field welding of stainless steel or aluminum, all welders shall be required to take the qualification tests regardless of past experience or availability of certified qualification papers.

D. Field welding practices shall conform to OSHA construction standards, Part 1926, Subpart J, Welding and Cutting. Shop welding practices shall conform to OSHA General Industry Standards, Part 1910, Subpart Q, Welding, Cutting, and Brazing.

E. Welding electrodes for structural steel shall conform to the standard recommendations of the AISC. Welding electrodes for stainless steel shall conform to applicable AWS Specifications and shall be as recommended by Welded Austenitic Chromium-Nickel Stainless Steels, Techniques and Properties, published by the International Nickel Company, New York, New York. Welding electrodes for aluminum shall conform to applicable AWS Specifications.

F. Each welder and welding operator must identify all welds with welder's assigned symbol.

G. Welders performing unsatisfactory work shall be removed from the welding process.

H. The Owner may inspect any weld by radiographic or other means. Welds not in

I. Accordance with the requirements specified herein shall be repaired or replaced at the Contractor's expense. Excessive porosity, nonmetallic inclusions, lack of fusion, incomplete penetration and cracking shall constitute grounds for rejection of welds.

1.16 Erection and Setting

A. In the erection and setting of all fabricated equipment, the Contractor shall exercise care to ensure that each item of equipment is adequately supported so as not to bend or distort under its own weight until adequate foundation support and anchorage are provided. Where lifting lugs, angles or clips are provided on equipment, they shall be used in erecting and setting the equipment. Erection and setting of equipment and structural steel shall conform to the requirements of OSHA Construction Standards, Part 1926, Subpart R, Steel Erection, Subpart H, Material Handling, Storage, Use, and Disposal, and Subpart N, Cranes, Derricks, Hoists, and Conveyors. Erection of structural steel shall conform to the latest requirements of the AISC Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings.

B. During placement and prior to any grouting or connection of adjacent piping, the equipment shall be leveled and aligned true to level, plumb, alignment and grade with all parts bearing or fitting the structure or equipment accurately and securely. It shall not be permitted to cock out of alignment, nor shall the Contractor redrill, reshape or force fit any fabricated items.

C. The Contractor shall take all measurements necessary to properly fit Contractor's work in the field, and Contractor shall be governed by and responsible for these measurements and the proper working out of all details. The Contractor shall be responsible for the correct fitting of all work in the field and the accurate placement of all anchor bolts installed by Contractor.

D. The Contractor shall bring all parts to be erected or assembled into close contact. Before assembly, all surfaces to be in contact with each other shall be thoroughly cleaned. Drift pins may be used only for bringing members into position, never to enlarge or distort holes. Torching or burning of holes or cutting of fabricated items to correct misalignment or shop errors shall not be permitted. Enlargement of holes necessary to make field connections shall be done only with the Engineer's approval by reaming with twist drills and in a manner acceptable to Engineer.

E. All equipment shall be furnished with suitable eyebolt lifting lugs or lifting angles to facilitate handling.

1.17 Special Tools and Accessories

Equipment requiring periodic repair and adjustment shall be furnished complete with all special tools, instruments and accessories required for proper maintenance. Special tools and accessories shall include those tools and accessories not normally available in an industrial hardware or mill supply house. Equipment requiring special devices for lifting or handling shall be furnished complete with those devices.

1.18 Galvanizing

A. All galvanizing shall be done by the hot-dip process after fabrication in conformity with requirements of ASTM A 123, Grade 100; ASTM A 153, ASTM A 384 and ASTM A 385. Articles to be galvanized shall be pickled before galvanizing. Articles to be painted shall not be quenched.

B. Where galvanized bolts are specified or required by the Drawings, zinc plated bolts will be acceptable provided zinc plating conforms to ASTM B 633, Type II.

C. Areas of galvanizing damaged at the factory by welding or burning or otherwise damaged shall be thoroughly stripped and cleaned and recoated with zinc to the required thickness by the hot dip process. Areas of galvanizing damaged in the field during transportation, handling or installation shall be stripped, cleaned, and recoated with zinc to the required thickness in accordance with ASTM A 780, Annex A3.

D. Galvanized articles shall be free from uncoated spots, blisters, flux, black spots, dross, projections and other defects not consistent with acceptable galvanizing practice.

E. Zinc and cadmium plating shall be subject to visual examination to determine uniformity of coating. The Engineer may require that the coating uniformity be tested in accordance with ASTM A 239 or ASTM E 376.

1.19 Vibration Testing

A. Unless specified otherwise in the Specifications, each pump or blower having a rated power of 50 HP, or greater, shall be tested in the field for acceptable vibration levels. Vibration testing shall be performed by an experienced, factory-trained and authorized vibration analysis expert (not a sales representative) retained by the Contractor for this work. Each unit shall be tested separately without duplicate equipment running. All field testing shall be done in the presence of the Engineer. The Engineer shall be furnished with four certified copies of vibration test data for each test performed.

B. Where specified in the Specifications, equipment which is assembled and tested on the manufacturer's floor shall also be checked triaxially for vibration by the manufacturer. The results of these tests, along with location of vibration check points, shall be submitted to the Engineer. All readings shall be made on an X-Y recorder with appropriate scales indicated and an explanation thereon of any recordings exceeding specified limits. The field tests shall include substantiation of the manufacturer's test data.

C. For systems with variable speed drives, tests shall be conducted at various speeds between maximum and minimum. For systems with two-speed drives, tests shall be conducted at both speeds. For systems with constant-speed drives, tests shall be conducted under various loading conditions as determined by the Engineer.

D. Rotating equipment shall be tested for vibration in the field after installation by the following method. Equipment, complete with drive systems, in place at the job site, shall not vibrate more than the values allowed herein, unless otherwise specified in the detailed equipment specifications. All field tests shall be running tests with the equipment operating on the product for which it is intended or a substitute acceptable to the Engineer. The term displacement, as used herein, shall mean total peak-to-peak movement of vibrating equipment, in mils; velocity shall mean the peak velocity or speed of the vibrating equipment, in inches per second; acceleration shall mean the maximum acceleration which occurs during the vibration cycle, measured in G's. Displacement and velocity shall be measured by a meter equal to IRD Mechanalysis Vibration Meter Model 306, or Bently-Nevada Model TK-8. Acceleration shall be measured by suitable equipment equal to IRD Mechanalysis, Bently-Nevada, subject to approval of the Engineer. Frequency of vibration, in cycles per minute (cpm), shall be determined when vibration exceeds specified levels or as otherwise necessary. Vibration shall be measured on the bearing housing, unless other locations are deemed necessary by the vibration analysis expert and Engineer.

E. For all equipment tested, vibration shall be checked in the radial and axial directions. For pumps, vibration shall not exceed that permitted by the Hydraulic Institute.

F. Critical speeds of all rotating equipment shall meet the following:

1. For stiff shaft designs, the first critical speed of the rotating equipment shall be at least 25 percent above the maximum design operating speed.

2. For flexible shaft designs, critical speeds shall be at least 2 percent above or below normal design operating speeds.

G. The Contractor shall be responsible for unit and system assembly vibration testing and their results, which shall be within the specified limits. Copies of test results shall be submitted to the Engineer for review. Should the vibration field test results exceed shop test results or the limits specified herein, the Contractor shall correct the deficiencies within 30 days. After corrections have been completed, the vibration testing shall be rerun and the results resubmitted to the Engineer for review.

1.20 Hydraulic Systems

A. All pipes, tubes and hoses for hydraulic fluid shall be securely restrained against movement.

B. All hydraulic fluid reservoirs for hydraulic power packs shall be equipped with a low level shut-off mechanism which shall stop operation of the power pack when the level of fluid in the reservoir reaches a predetermined low level.

C. All hydraulic systems shall be equipped with an alarm to notify the operator of system malfunction.

1.21 Noise Criteria

A. Unless otherwise specified, noise levels for all operating equipment shall not exceed 90 dB at 5 feet from the equipment when measured on the A scale of a calibrated sound level meter at slow response.

B. Noise criteria shall be met without the use of special external barriers or enclosures.

1.22 Identification of Piping and Equipment

A. General: All equipment and piping specified to be painted shall be color coded as specified by the Owner.

B. Equipment: All major items of equipment shall have an identification nameplate and dataplate.

1. Nameplates: The Contractor shall submit a suitable list of all items of major equipment to the Engineer, who will furnish the Contractor with an identification numbering system. The nameplates shall be of Type 304 stainless steel, No. 6 finish, and not less than No. 16 gauge with indented stamped lettering. Nameplates shall be attached to equipment bases in easily visible and accessible locations. Nameplates shall be fastened in a permanent manner, arranged not to damage the equipment, with not less than four stainless steel fasteners. Dataplates: Each item of mechanical equipment shall be provided with a stainless steel dataplate. Separate dataplates shall be provided for motors, engines and driven equipment. Dataplates shall include the following minimum information:

    a. Name of equipment (from equipment specifications)

    b. Manufacturer

    c. Model designation

    d. Serial number

    e. Rated horsepower

    f. Service factor

    g. Electrical and insulation data

    h. Speed (rpm)

i. Capacity and head (discharge pressure)

j. Net weight.

k. Lettering shall be upper case, block style in size and spacing to suit the nameplate. The identification nameplates shall not be painted.

C. Valves: All valves shall be identified with a round brass disc, approximately 1-1/2-inches in diameter and not less than No. 14 gauge, coated with a clear lacquer. Discs shall be fastened to valves in a permanent manner; attachment by chain to handwheels or other operators shall not be acceptable. Discs shall be stamped using indented numerals and/or letters with a valve number corresponding to its identification number in the valve schedule to be included in the operation and maintenance manual.

D. All pushbutton stations, switches, motor controllers, transmitters and other control equipment shall have identification nameplates of the engraved, laminated plastic type affixed to or adjacent to the switch, pushbutton station, etc.

E. All manufacturer's nameplates, identification nameplates and ASME code plates located on areas of equipment to be insulated shall be removed and reattached on uninsulated areas in a manner acceptable to the Engineer.

1.23 Safety Signs

The following sign shall be provided at all areas where oxygen or flammable materials are stored or used (colored red, white and black):

DANGER
NO SMOKING, MATCHES, OR OPEN FLAMES

1. The following sign shall be affixed to all entrance hatches or access manways on covered tanks and vessels:

CAUTION
OXYGEN DEFICIENT OR TOXIC CONDITIONS MAY EXIST FOLLOW PRESCRIBED PROCEDURES BEFORE ENTRY

2. The following sign shall be provided at all compressor vents and equipment blowoffs:

CAUTION
LOUD BLOWDOWN MAY OCCUR WITHOUT WARNING

END OF SECTION

Part 1 General

1.01 Scope

A. The work under this Section defines the minimum scope of services to be provided by the Contractor using factory representatives of the manufacturers of the equipment to be installed during installation, start-up, and operator training.

B. Equipment manufacturers assigned unit responsibility for systems comprised of several components shall provide the services of factory representatives from each component manufacturer to perform the duties required under these Specifications. The equipment manufacturer assigned unit responsibility shall be responsible for coordinating the activities of the system component manufacturers.

1.02 Qualification

A. Qualification of the representatives for installation, start-up, and operator training purposes shall be appropriate for the equipment being installed and shall be subject to the approval of the Engineer/Architects/Owner Representative. Where equipment has significant process complexity, furnish the services of engineering personnel knowledgeable in the process involved and the function of the equipment.

B. References in various equipment sections of the terms “factory representative” or “field representative” shall mean an employee of the equipment manufacturer who is completely knowledgeable of the construction, installation, operation and maintenance of the equipment. A sales representative does not qualify. Any field or factory representative not an active employee of the manufacturer must provide documentation from the manufacturer stating that the individual, by name, has been formally trained in the installation, operation and maintenance of the equipment and is authorized to make the required certification to perform the required services.

1.03 Coordination

A. The Contractor shall coordinate the visits of factory representatives during installation, start-up and operator training in accordance with the requirements of Section 01655 of these Specifications.

B. The Contractor shall notify the Owner Representative 72 hours prior to any impending visit by factory representatives so that the Engineer can be present.

C. The Contractor shall coordinate the visits of all factory representatives for operator training with the Owner. The Contractor shall provide the Engineer/Architects/Owner Representative and Owner with a training schedule a minimum of 15 days prior to the start of the training period.

D. When approved by the Engineer, the period of service on more than one item furnished by the same manufacturer may run concurrently.

1.04 Installation Inspection Services

A. The Contractor shall furnish the services of a competent factory representative to inspect the installation of each piece of equipment prior to start-up and functional testing in accordance with the requirements of these Specifications. The time required shall be shown in the equipment sections of these Specifications, but shall be no less than one, eight-hour day.

B. The factory representative shall certify that the equipment has been installed in accordance with the manufacturers' recommendations and is ready for start-up.

1.05 Start-Up Services

The Contractor shall furnish the services of a competent factory representative to supervise the start-up, functional testing, and field performance testing for each item or system installed in accordance with Section 01655 sections shown in. The time required shall be shown in the equipment sections if provided, but shall be no less than one, eight-hour day.

1.06 Operator Training Services

A. The Contractor shall furnish the services of a factory representative to train the Owner's personnel in the operation and maintenance of each item installed under these Specifications. The time required shall be shown in the equipment sections, but shall be no less than one, eight-hour day.

END OF SECTION

Part 1 General

1.01 Scope

A. The work under this Section includes, but is not necessarily limited to, the provision of all labor and material required to perform start-up of all equipment and mechanical systems installed under this Contract.

B. The work defined under this Section includes providing the services of a factory representative in accordance with the requirements of Section 01645 of these Specifications.

C. Certification of start-up and full testing shall be performed by the manufacturer using the services of a factory representative trained in this type service.

D. Unless otherwise specified, the Contractor shall furnish all labor, materials, water, air, oil, power, fuel, chemicals, test equipment and other items required to conduct the field tests, including any retests.

E. The cost of all field testing shall be included in the Contract Price and no separate payment will be made.

1.02 Coordination

The Contractor shall not proceed with any functional test or operating test until the operation and maintenance manuals for the equipment have been submitted and been designated “No Exceptions Taken”. The Contractor shall coordinate all activities required for starting of systems including the visits by the factory representatives, particularly where an equipment item's operation is dependent on the operation of other equipment. Prior to calling the factory representative, the Contractor shall ensure that all necessary related equipment, structures, piping and electrical work is complete. Any required revisits to the site by the factory representative shall be provided by the Contractor.

1.03 Pre Start-Up Maintenance

After installation and prior to start-up, all grease- lubricated joints, shaft couplings and bearings shall be flushed out and re-greased. All oil reservoirs and sumps shall be completely drained and flushed and refilled with the proper lubricant. All operating fluid and gas reservoirs shall be filled with the proper fluid and gases. Screens and filters shall be checked for contamination and replaced if necessary. The equipment shall then be tagged, signed and dated, indicating that the equipment has been properly lubricated or prepared for start-up.

1.04 Installation Inspection

A. Prior to energizing any piece of equipment or performing a functional test, a factory representative of the equipment manufacturer shall inspect the installation of the equipment. The factory representative shall determine if the equipment has been installed in accordance with the manufacturer's recommendations, pre-start-up maintenance has been performed, and is ready for start-up and the initiation of the functional test.

B. Should the installation inspection indicate that the equipment has been improperly installed or prepared for start-up, the Contractor shall provide such modifications or adjustments as required for the equipment to operate properly.

C. The factory representative shall certify that the equipment has been installed in accordance with the Drawings, Specifications, and the manufacturer's recommendations and that the equipment is ready for start-up and functional testing to be performed.

1.05 Functional Test

A. Following the installation inspection by factory representative, perform a functional test on each piece of equipment. The functional test shall consist of operation of the equipment on a normal duty cycles for a sufficient period of time to determine satisfactory operation. Time required for functional testing shall be as specified in the equipment specifications or a minimum one continuous eight-hour period, whichever is longer. To the maximum extent practical, exercise the full capabilities of all equipment including remote operation, instrumented control schemes, alternate modes of operation and emergency operation.

B. Should the results of the functional test indicate that the equipment has failed to perform in accordance with the Specifications, the Contractor shall make, at no additional cost to the Owner, all modifications or adjustments as required for satisfactory operation, including replacement of any or all components, if necessary. Following the modifications or adjustments, the Contractor shall repeat the functional test. This procedure shall be repeated until the results of the test indicates that the equipment has satisfied the requirements of the applicable Specification section.

C. After the functional test is completed, each manufacturer shall certify, in writing, that tests were made in accordance with the Specifications and the manufacturer’s recommendations, that the functional tests and start-up operation have been satisfactory and that the equipment is fully operational and capable of meeting operating requirements.

1.06 Operating Test Period

A. Following the functional test, the Contractor shall place each system into service and undergo an operating test period under normal service conditions. The minimum time for the operating test period for each system shall be 30 consecutive days, excluding time that the equipment is taken out of service.

B. Where required in the equipment specifications, process performance testing shall be performed during the operating test period in accordance with the requirements of the equipment specifications. The Contractor shall provide all materials and labor, including the services of a factory representative, necessary to perform the performance testing. The test period shall commence upon the initiation of operation of all systems and shall end after the successful operation of the equipment for the minimum time required.

C. The Contractor shall repair and make all modifications required due to mechanical failure of the equipment during the operating test period. Should the equipment fail to meet the performance testing requirements, a factory representative shall evaluate the equipment and determine the cause of the process failure. The Contractor shall make all modifications recommended by the manufacturer.

1.07 Certification

A. Upon completion of startup, the Contractor shall provide written certification from all equipment manufacturer’s factory representatives. Written certification shall indicate that tests were made in accordance with the manufacturer's recommendations, that the test and start-up operation has been satisfactory completed and that the equipment is fully operational under design requirements. Written certification shall be filed with the Engineer/Architects/Owner Representative on the manufacturers stationary.

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 of 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/Architect/Owner Representative.

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.

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/Architect/Owner Representative 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/Architect/Owner Representative.

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/Architect/Owner Representative will decide what method of restoration shall be used.

G. Timing: Schedule final cleaning as approved by the Engineer/Architect/Owner Representative 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/Architect/Owner Representative 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/Architect/Owner Representative 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, as deemed necessary by the Owner.

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/Architect/Owner Representative.

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. Record Drawings shall be reproducible, shall have a title block indicating that the drawings are Record Drawings, the name of the company preparing the Record Drawings, and the date the Record Drawings were prepared. The Owner will provide Final Record Drawings based on Contractors Mark up Record Drawings.

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.

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/Architect/Owner Representative for the Owner.

B. Final Record Drawings to be provided by Owner.

C. 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 Scope

A. The Contractor shall provide five copies of a complete and comprehensive reference manual (Operating and Maintenance Manual) containing operating and maintenance data to enable operators and plant engineers to correctly operate, service and maintain all equipment and accessories covered by the Specifications and Drawings. The data contained in the manual shall explain and illustrate clearly and simply all principles and theory of operation, operating instructions, maintenance procedures, calibration procedures and safety precautions and procedures for the equipment involved.

B. No separate payment will be made for the Operating and Maintenance Manual and the cost of said manual shall be included in the Contract Price.

1.02 Submittal Schedule

A. The Contractor shall submit, for the Engineer/Architect/Owner Representative approval, two preliminary copies of the manual with all specified material before the work covered by these Contract Documents is 80 percent complete. The Engineer/Architect/Owner Representative will notify the Contractor, in writing, of any deficiencies in the manual and will return one copy of the manual for completion and/or correction.

B. Before final acceptance, the Contractor shall submit five copies of the revised manual, complete in detail as specified below.

1.03 Submittal Format

A. Each copy of the manual shall be assembled in one or more loose leaf binders, each with title page, typed table of contents, typed list of tables, typed list of figures, and heavy section dividers with reinforced holes and numbered plastic index tabs. Binders shall be 3-ring, hardback type, with transparent vinyl pocket front cover suitable for inserting identifying cover and with a transparent vinyl pocket on the spine for label. All data shall be punched for binding. Composition and printing shall be arranged so that punching does not obliterate any data. The cover and binding edge of each manual shall have the project title, specification section number and title, and manual title printed thereon, all as approved by the Engineer.

B. All copies of shop drawings, figures and diagrams shall be reduced to either 8-1/2 x 11-inches or to 11-inches in the vertical dimension and as near as practical to 17-inches in the horizontal dimensions. Such sheets shall be folded to 8-1/2 x 11-inches. The manual and other data shall be printed on first quality paper, 8-1/2 x 11-inch size with standard 3-hole punching. Binders shall be labeled Vol. 1, Vol. 2, etc., where more than one is required.

The table of contents for the entire set, identified by Volume number, shall appear in each binder. Text, figures and drawings shall be clearly legible and suitable for dry process reproductions.

C. Each submittal shall have a cover sheet that includes the following information:

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

2. The Project title.

3. Numerical submittal numbers, starting with 1.90, 2.90, etc. Revisions to be numbered 1.91, 1.92, 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.

D. The Engineer/Architect/Owner Representative will not recommend final acceptance of the Work until the Operating and Maintenance Manual is complete and satisfactory to Engineer/Architect/Owner Representative.

1.04 Contents of Operating and Maintenance Manual

A. Each manual shall include a title page which includes all information specified in Article 1.03, paragraph C. of this Section. In addition, the title page shall include manufacturer's address, phone number, facsimile number, and contact; manufacturer's equipment name and model number; supplier's address, phone number, facsimile number, and contact.

B. Each manual shall include a table of contents identifying the location of each item listed below, for each component supplied. For items not applicable to a component, the table of contents shall list N/A for the page number.

C. For all equipment, the Contractor shall furnish a complete, detailed listing of all equipment, components and accessories showing component name, manufacturer, model number and quantity information shall be furnished for each component as outlined below:

1. Equipment function, normal operating characteristics, performance data and limiting conditions.

2. Detailed disassembly, overhaul and reassembly, installation, alignment, adjustment and checking instructions.

3. Detailed operating instructions for start-up, calibration, routine and normal operation, regulation and control, safety, shutdown and emergency conditions. Detailed list of settings for relays, pressure switches, temperature switches, level switches, thermostats, alarms, relief valves, rupture discs, etc.

4. Detailed preventative maintenance procedures and schedules, including detailed lubrication instructions and schedules, identification of required lubricants and operating fluids (description, specification and trade name of at least two manufacturers), and diagrams illustrating lubrication points.

5. Detailed guide to “troubleshooting”.

6. Detailed parts lists identified by title, materials of construction, manufacturer's part number, list of recommended spare parts identified as specified above, predicted life of parts subject to wear, and an exploded or concise cut-away view of each equipment assembly.

7. Electrical and instrumentation schematics, including motor control centers, control panels, instrument panels and analyzer panels.

8. List of all special tools supplied and description of their use. Special tools include any tool not normally available in an industrial hardware or mill supply house.

9. List of names and addresses of nearest service centers for parts, overhaul and service.

10. Procedures for storing, handling and disposing of any chemicals or products used with the equipment or system.

11. The supplier's operation and maintenance information will address the particular equipment furnished, with specific details on operation and maintenance practices. General data is not acceptable. Information contained in the manual which is not acceptable to the Project shall be marked out and noted as “N/A”.

END OF SECTION

Section 01740
Warranties and Bonds

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 re-warranted 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 Warranties and Bonds 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 Scope

The work in this Section consists of furnishing all material and equipment and performing all labor necessary for demolishing and disposing of designated facilities indicated on the Drawings.

1.02 Submittals

The Contractor shall submit a written request, to include a detailed demolition procedure, to the Owner for approval at least 10 days before demolition is started. The demolition procedure shall include a detailed description of the methods and equipment to be used for each operation and the sequence of work. The demolition procedures shall provide for safe conduct of work, protection of the property, which is to remain undisturbed and coordination with other work or operation which may be in progress.

Part 2 Products (Not Used)

Part 3 Execution

3.01 Demolition

A. All material shall be removed as necessary for construction, or in any event, to a minimum depth of three feet below finished grades as shown on the Drawings.

B. Any structure, or part thereof, remaining below grade shall be mechanically fractured so that subsurface water will freely pass through the slab or floor of the structure, and so that no void will remain after backfilling the work site to grade as shown on the Drawings.

C. The Contractor shall be responsible for removing all existing service connections to the buildings or site and permanently plugging the pipes where required in accordance with requirements of the utility companies concerned.

D. The Contractor will be responsible for any damage caused to other structures, and shall be held liable for any and all repairs, replacement of parts or renovations required to restore any structure, portion of structure, equipment or items, not intended for demolition. The Contractor shall restore any damaged facilities to their condition prior to demolition provided the damage was result of the demolition. If the Contractor does not repair any such damage immediately, or if the repairs are not suitable to the Owner, the Owner reserves the right to have such repairs made by another party and deduct the cost of required repairs from money due Contractor.

E. Dust-tight, weathertight partitions shall be erected to protect existing facilities from dust and weather while wrecking is in progress and until such time as closures have been made. Partitions may be constructed of wood and shall have a covering of tarred roofing felt on the weather side.

F. All salvageable metal materials shall remain the property of the Owner and shall be cleaned and stored on the Owner's property at a location determined by the City of Temple.

3.02 Disposal

A. All materials, which are not delivered to the Owner as specified above or indicated on the Drawings, shall become the property of the Contractor, and shall be demolished, moved or otherwise disposed of at the option of the Contractor by a method approved by the Owner.

B. All demolished structures, equipment and materials shall be removed from the work site by the Contractor.

C. All demolished structures, equipment and materials which are either left in place or removed to the disposal site shall be in a non-hazardous condition.

D. Manhole frames and covers to be removed are the property of the Owner and shall be delivered to a place designated by the Owner.

END OF SECTION

SECTION 02225
Trench Excavation and Backfill

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 pipelines 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 pipe 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 ASTM D 698, except that for cohesionless, free draining soils "maximum dry density" shall mean the maximum index density as determined by 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, or ASTM D 2922.

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.

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

Crushed stone shall be utilized for trench foundation (trench stabilization) and 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.

2.02 BEDDING AND HAUNCHING MATERIALS

A. Unless specified otherwise, bedding and haunching materials shall be earth material for force mains and crushed stone for storm sewers and gravity sewers 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.

2.03 INITIAL BACKFILL

A. Initial backfill material shall be earth materials or crushed stone as specified for bedding and haunching materials.

B. Earth materials utilized for initial backfill 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, 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.

2.04 FINAL BACKFILL

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, initial backfill or final backfill materials, including compaction requirements.

2.06 CONCRETE

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.

2.07 FLOWABLE FILL

Flowable fill, where required for trench backfill, shall meet the requirements of Georgia Department of Transportation Standard Specifications, Section 600 for Excavatable or Non-Excavatable type.

2.08 GRANULAR MATERIAL

Granular material, where required for trench backfill, shall be sand, river sand, crushed stone or aggregate, pond screenings, crusher run, recycled concrete, or other angular material. Granular material shall meet gradation requirements for Size No. 57 or finer.

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, as much as possible, 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 6-inches clearance between the rock and any part of the pipe or manhole. The maximum allowable width of rock excavation for payment shall be based on a trench width equal to the outside diameter of the pipe barrel plus 18-inches, but the total allowable rock excavation width for payment will not be less than 36-inches.

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.

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 and manholes. Remove boulders and stones to provide a minimum of 6-inches clearance between the rock and any part of the pipe, manhole or accessory.

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 performed 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. The sides of all trenches and excavations shall be adequately sheeted, braced and shored.

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 shall 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.

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 TRENCH ROCK EXCAVATION

A. Definition of Trench 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 cubic yard.

B. Blasting: Exhaust other practical means of excavating prior to utilizing blasting as a means of excavation. 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 a 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. Water shall be pumped into a temporary basin approximately 5'W x 10'L x 3'D wrapped with silt fence to control erosion.

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 order trench stabilization by directing the Contractor to over excavate trench bottom and fill with crushed stone.

C. 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 above the pipe.

D. 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. Gravity Sewer Mains and Force Mains

1. Ductile Iron Pipe

a. Unless otherwise shown on the Drawings or specified, utilize earth materials for bedding and haunching. Undisturbed soil or compacted trench material shall be used for bedding and compacted soil at a minimum of 12" above pipe shall be used for backfill as detailed on the Drawings.

b. Unless otherwise shown on the Drawings or specified, use crushed stone for bedding in rock trench and compacted soil at a minimum of 12" above the pipe for backfill as detailed on the Drawings.

2. Polyvinyl Chloride Pipe

a. Unless shown otherwise on the Drawings, utilize stone per D.O.T. standards for bedding material and 4' minimum compacted soil placed in 6" lifts and compacted to 85% modified proctor for backfill as detailed on the drawings.

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 constructing 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 12-inches above the pipe barrel. 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 for initial backfill.

3.08 CONCRETE ENCASEMENT FOR PIPELINES

Where concrete encasement is shown on the Drawings for pipelines, excavate the trench to provide a minimum of 12-inches clearance from the barrel of the pipe. Lay the pipe to line and grade on solid concrete blocks or solid bricks. 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 in a manner approved by the Engineer. Surplus soil may be neatly distributed and spread over the site, if approved by the Engineer, except that surplus soil shall not be distributed and spread over the site in areas under Corps of Engineers jurisdiction. 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, compact 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.

3.11 BACKFILL WITHIN RIGHT-OF-WAYS

Compact backfill underlying pavement and sidewalks, and backfill under dirt and gravel roads to a minimum 95 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 FLOWABLE FILL

A. Where flowable fill is required, excavate the trench to provide a minimum of 6-inches clearance on either side of the pipe barrel. Lay the pipe to line and grade on solid concrete blocks or bricks. In lieu of bedding, haunching and initial backfill, place flowable fill to the full width and depth of the trench.

B. Flowable fill shall be protected from freezing for a period of 36 hours after placement. Minimum temperature of flowable fill at point of delivery shall be 50 degrees F.

C. The Contractor shall provide steel plates over flowable fill in road locations.

3.14 COMPACTED GRANULAR MATERIAL

Where compacted granular material is required as initial and final backfill material, it shall be placed after bedding and haunching material specified elsewhere has been placed. Compacted granular material shall be compacted to a minimum 95 percent of the maximum dry density.

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 site between each manhole, every 100 feet within road rights-of-way, or more frequently if ordered by the Engineer. The Engineer Engineer shall direct where density tests will be performed along the Project route.

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.

2. Foundations and shallow spread footing foundations are required to be inspected by a geotechnical engineer, who shall verify suitable bearing and construction.

D. Comply with applicable codes, ordinances, rules, regulations and laws of local, municipal, state or federal authorities having jurisdiction.

END OF SECTION

SECTION 02240 – DEWATERING

PART 1 -GENERAL

1.1 SCOPE

A. This Section shall apply to all excavation, except trench excavation.

B. Construct all permanent work in areas free from water. Design, construct and maintain all wells, pumps, vacuum systems, sumps, dikes, levees, cofferdams and diversion and drainage channels as necessary to maintain the areas free from water and to protect the areas to be occupied by permanent work from water damage. Remove temporary works after they have served their purpose.

C. The Contractor shall be responsible for the stability of all temporary and permanent slopes, grades, foundations, materials and structures during the course of the Contract. Repair and replace all slopes, grades, foundations, materials and structures damaged by water, both surface and subsurface, to the lines, grades and conditions existing prior to the damage, at no additional cost to the Owner.

PART 2 -PRODUCTS (NOT USED)

PART 3 -EXECUTION

3.1 CARE OF WATER

A. Except where the excavated materials are designated as materials for permanent work, material from required excavation may be used for dikes, levees, cofferdams and other temporary backfill.

B. Furnish, install, maintain and operate necessary pumping and other equipment for dewatering the various parts of the work and for maintaining the foundation and other parts free from water as required for constructing each part of the work.

C. Install all drainage ditches, sumps and pumps to control excessive seepage on excavated slopes, to drain isolated zones with perched water tables and to drain impervious surfaces at final excavation elevation.

D. Dewater by means which will insure dry excavations, preserve final lines and grades, do not disturb or displace adjacent soil.

E. 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.

F. Do not overload or obstruct existing drainage facilities.

G. After they have served their purpose, remove all temporary protective work at a satisfactory time and in a satisfactory manner. All diversion channels and other temporary excavations in areas where the compacted fill or other structures will be constructed shall be cleaned out, backfilled and processed under the same Specifications as those governing the compacted fill. Fill or grout all temporary dewatering wells unless otherwise directed by the Engineer.

H. When the temporary works will not adversely affect any item of permanent work or the planned usage of the Project, the Contractor may be permitted to leave such temporary works in place. In such instances, breeching of dikes, levees and cofferdams may be required.

3.2 DEWATERING

A. By the use of well points, pumps, tile drains or other approved methods, the Contractor shall prevent the accumulation of water in excavated areas. Should water accumulate, it shall be promptly removed.

B. Excavations shall be continuously dewatered to maintain a ground water level no higher than three to four feet below the lowest point in the excavation. Dewatering systems shall be designed to allow for localized variations in the depth of excavations required to reach a suitable foundation. Dewatering shall be accomplished well enough in advance of excavation to ensure that groundwater is already lowered prior to completing the final excavation to finish subgrade.

C. All destabilized subgrade conditions caused by inadequate or untimely dewatering operations shall be undercut and backfilled with suitable backfill material at no additional cost to the Owner.

D. Piezometric observation wells are required to monitor the ground water level to insure proper dewatering prior to excavation below the static water table. The number of wells required will vary depending on the size and depth of structures.

END OF SECTION

SECTION 02241 – GROUNDWATER CONTROL PART 1

GENERAL

1.1 SCOPE

A. Groundwater control includes construction and procedures required to remove excessive groundwater that may be encountered in subgrades and soils to be excavated.

B. Temporary groundwater control consists of trenching, pumping, dewatering and draining of groundwater as required to advance the work.

1.2 QUALITY ASSURANCE

A. The Contractor shall notify the Engineer for inspection of trenches prior to construction of underdrains.

B. Completed underdrains shall be inspected by the Engineer prior to backfilling.

C. Work on DOT and county street rights-of-way shall be in accordance with the Georgia DOT Standard Specifications for Road and Bridge Construction.

PART 2 -PRODUCTS

2.1 MATERIALS AND CONSTRUCTION

A. Underdrain Materials: Filter cloth for underdrains shall be a pervious sheet of synthetic polymer filaments, woven from continuous filaments. Filter cloth shall be the type recommended by the manufacturer for the intended application. The filter cloth specification shall be subjected to the Engineer's approval. Drainage fill shall be Size No. 57 crushed stone, meeting ASTM C 33.

B. Pervious Backfill: Pervious backfill shall be natural or manufactured sand or crushed stone, free-draining and predominant in sand size particles.

C. Underdrain Pipe

1. Clay pipe, perforated, extra-strength meeting ASTM C 700.

2. PVC perforated sewer pipe meeting ASTM D 3034.

PART 3 -EXECUTION

3.1 GENERAL

A. Temporary groundwater control shall be employed wherever wet soils are encountered in subgrades and in soils to be excavated.

1. In soils to be excavated, a system of ditches shall be maintained ahead of the work to allow the soil to drain. Ditches shall be of the number and depth required to allow free-draining of the soil. Means of removing the water from ditches shall be provided. This work shall be incidental to the grading operation.
2. In paving subgrade areas, ditches may be excavated below subgrade, only if approved by the Engineer.

3. Groundwater in utility trenches shall be handled in accordance with generally accepted practice.

B. Underdrains

1. Pipe, where specified, shall be laid true to line and grade and shall show a full circle of light when lamped.

2. Access to ends of pipe shall be provided at changes in grade and direction to allow inspection and flushing of underdrains after partial or complete backfilling.

3. All underdrain pipe shall be flushed and inspected prior to final closure.

4. Filter fabric for underdrains shall be laid in a trench and folded back to allow drainage fill and pipe, if specified, to be inserted. The drainage fill shall be compacted. The fabric sides shall then be lapped a minimum of 12-inches across the top of the gravel. Any rips or tears in the fabric shall be repaired by lapping a separate fabric section 12-inches beyond the tear in each direction.

5. Backfill shall be carefully placed and compacted to prevent damage or movement of filter cloth.

END OF SECTION

SECTION 02300 – EARTHWORK

PART 1 -GENERAL

1.1 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.

1.2 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 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 and/or observed by the Architect/Engineer/Owner Representative 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. 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, will be treated as an unforeseen condition.

PART 2 - PRODUCTS

2.1 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:

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:

7. Pea Gravel: Pea gravel shall be clean, naturally rounded aggregate, 1/8 to 3/4-inch in diameter per ASTM C 33.

Sieve Size	Percent Passing
No. 4	100
No. 16	25 -75
No. 100	0 -25

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 as directed by the Engineer, shall be used to stockpile soil material for backfilling around structures and to stockpile needed topsoil.

PART 3 - EXECUTION

3.1 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.

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.

2. All extra excavation made at the order of the Engineer will be paid for on the basis of the actual volume of the excavation as measured by the Engineer. No measurement for payment shall be made until all dewatering as specified in Section 02240 has been successfully accomplished.

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.

3.2 - 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.

3.3 - 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:
        1) 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.
        2) 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 insure 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.

c. Where shown on the Drawings, removal and replacement of unsuitable material shall be included in the lump sum bid. Payment for removal and replacement of unsuitable material not shown on the Drawings shall be made at the unit price bid.

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.

3.4 - 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.

3.5 - 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.

3.6 - 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. 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.

3.7 - 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.

3.8 - 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.

3.9 - CLEANING

A. 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

SECTION 02575

PAVEMENT REMOVAL AND REPLACEMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Furnish all labor, materials, equipment, tools and transportation and perform all work necessary for cutting, removing, protecting and replacing existing pavements of the various types encountered, including driveways, sidewalks, curbs and gutters.

B. Permits: Obtain all necessary permits and provide advance notice to the appropriate authorities, as required, prior to construction operations.

C. Protection Of Existing Improvements: Protect from damage all pavements, sidewalks and other improvements that are to remain within the work area. Repair all damage to such improvements, as a result of the Contractor's operations, beyond the limits of the work of pavement replacement as described herein, at no additional cost to the Owner.

1.02 JURISDICTIONAL REQUIREMENTS

A. Perform all work within the rights-of-way of public thoroughfares in accordance with the requirements of the Governmental agency having jurisdiction and work within state highway right-of-way in full compliance with all requirements of the permit drawings, and to the satisfaction of the Georgia Department of Transportation.

B. Portions of the Standard Specifications for Road and Bridge Construction of the Georgia Department of Transportation, current edition, and supplements thereto, hereinafter called the GDOT Specifications, are referred to herein and amended, in part, and the same are hereby made a part of this Contract to the extent of such references, and shall be as binding upon the Contractor as though reproduced herein in their entirety.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Use only materials, including limerock, bituminous prime and tack coat, and asphaltic concrete, meeting the requirements of the GDOT Specifications as follows:
   1. Limerock: Miami or Ocala Limerock.
   2. Bituminous Prime Coat: Cutback asphalt, Grade RC-70.
   3. Bituminous Tack Coat: Emulsified asphalt, Grade RS-2.
   4. Asphaltic Concrete: Type S-I, unless otherwise indicated on the Construction Documents.

PART 3 - EXECUTION

3.01 PREPARATION

A. Pedestrian Crossings: Where the work crosses or interferes with pedestrian crossings, take extreme care and all necessary safety measures to insure the safety of pedestrians.

3.02 REMOVALS

A. Pavement Removal: Where existing pavement is to be removed, cut the surfacing with a mechanical saw prior to trench excavation, leaving a uniform and straight edge, with minimum disturbance to the remaining adjacent surfacing.

B. Sidewalk, Drive & Curb Removal: Remove portions of concrete sidewalks, curbs, combination curb and gutter, walks, drive ribbons, or driveways by initially sawing the structure, with a suitable power saw, as specified above for pavement. When a formed joint in the concrete exists within 3 feet of the proposed saw cut and parallels the proposed saw cut, extend the removal line to the formed joint. After sawing, remove the material.

3.03 RESTORATIONS

A. General: Replace or restore street or roadway pavement cut and removed in equal or better condition than the original and as shown on the Drawings. The Drawings indicate minimum requirements.

B. Pavement Restoration - Asphalt:
1. Employ construction methods and equipment generally meeting the requirements established therefor in the GDOT Specifications, but, for trench restoration, modified as necessary to meet narrow strip construction conditions. Obtain approval of the Engineer for such modifications prior to their use. When pavement is removed to the edge of the roadway, extend the replaced base course not less than 6-inches beyond the edge of the surfacing.
2. Compact the limerock base course for its full thickness to not less than 100 percent of maximum density as determined by AASHTO T 180. Determine field density of limerock base in place by AASHTO T 238. Compact the upper surface of the completed base course to an elevation to permit the full depth of the surface course to be constructed without deviating from the grade of the adjacent pavement surface.
3. Upon compaction and completion of the base course, apply a prime coat to the surface and allow to cure without sanding for a period of 24 hours. Take all necessary precautions to protect the primed surface against damage during this interval. If, at the end of 24 hours, it is not proposed to proceed at once with the application of the surface course, give the primed surface a light application of clean sand and open to traffic.

4. Before the prime coat has cured, or if the surface has been sanded, after the sand has been removed and a tack coat applied, place and compact the asphaltic concrete surface course to match the line and grade of the existing surface. Construct joints with existing surface and base straight and neat and, if necessary to obtain a straight neat joint, cut out sufficient existing material and replace it with new material.

C. Concrete Sidewalk, Walkway, Driveway Ribbon And Curb Restoration:

1. Replace concrete sidewalks, walkways, driveways, driveway ribbons and curbs required to be removed using Class B (3000 psi) concrete.
2. Replace portions of these items to conform to the lines, grades and cross sections of the removed portions. Construct concrete sidewalks and walkways to 4-inch thickness and concrete driveways and driveway ribbons to 6-inch thickness. Replace concrete curbs and gutters to joint neatly to the remaining sections.

3. Pavement Restoration - Concrete: Replace rigid pavement with Class B (3000 psi) concrete, using high early strength cement. Replace the base course for rigid pavement with limerock base material, compacted to a thickness to match the existing base.

4. Non-surfaced Streets, Alleys and Driveways: Restore with 6 inches of compacted limerock base material placed in the top of the trench.

5. Pavement Markings: Restore pavement stripes and markings which have been disturbed or erased during construction using the same type materials as removed, i.e. paint, reflective, thermoplastic, and of the same width as those disturbed during construction. Use equipment and method of painting conforming to the requirements of Section 652 to 655 of the GDOT Specifications.

3.04 ASPHALTIC CONCRETE SURFACE COURSE OVERLAY

A. Where pavement overlay is required, asphaltic concrete pavement restoration of the trench cut, as specified herein above, will not be required. Extend the surface course overlay over the reconstructed base course, the temporary asphalt surfacing, the asphalt-sand seal, if used, and the existing pavement to the limits of the full width of the driving lane cut, two lanes if both cut, or the full width of roadway as indicated on the Construction Documents or as otherwise directed by the Engineer. In driveway overlay, extend the overlay the full width of the driveway from edge of pavement or right- of-way to sidewalk.

B. Sweep the roadway surface clean of all dirt and dust, apply a tack coat and construct a 1-inch compacted thickness of Type S-III asphaltic concrete in accordance with the requirements specified above for pavement restoration. Correct any depressions or deviation from the line and grade of the existing pavement of more than one inch with an asphaltic concrete leveling course prior to placement of the overlay asphalt.

END OF SECTION

SECTION 02668
Water Service Connections

PART 1 GENERAL

1.01 SCOPE

A. The work covered by this Section includes furnishing all materials and equipment, providing all required labor and installing water service connections and all appurtenant work according to these Specifications and/or to the Water Connection Detail as shown schematically on the Drawings.

B. Water meters are not to be furnished nor installed. However, the water meter connection must be compatible with the water meters currently used by the City/County.

C. No galvanized pipe or fittings shall be used on water services.

1.02 LOCATIONS

Locations shall be directed by the Engineer along the route of the water mains.

1.03 SERVICE COMPATIBILITY

It is the intent of these Specifications that the water service connections shall duplicate those presently being provided by the City/County in order to be compatible with their service maintenance procedures.

1.04 QUALITY CONTROL

All materials installed under this Section shall have the approval of the NSF for water services.

PART 2 PRODUCTS

2.01 MATERIALS AND CONSTRUCTION

A. Service Line

1. Copper Tubing: Tubing shall be ASTM B 88, Type K, rolled type. Fittings shall be brass with flare connection inlets and outlets, ANSI B16.26. Where required, adapters shall be brass. Unions shall be cast bronze. Joints shall be flare type. All fittings shall be of bronze construction with flare type connections.

2. Provide detection tape for all pipe greater than 12-inches in diameter. Detection tape shall be buried 4 to 10-inches deep. 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 finish grade surface.

B. Meter Boxes

1. Meter boxes shall be cast iron painted black with a locking lid quad valve box. Meter boxes shall have nominal dimensions of 14-3/4 inches x 17 inches at bottom, 12 inches x 14 inches opening, and 12 inches tall. Meter box assemblies shall include one U-branch, four ball valves, two unions, two touch plugs with cotter pins, and two expansion connections. The entire assembly shall be configured to allow 7-1/2 inch meter and an ASSE 1024 dual check valve with a combined distance of 12-3/4 inches between inlet and outlet unions for the installation of the meter and ASSE 1024 dual check valve backflow preventer. The City/County will install the meter for domestic use or irrigation use after property owner applies for it.

2. Meter boxes shall be equal to Ford Meter Box Company, Double Gulf Box Part #LDG12U-243FULTTPNA (formerly Part #LDG12U-243-NA-TT).

C. Valves and Accessories

1. Ball valves shall be full port bronze, heavy duty type. Valve ends shall be threaded. Valves shall have a minimum 200 psi working pressure for water. Valves shall have stainless steel nut and handle. Valves shall be made in the U.S.A.

2. Corporation Cocks

a. Corporation cocks shall be ground key type, shall be made of bronze conforming to ASTM B61 or B62 and shall be suitable for the working pressure of the system. Ends shall be suitable for flare type joint. Coupling nut for connection to flared copper tubing shall conform to ANSI B16.26.
b. Corporation cocks shall be equal to Ford FB-600-4.

PART 3 EXECUTION

3.01 GENERAL

A. Immediately following completion of the water main system, the Contractor shall install water taps and meter boxes for each planned lot of the subdivision. All taps shall remain exposed at the main until the system has been successfully inspected, disinfected and tested for pressure.

B. Installation shall conform to the details for water service connections appearing schematically on the Drawings. Contractor shall provide any and all appurtenant work required to provide the intended water service connections.

C. The Contractor shall be prepared to make emergency repairs to the water system, if necessary, due to damage by others working in the area. In conjunction with this requirement, the Contractor shall furnish and have available at all times, a tapping machine, for the purpose of making temporary water service taps or emergency repairs to damaged water services. The Contractor shall furnish the City/ County a phone number of an individual with the authority to initiate emergency repair work. This number must be provided prior to starting work on the Project.

3.02 TAPPING MAIN

A. All services connected to water main shall be through a 1-inch direct tap, regardless of service and meter size.

B. The water main shall be tapped with a tapping machine specifically designed for that purpose. The tap shall be a direct tap into the water main through a 1-inch brass corporation cock. All taps shall be supervised by the City/County Water Department. All taps shall be made on the water main at a position so as not to be the top side of the pipe nor the bottom of the pipe. Distance between taps must be a minimum of 12-inches apart.

3.03 SERVICE LINES

A. Copper tubing between tap and water meter shall be one continuous length of pipe with no intermediate joints or connections. The service line shall be placed without sharp turns or bends from the water main to the meter box.

B. When meters are located on the opposite side of the street from the water main, new copper service lines shall be extended through a common 6-inch bore, Schedule 40 PVC conduit to the service side. Replacement of existing services may be by free bore without a casing.

C. Provide detection tape over all service lines.

D. 1-1/2-inch water services (meter box installation only) are made by utilizing a branch connection (wye) and two 1-inch direct taps. 1-inch copper tubing lines are joined at the branch connection at the meter box (meter box equal to CdR box 17 x 30 x 20 dimensions with water logo). Branch connections shall be equal to Ford Model #Y-28-246 with two 1-inch copper flare connections x 1-1/2-inch male iron pipe threads. A curb stop equal to Ford Model #B11-666W is threaded onto the 1-1/2-inch end of branch connection. Utilizing a 1-1/2-inch, 3-piece meter coupling equal to Ford Model #CF31-66 and meter coupling bushing Model #BIM-66 is threaded onto the opposite side of the curb stop.

E. 2-inch water services (meter box installation only) are made by utilizing a branch connection and three 1-inch direct water taps. 1-inch copper tubing lines are joined at the branch connection at the meter box (meter box equal to CdR box 24 x 36 x 24 dimensions with water logo). Branch connections shall be equal to Ford Model #Y-28-347 with three 1-inch copper flare connections x 2-inch male iron pipe threads. A curb stop equal to Ford Model #B11-777W is threaded onto the 2-inch end of branch connection. Utilizing a 2-inch, 3-piece meter coupling equal to Ford Model #C38-77 with bushing Model #BIM-77 is threaded onto the opposite side of the curb stop.

3.04 METER BOXES

A. The meter box shall be located parallel to the curb and centered within the space two feet behind the back of the curb. The meter box lid shall be set at finished grade of the road shoulder. The meter box shall be placed on a bed of gravel or crushed stone. The bed shall be 3-inches thick and extend 6-inches in all directions beyond the edge of the meter box. The box shall be carefully and uniformly backfilled to prevent distortion that would cause leaks. Meter boxes shall be located in pairs within two feet of the common property lines between the lots.

B. All water meters shall have fluorescent markings at curb. Markings shall not be the same color as markings denoting hydrants.

C. An 8-inch long threaded brass nipple shall be provided between the meter and a ball valve on the residence side of the meter box. The ball valve shall be located in an 8-inch diameter fiberglass valve box with lid. The valve box shall be placed on a blanket of granular crushed stone. The bed shall be 3-inches thick and extend 3-inches in all directions beyond the edge of the valve box.

3.05 RELOCATION OF SERVICE LINES

A. Relocate the existing meter to the new right-of-way limits and reconnect to the house service. Existing meters already located at the new right-of-way limits will not need relocating.

B. Before disconnecting the existing meter, the existing corporation in the main shall be closed. All existing meters and meter boxes shall be removed, if not already located at the right-of-way, reinstalled and reconnected as indicated on the Drawings.

C. Existing service lines shall be field-located by the Contractor. The Contractor shall be responsible for locating existing water meters, relocating the meters and meter boxes as necessary, and determining the existing size service line to reconnect the meters to the new water mains. All service lines installed under existing pavement, including streets, driveways and sidewalks, shall be installed by boring.

3.06 TRANSFER OF SERVICE

Immediately before connecting to the relocated or existing meter, all service lines shall be flushed to remove any foreign matter. Any special fittings required to reconnect the existing meter to the new copper service line, or the existing private service line, shall be provided by the Contractor. To minimize out of service time, the Contractor shall determine the connections to be made and have all the required pipe and fittings on hand before shutting off the existing service. After completing the connection, the new corporation stop shall be opened and all visible leaks shall be repaired.

3.07 MAINTENANCE AND REPAIRS

The tap, service line and meter box shall remain under the developer's maintenance responsibility for the same warranty period as the water main. The developer shall promptly repair any damage to the water system during the warranty period.

END OF SECTION

SECTION NO. 02730

SEWERS AND ACCESSORIES

PART 1 - GENERAL

SCOPE

This Section describes products to be incorporated into sewers and accessories 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.

General: 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.

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.

SUBMITTALS

If required by the Engineer, Complete product data and engineering data, including shop drawings, shall be submitted to the Engineer.

Operating and maintenance data for all equipment shall be furnished in accordance with Section 01730 of these Specifications.

TRANSPORTATION AND HANDLING-IF APPLICABLE

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.

Handling: Handle pipe, fittings, valves and accessories carefully to prevent shock or damage. Handle pipe by rolling on skids, forklift, or front loader. Do not use material damaged in handling.

Lined pipe shall be handled and transported to prevent damage to linings.

OWNER FURNISHED MATERIALS- IF APPLICABLE

The Contractor shall submit, in conjunction with the construction progress schedule, a schedule of required deliveries for materials furnished by the Owner. The Contractor shall coordinate material shipments with the Owner and the material suppliers.

Materials furnished by the Owner will be delivered by Truck. Pipe and other material to be furnished by the Owner shall be delivered to the Owner's storage yard or another site agreed upon by the Contractor at no additional cost to the Owner.

The Contractor shall maintain communication with the material suppliers and the Owner as necessary, to keep informed as to scheduled shipment, and upon notice to the Contractor of the delivery of materials, the Contractor shall proceed without delay to unload such materials.

Upon receipt of materials from the manufacturer, the Contractor shall make an inspection of such materials; check and certify the bill of lading, noting any discrepancies; obtain a proper memorandum signed by the agent of the carrier for any shortage in the shipment, or any damaged materials received. All bill of lading and any memorandum for shortage or damage of material in the shipment shall be promptly submitted to the Engineer. The Contractor shall be responsible for distribution of all materials as required to complete the Work. Materials furnished to the Contractor shall be in the custody of the Contractor from the time of receipt by the Contractor of such materials from the carrier until final acceptance of the completed Work. The Contractor shall be responsible for any loss or damage to materials furnished by the Owner.

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.

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. Store joint gaskets 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.

QUALITY ASSURANCE

Product manufacturers shall provide the Engineer with written certification that all products furnished comply with all applicable provisions of these Specifications.

If ordered by the Engineer, each pipe 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 five days during initial pipe installation.

PART 2- PRODUCTS

DUCTILE IRON PIPE (DIP)

Ductile iron pipe shall be utilized where shown on the Drawings.

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 wall thickness shall be determined based on dead loads indicated on the Drawings and the anticipated live loads, assuming a minimum HS 20 live load.

Pipe Sizes (inches)	Pressure Class (psi)
4 - 12	350
14 - 20	250
24	200
30 - 60	150

Fittings and Accessories

Fittings shall be ductile iron and shall conform to AWWA C110/ANSI A21.10 or AWWA C153/ANSI A21.53 with a minimum rated working pressure of 250 psi.

Flanged elbow fittings shall be ANSI pattern using short radius elbows except where noted differently on the Drawings. Special fittings, ductile iron wall pipes and sleeves shall conform to the dimensions and details as shown on the Drawings.

Joints for Ductile Iron Pipe and Fittings

General

Joints for ductile iron pipe and fittings shall be mechanical joint, flanged joint or push-on joint as shown on the Drawings or specified herein.

Unless otherwise shown on the Drawings, specified or directed, all ductile iron pipe laid underground shall be joined using push-on type joints.

In all cases, gaskets shall be made of material that will not be damaged by the fluid being transported nor by the environment in which the pipe is installed.

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.

Mechanical Joints

Joints shall conform to AWWA C111/ANSI A21.11.

Bolts and nuts 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.

Gaskets shall be in accordance with AWWA C111/ANSI A21.11 and shall be constructed of plain rubber.

Mechanical joint glands shall be ductile iron.

Push-On Joints: Push-on joints and gaskets shall conform to AWWA C111/ANSI A21.11. Details of the joint design shall be in accordance with the manufacturer's standard practice such as ACIPCO "Fastite", McWane (Clow) "Bell-Tite", or U.S. Pipe "Tyton" joints.

Cement Linings: Pipe and fittings shall be cement lined in accordance with AWWA C104/ANSI/AWWA C104/A21.4. Seal coat is not required.

Polyethylene Encasement: Polyethylene film shall meet the requirements of AWWA C 105.

Wall Sleeves and Wall Pipes

Where piping passes through concrete structures, furnish and install wall sleeves unless wall pipes or other provisions are specifically shown on the Drawings. Wall sleeves shall be accurately located and securely fastened into position before concrete is poured.

Wall Sleeves

For pipe sizes smaller than 3-inches, wall sleeves shall be steel oversize sleeves furnished with a full circle, integral, or continuously welded waterstop collar. The sleeve seal shall be the mechanically expanded, synthetic rubber type. Provide all associated bolts, seals and seal fittings, pressure clamps, or plates necessary to achieve a watertight installation. Sleeves shall extend the full thickness of the concrete. Sleeves and seal shall be Link Seal.

For larger pipe sizes, wall sleeves shall be ductile iron mechanical joint wall sleeves. Unless specified or shown otherwise for a specific situation, wall sleeves shall be mechanical joint bell-plain end type with waterstop/thrust collar. The collar shall be capable of withstanding a thrust force caused by a 250 psi dead end load from either direction on that size pipe. Sleeves shall be constructed with studs and mechanical joint retainer gland on the air side of the concrete structure. Provide retainer gland where shown on the Drawings. Where the concrete structure is exposed to dirt on one side and is wet on the other side, construct with studs and glands on the dirt side. Wall sleeves shall be equal to ACIPCO A-10771.

Wall Pipes

Wall pipes shall be either ductile iron with integral waterstop/thrust collar or centrifugally cast ductile iron with a continuously welded waterstop/thrust collar. The welded on collar shall be attached to the pipe by the manufacturer. The collar shall be capable of withstanding a thrust force caused by a 250 psi dead end load from either direction on that size pipe. Wall pipes shall be furnished uncoated on the outside and cement lined on the inside. Unless specified or shown otherwise, wall pipes shall be flange end type.

Wall pipes shall be cast and/or fabricated and lined in one manufacturer's facilities and delivered to the job site ready for use.

VITRIFIED CLAY PIPE (VCP)- **NOT ALLOWED**

REINFORCED CONCRETE PIPE (RCP)

Pipe

Pipe shall be bell and spigot reinforced concrete conforming to ASTM C 76 for Class III, IV and V pipe as shown on the Drawings. Wall thickness design shall correspond to Wall C.

In addition, the pipe and materials shall meet the following requirements:

Concrete shall have a minimum compressive strength of 5,000 psi for Class III and IV and 6,000 psi for Class V;

Cement shall meet the requirements of ASTM C 150, Type II;

Absorption shall not exceed six percent when tested in accordance with ASTM C 497.

Reinforced concrete pipe shall be supplied in lengths of at least eight feet, except for specials.

Joints: Pipe shall have concrete and rubber O-ring gasket type joints conforming to ASTM C 361. A rectangular groove shall be supplied in the spigot end to receive the rubber O-ring gasket, and it shall be so formed that when the joint is complete the gasket will be deformed to a rectangular shape and confined on all four sides. Bell and spigot surfaces shall be accurately formed and smooth to provide a close sliding fit with a nominal clearance of 1/16-inch.

Fittings and Specials: Reinforced concrete pipe fittings and specials shall meet all requirements for reinforced concrete pipe, including materials of construction, structural strength, linings, and joints. Provide special adapters or transition pieces for connection to pipe of different materials where shown on the Drawings.

Acceptance

Acceptance of pipe shall be on the basis of plant load-bearing tests for the load to produce 0.01-inch crack, material tests, and inspection of manufactured pipe for visual defects and imperfections as described in Paragraph 5.1.1 of ASTM C 76.

Provide results of tests on pipe, pipe materials, joint material, and made-up joints performed by an independent testing laboratory approved by the Engineer. Include materials, absorption, crushing, and hydrostatic leakage tests on pipe of each size in accordance with applicable specifications.

Each length of pipe shall be stamped by a regular employee of the approved testing laboratory.

Inspect pipe after delivery for laboratory stamp, shape, cracks, uniformity, blisters and imperfect surfaces, hammer test, damaged ends, and gasket grooves. Do not accept or use pipe with repaired or patched gasket grooves or shoulders. Any pipe repaired or patched is subject to rejection if such repairs or patches, in the opinion of the Engineer, are not sound and properly finished.

The Engineer shall, at its own discretion, select another independent testing laboratory to confirm those tests performed by the manufacturer's testing laboratory. This testing laboratory shall observe the tests conducted by the laboratory selected by the manufacturer, or, as necessary, conduct its own tests. The manufacturer shall provide the necessary facilities for the performance of these tests at the plant site. These test specimens shall be provided in accordance with paragraph 11 of ASTM C 76.

No pipe shall be shipped before it has been cured for a minimum of 14 days.

POLYVINYL CHLORIDE (PVC) GRAVITY SEWER PIPE

Acceptability of PVC pipe for gravity sewers is indicated in the following table:

Standard Minimum Thickness Type PVC[1]	**Wall**	**Acceptable Manufacturers**	**≤ 6”**	**8” to 15”**	**18”**	**21”**	**24”**
ASTM D 3034 SDR 35 12454B	Solid Wall	Open	Yes	Yes	No	No	No

[1] As specified in ASTM D 1784

All pipe shall have a minimum pipe stiffness of 46 psi at five percent deflection as determined by ASTM D 2412.

PVC gravity sewer pipe shall be supplied in lengths not longer than 13 feet.

Fittings

Fittings 15 inches in diameter and less shall be manufactured in accordance with ASTM D 3034. PVC compound shall be 12454B or 12454C as specified in ASTM D 1784.

For sizes 8-inches and less in diameter, fittings shall be molded in one-piece with no solvent welded joints. Minimum socket depths shall be as specified in ASTM D 3034, Table 2.

For sizes 10-inches and larger in diameter, fittings shall be fabricated from pipe conforming to ASTM D 3034 using solvent welding. No field fabrication of fittings will be allowed. All such fabrication shall be performed at the factory and the fittings shall be delivered ready for use.

Fittings 18 inches in diameter and larger shall be fabricated from pipe conforming to ASTM F 679 using solvent welding. No field fabrication of fittings will be allowed. All such fabrication shall be performed at the factory and the fittings shall be delivered ready for use.

Joints: Joints for pipe and fittings shall be of the integral bell and spigot type with a confined elastomeric gasket having the capability of absorbing expansion and contraction without leakage, when tested in accordance with ASTM D 3212. Gaskets shall meet the requirements of ASTM F 477. The joint system shall be subject to the approval of the Engineer and shall be identical for pipe and fittings.

Manhole Connections - Solid Wall Pipe: The sewer shall be connected to manholes utilizing a boot connection.

Acceptance: Acceptance will be on the basis of the Engineer's inspection and the manufacturer's written certification that the pipe and fittings were manufactured and tested in accordance with the applicable standards.

MANHOLES AND PRECAST CONCRETE PRODUCTS

Precast Concrete Sections

Precast concrete sections shall meet the requirements of ASTM C 478 or ASTM C 913. The minimum compressive strength of the concrete in precast sections shall be 4,000 psi.

Wall thickness shall be as shown on the Drawings.

Transition slabs or cones which convert bases larger than four feet in diameter to four foot diameter risers shall be designed by the manhole manufacturer to carry the live and dead loads exerted on the slab.

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. Butyl rubber sealant shall be equal to Kent Seal No. 2 or Concrete Sealants CS202.

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.

Iron Castings

Cast iron manhole frames and covers 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.

Manhole frames and covers shall be as shown on the Standard Details.

All frames and covers shall have machined horizontal bearing surfaces.

All manholes shall have standard frames and covers except where specifically shown otherwise on the Drawings.

Watertight covers shall be bolt-down type and shall be equipped with four 1/2-inch stainless steel bolts and a 1/8-inch red rubber or rubber O-ring gasket. Covers shall be rotatable and interchangeable. Bolt holes shall be bored through so that debris entering the bolt hole will fall into the manhole. Bolt holes shall have the full 360 degree circle within the cover's radius when bored through the cover.

Steps: Manhole steps shall be polypropylene molded around a steel rod as detailed on the Drawings and shall be equal to products of M.A. Industries.

Boots: Provide preformed rubber boots and fasteners equal to those manufactured by Kor-N-Seal or Press Seal Gasket Corporation. Boots may be mechanically attached to the manhole or cast into the walls of the manhole.

MISCELLANEOUS ACCESSORIES

Flexible Adapter Couplings-**NOT ALLOWED** - All Adaptor Couplings Shall Be Harco Style or Equivalent.

PART 3 - EXECUTION

EXISTING UTILITIES AND OBSTRUCTIONS

The Drawings indicate utilities or obstructions that are known to exist according to the best information available to the County. The Contractor shall call the Utilities Protection Center (UPC) (1-800-282-7411) as required by Georgia law (O.C.G.A. §§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.

Existing Utility Location: The following steps shall be exercised to avoid interruption of existing utility service.

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 ten 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.

Expose the facility to verify its true location and grade 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.

Avoid utility damage and interruption by protecting it with means or methods recommended by the utility owner.

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.

Conflict with Existing Utilities

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 sewer 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 sewer to avoid horizontal conflicts if the new alignment remains within the available right-of-way or easement and complies with regulatory agency requirements after a written request to and subsequent approval by the Engineer. Where such relocation of the sewer is not approved by the Engineer, the Contractor shall arrange to have the utility, main, or service relocated.

Vertical Conflict: Vertical conflict shall be defined as when the actual vertical separation between a utility, main, or service and the proposed sewer does not permit the crossing without immediate or potential future damage to the utility, main, service, or the sewer. The Contractor may change the proposed grade of the sewer to avoid vertical conflicts if the changed grade provides minimum required capacity, maintains adequate cover and complies with regulatory agencies requirements, after written request to and subsequent approval by the Engineer. Where such relocation of the sewer is not approved by the Engineer, the Contractor shall arrange to have the utility, main, or service relocated.

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.

Water and Sewer Separation

Sewers should maintain a minimum 10 foot edge-to-edge separation from water mains. Where the sewer crosses a water main, an 18-inch vertical separation shall be maintained where possible. Where possible, a full joint of sewer pipe shall be centered over the water main. Any deviation shall be requested in writing to the Engineer.

No water main shall be permitted to pass through or come in contact with any part of a manhole.

CONSTRUCTION ALONG HIGHWAYS, STREETS AND ROADWAYS

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 with reference to construction operations, safety, traffic control, road maintenance and repair.

Traffic Control

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 flagman training program.

Construction traffic control devices and their installation shall be in accordance with the current Manual On Uniform Traffic Control Devices for Streets and Highways.

Placement and removal of construction traffic control devices shall be coordinated with the Georgia Department of Transportation and the City of Villa Rica a minimum of 48 hours in advance of the activity.

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.

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.

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.

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 Department of Transportation and the City of Villa Rica. Sign panels shall be of durable materials capable of maintaining their color, reflective character and legibility during the period of construction.

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.

Construction Operations

Perform all work along highways, streets and roadways to minimize interference with traffic.

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.

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.

Shaping: Reshape damaged slopes, side ditches, and ditch lines immediately after completing backfilling operations. Replace topsoil, sod and any other materials removed from shoulders.

Construction operations shall include cleanup and utility exploration.

Excavated Materials: Do not place excavated material along highways, streets and roadways in a manner which obstructs traffic. Sweep all scattered excavated material off the pavement in a timely manner.

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.

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.

Maintaining Highways, Streets, Roadways and Driveways

Maintain streets, highways, roadways and driveways in suitable condition for movement of traffic until completion and final acceptance of the work.

During the time period between pavement removal and completing permanent pavement replacement, maintain highways, streets and roadways by the use of steel running plates. The edges of running plates 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.

Furnish a road grader or front-end loader for maintaining highways, streets, and roadways. Make the grader or front-end loader available at all times.

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.

PIPE DISTRIBUTION

Pipe shall be distributed and placed in such a manner that will not interfere with traffic.

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 County. The County 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.

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.

No distributed pipe shall be placed inside drainage ditches.

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.

LOCATION AND GRADE

The Drawings show the alignment and grade of the sewer and the position of manholes and other appurtenances. At no instance shall ssmh's ever be spaced over 400'. The slope shown on the profile and/or called for in the Specifications is the slope of the invert of the pipe.

Prior to clearing and grubbing, construction staking shall be performed.

Construction shall begin at the low end of the sewer and proceed upstream without interruption. Multiple construction sites shall not be permitted without written authorization from the Engineer for each site. As a minimum, cut sheets between construction sites shall be submitted and approved before multiple construction sites will be permitted.

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.

LAYING AND JOINTING PIPE AND ACCESSORIES

Lay all pipe and fittings to accurately conform to the lines and grades established by the Engineer.

Pipe Installation

Proper implements, tools and facilities shall be provided for the safe performance of the Work. All pipe, fittings and valves 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 sewer materials and protective coatings and linings. Under no circumstances shall sewer materials be dropped or dumped into the trench.

All pipe, fittings and 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.

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 which contains dirt shall be laid.

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.

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.

It is common practice to lay pipe with the bells facing the direction in which work is progressing, however, it is not mandatory.

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.

Polyethylene Encasement: Installation shall be in accordance with AWWA C105 and the manufacturer's instructions. All ends shall be securely closed with tape and all damaged areas shall be completely repaired to the satisfaction of the Engineer.

Alignment and Gradient

Lay pipe straight in alignment and gradient or follow true curves, where shown on the Drawings, as nearly as practicable. Do not deflect any joint more than the maximum deflection recommended by the manufacturer.

Maintain a transit, level and accessories on the job to lay out angles and ensure that deflection allowances are not exceeded.

The Contractor shall check the invert elevation at each manhole and the pipe invert elevation at least three times daily, start, mid-day and end of day. Elevations shall be checked more frequently if more than 100 feet of pipe is installed in a day or if the pipe is being constructed at minimum slope.

The Contractor shall check the horizontal alignment of the sewer at the same schedule as for invert elevations.

Expediting of Work: Excavate, lay the pipe, and backfill as closely together as possible, as determined by the Engineer. 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.

Joint Assembly

Joints shall be assembled in accordance with the manufacturer's recommendations.

The Contractor shall internally inspect each pipe joint to insure proper assembly for pipe 30-inches in diameter and larger after the pipe has been brought to final alignment.

On reinforced concrete pipe, diameters 30-inches and larger, the Contractor shall fill the voids, on the pipe joint interior, with grout.

Cutting Pipe

Cut ductile iron pipe using an abrasive wheel saw.

Cut PVC pipe using a suitable saw.

Remove all burrs and smooth the end before jointing.

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.

House Connections: Install wyes or tees in locations designated by the Engineer for future connection of service lines. Plug the branch of the wye or tee. Record the location of fittings installed on a copy of the Contract Drawings to be submitted as Record Drawings.

MANHOLE AND PRECAST CONCRETE PRODUCT CONSTRUCTION

Construct manholes as shown on the Drawings. Should manhole become depositioned remove and replace bedding, compact and reset bottom section.

Precast Concrete: Handle sections carefully to prevent cracking or chipping. Provide uniform bedding of the bottom section to prevent uneven loading. Install gaskets and joint sealants in accordance with manufacturer's recommendations to produce a watertight structure.

Brick: Bed the bottom and sides of every brick in mortar. Apply a smooth coat of mortar, 3/4-inch thick, on the inside and outside.

Pipe Connections: Seal the connection between the pipe and the manhole as follows:

Pipe 36-Inch Diameter and Less: Connect pipe to manhole utilizing rubber boots.

Pipe 42-Inch Diameter and Larger: Construct manhole collars as shown on the Drawings after the pipe has been sealed into the manhole.

If rubber boots are damaged, replace Type I boots with a new boot and repair Type II boots by constructing a manhole collar.

If preformed openings must be enlarged or altered, or if new openings must be made in the field, minimize the amount of material removed to provide closely matched surfaces for grouting.

Inverts: Form channels as shown on the Drawings, rounded, and troweled smooth with brick faces exposed. Maintain consistent grade through the invert.

Top Elevations: Build manholes outside of paved areas to 18-inches above finished grade unless otherwise shown on the Drawings or directed by the Engineer. Build manholes in paved areas to existing grades.

Drop Connections: Manholes requiring drop connections are shown on the Drawings. Construct drop connections of the same materials as the upstream sewer and in accordance with the details shown on the Drawings.

Frames and Covers: Unless frame and cover is at grade, the frame shall be cast into the cone section.

Seal all manhole joints and lift holes, both inside and out, with grout. Between precast sections, this is in addition to joint sealant.

CONCRETE COLLARS

Construct collars as shown on the Drawings.

INSPECTION AND TESTING

Clean and test lines prior to placing line in service and before requesting final plat approval. Where any obstruction is met, clean the sewers by means of rods, swabs, or other instruments. When requested by the Engineer, flush out lines and manholes before final inspection.

Alignment: Pipe lines shall be straight and show a uniform grade between manholes. Correct any discrepancies discovered during inspection.

The sewer alignment will be checked by a visual inspection including either laser or lamping alignment.

Watertightness: All sewers constructed shall be tested for watertightness to the maximum extent feasible. Infiltration tests and exfiltration tests shall be performed on all new sewers constructed as indicated below. In such cases the watertightness of the sewers less than or equal to 24-inches shall be based on a visual inspection, and for sewers 30-inches and larger based on the individual joint test as specified below. All visible leaks, including those found via television inspection, shall be repaired.

Infiltration Tests

Install suitable weirs in manholes selected by the Engineer to determine the leakage of ground water into the sewer. The maximum length of line for each infiltration test shall be 5,000 feet. Install weir for a minimum of four hours before measuring flow. If leakage in any section of the sewer line exceeds 25 gpd/inch diameter/mile, locate and repair leaks. Repair methods must be approved by the Engineer. After repairs are completed, re-test for leakage.

Furnish, install, and remove the necessary weirs, plugs, and bulkheads required to perform the leakage tests.

Weirs shall be V-notch type equal to Pollard (800/437-1146).

Exfiltration Tests

Low-Pressure Air Test: Sewer diameters less than or equal to 24-inches.

Prior to air testing, the section of sewer between manholes shall be thoroughly cleaned and wetted. Immediately after cleaning or while the pipe is water soaked, the sewer shall be tested with low-pressure air. At the Contractor's option, sewers may be tested in lengths between manholes or in short sections (25 feet or less) using inflatable balls pulled through the line from manhole to manhole. Air shall be slowly supplied to the plugged sewer section until internal air pressure reaches approximately 4.0 psi. After this pressure is reached and the pressure allowed to stabilize (approximately two to five minutes), the pressure may be reduced to 3.5 psi before starting the test. If a 1.0 psi drop does not occur within the test time, then the line has passed the test. If the pressure drops more than 1.0 psi during the test time, the line is presumed to have failed the test, and the Contractor will be required to locate the failure, make necessary repairs, and retest the line. All gravity sewer low-pressure air testing shall meet ASTM F 1417 standards. Minimum test time for various pipe sizes and types is as follows:

Nominal Pipe Size, inches	Time (Min/100 feet)	
	VCP, RCP	DIP, PVC
4	0.4	3.9
6	0.7	5.7
8	1.2	7.6
10	1.5	9.4
12	1.8	11.3
15	2.1	14.2
18	2.4	17.0
21	3.0	19.8
24	3.6	22.8

Required test equipment, including inflatable balls, braces, air hose, air source, timer, rotameter as applicable, cut-off valves, pressure reducing valve, 0-15 psi pressure gauge, 0-5 psi pressure gauge with gradations in 0.1 psi and accuracy of + two percent, shall be provided by the Contractor. Testing equipment shall be equal to Cherne Air-Loc Testing Systems.

The Contractor shall keep records of all tests made. Copy of such records will be given to the Engineer. Such records shall show date, line number and stations, operator, and such other pertinent information as required by the Engineer.

The Contractor is cautioned to observe proper safety precautions in performance of the air testing. It is imperative that plugs be properly secured and that care be exercised in their removal. Every precaution shall be taken to avoid the possibility of over-pressurizing the sewer line.

Individual Joint Test: Pipe joints for sewers 30-inches in diameter and larger shall be air tested individually. The joint tester assembly shall be placed over the joint and shall pressurize the joint area to 4 psi. The pressure shall not drop more than 2 psi in 10 seconds. The joint tester assembly shall be equal to Cherne Industries, Inc.

Deflection Test: All polyvinyl chloride pipe gravity sewers.

Test PVC gravity sewer for excessive deflection by passing a mandrel through the pipe. Deflection of the pipe shall not exceed five percent.

The mandrel size shall be based upon the maximum possible inside diameter for the type of pipe being tested, taking into account the allowable manufacturing tolerances of the pipe. The mandrel shall have an odd number of legs, or vanes, with a quantity of such equal to or greater than nine. The legs of the mandrel shall be permanently attached to the mandrel. A mandrel with variable sizes shall not be allowed. The mandrel shall be constructed of steel, aluminum or other material approved by the Engineer, and shall have sufficient rigidity so the legs of the mandrel will not deform when pulling through a pipe. The mandrel dimensions shall be checked by the Engineer before use by the Contractor.

Excavate and install properly any section of pipe not passing this test. Re-test until results are satisfactory.

This test shall be performed twice:

Once within the first 30 days of installation, and
Once during final inspection, but no sooner than 30 days after pavement backfill done, at the completion of this contract.

Closed Circuit Television: The interior of the gravity sewers shall be subjected to a televised inspection. The audio/video tape shall provide an audio description of what is being viewed; provide a continuous running footage indicator between manholes; and be prepared in the presence of the Inspector. Prior to Final Acceptance the Engineer shall be provided with one copy of the TV inspection report and video cassette showing the entire length of gravity sewer being tested. The report shall contain the condition of pipe, type of pipe, depth, location of services, length, type joint, roundness, and distance between manholes. Any pipe found to be cracked, leaking, misaligned, bellied or otherwise defective shall be removed and replaced.

Manholes

Prior to testing manholes for watertightness, all liftholes shall be plugged with a non-shrink grout, all joints between precast sections shall be properly sealed and all pipe openings shall be temporarily plugged and properly braced.

Vacuum Tests: The manhole, after proper preparation as noted above, shall be vacuum tested prior to or after backfilling. The test head shall be placed at the inside of the top of the cone section and the compression head inflated to 40 psi to effect a seal between the vacuum base and the manhole structure. Connect the vacuum pump to the outlet port with the valve open. A vacuum of 10-inches of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to 9-inches. The manhole shall pass if the time is greater than that specified in the table below. If the manhole fails the initial test, necessary repairs shall be made with non-shrink grout while the vacuum is still being drawn. Retesting shall proceed until a satisfactory test is obtained. Vacuum testing equipment shall be equal to that as manufactured by P.A. Glazier, Inc. All work dealing with vacuum testing will meet ASTM C 1244 standards.

MINIMUM TEST TIMES FOR VARIOUS MANHOLE DIAMETERS AND DEPTHS

Depth (feet)	Diameter, feet		
	4	5	6
8	20	28	33
10	25	33	41
12	30	39	49
14	35	48	57
18	40	52	67
18	45	59	73
20	50	65	81
22	55	72	89
24	59	78	97
26	64	85	105
28	69	91	113
30	74	98	121

PROTECTION AND RESTORATION OF WORK AREA

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.

The Contractor shall plan, coordinate, and prosecute the work such that disruption to personal property and business is held to a practical minimum.

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.

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.

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.

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. Fences crossing the easement shall be gated.

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.

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. The Contractor may chip and grind vegetation and spread over the disturbed area if approved by the Engineer.

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.

Swamps and Other Wetlands

The Contractor shall not construct permanent roadbeds, berms, drainage structures or any other structures which alter the original topographic features within the easement.

All temporary construction or alterations to the original topography will incorporate measures to prevent erosion into the surrounding swamp or wetland. All areas within the easement shall be returned to their original topographic condition as soon as possible after work is completed in the area. All materials of construction and other non-native materials shall be disposed by the Contractor.

The Contractor shall provide temporary culverts or other drainage structures, as necessary, to permit the free migration of water between portions of a swamp, wetland or stream which may be temporarily divided by construction.

The Contractor shall not spread, discharge or dump any fuel oil, gasoline, pesticide, or any other pollutant to adjacent swamps or wetlands.

END OF SECTION

Section 02821
Chain Link Fences and Gates

PART 1 -GENERAL

1.1 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.

1.2 SUBMITTALS

A. Product data shall be submitted in complete conformance with the requirements of Section 01340 of these Specifications.

1.3 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.

1.4 STORAGE AND PROTECTION

A. Provide storage and protection in accordance with the requirements of Section 01611 of these Specifications.

1.5 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

2.1 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.

2.2 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

3.1 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.

3.2 CLEANING

A. 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

SECTION 02920 - Lawns and Grasses

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Fine grading and preparing lawn areas.
   2. Furnishing and applying soil amendments.
   3. Furnishing and applying fertilizers.
   4. Seeding new lawns.
   5. Sodding new lawns.
   6. Replanting unsatisfactory or damaged lawns.
   7. Preparing soil for sports fields.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 2 Section "Clearing and Grubbing".
   2. Division 2 Section "Earthwork".
   3. Division 2 Section “Erosion and Sedimentation Control”.

1.3 DEFINITIONS

A. Laser Grading: Laser Grading shall include the use of a land leveler that is equipped with a laser controlled hydraulic system that automatically raises and lowers the implement.

B. Rootzone: The combination of topsoil, subsurface soil, sand, lime and fertilizer lightly blended into a loose homogenous mixture, the sand being approximately 85% of the mixture.

C. Warrantied Sod: The specific area(s) of sod harvested and installed during the dormant season that later does not demonstrate reasonable regrowth of stolens to sufficiently re-establish an acceptable playing surface, therefore, is subsequently replaced by the Contractor at no cost to the Owner.

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Planting schedule indicating anticipated dates and locations for each type of planting.

C. Seed Certification from grassing contractor stating seed type, seed mix, percentage and application rate.

D. Lime Certification from grassing contractor stating type of lime (pelletized or powdered), lime supplier and rate of application.

E. Fertilizer Certification from grassing contractor stating composition of fertilizer and rate of application.

F. Polyacrylamide Erosion Control Emulsion Certification from grassing contractor stating type and rate of application.

G. Soil Analysis Report giving soil analysis and amendment recommendations. Alter fertilizer and lime requirements as dictated by the soil analysis data.

H. Sod Certification from grassing contractor for the Certified Tift Sport Hybrid Bermuda grass.

I. Maintenance instructions recommending procedures to be established by Owner for maintenance of landscaping during an entire year. Submit before expiration of required maintenance periods.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed landscaping work similar in material, design, and extent to that indicated for this Project and with a record of successful grass establishment.

B. Topsoil Analysis: Furnish a soil analysis made by a qualified independent soil-testing agency stating percentages of organic matter, inorganic matter (silt, clay, and sand), deleterious material, pH, and mineral and plant-nutrient content of topsoil.

1. Report suitability of topsoil for lawn growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and any limestone, aluminum sulfate, or other soil amendments to be added to produce a satisfactory topsoil.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

B. Sod: Harvest, deliver, store, and handle sod according to the requirements of the American Sod Producers Association's (ASPA) "Specifications for Turfgrass Sod Materials and Transplanting/Installing."

C. Fertilizer & Lime: Deliver in original sealed, labeled, and undamaged containers.

1.7 COORDINATION AND SCHEDULING

A. Planting Season: Sow lawn seed and install sod during normal planting seasons for type of lawn work required. Correlate planting with specified maintenance periods to provide required maintenance from date of Substantial Completion.

B. Weather Limitations: Proceed with planting only when existing and forecast weather conditions are suitable for work.

1.8 MAINTENANCE

A. Begin maintenance of lawns immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:

1. Seeded Lawns: 180 days after date of Substantial Completion.

a. When full maintenance period has not elapsed before end of planting season, or if lawn is not fully established at that time, continue maintenance during next planting season.

2. Sodded Lawns: 60 days after date of Substantial Completion.

B. Maintain and establish lawns by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.

1. Replant bare areas with same materials specified for lawns.

2. Add new mulch in areas where mulch has been disturbed by wind or maintenance operations sufficiently to nullify its purpose. Anchor as required to prevent displacement.

C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawns uniformly moist to a depth of 4 inches.

1. Lay out temporary lawn-watering system and arrange watering schedule to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly seeded, plugged, or sprigged areas.

2. Water lawn at the minimum rate of 1 inch per week.

D. Mow lawns as soon as there is enough top growth to cut with mower set at specified height for principal species planted. Repeat mowing as required to maintain specified height without cutting more than 40 percent of the grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain following grass height:

1. Mow grass from 2 to 3 inches high.

E. Postfertilization: Apply fertilizer to lawn after first mowing and when grass is dry.

1. Use fertilizer with a 10-10-10 content of nitrogen, phosphorus and potassium.

F. Re-apply polyacrylamide erosion control emulsion in any area that has been disturbed after initial application. Continue as needed until the site is completely established.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with the Association of Official Seed Analysts' "Rules for Testing Seeds" for purity and germination tolerances.

1. Seed Mixture: Provide seed of grass species and varieties appropriate to planting season and site conditions as published in the “Seeding Table” from Section 700.04 Seeding from the Georgia D.O.T. Standard Specification-1993 Edition. Cross-reference with chart on plans for revised mixes.

2. Seeding on slopes of 2:1: Utilize Interstate Lespedeza mix unless otherwise noted.

2.2 SOD

A. Sod: (For lawns) Certified turfgrass sod complying with ASPA specifications for machine-cut thickness, size, strength, moisture content, and mowed height, and free of weeds and undesirable native grasses. Provide viable sod of uniform density, color, and texture of the following turfgrass species, strongly rooted, and capable of vigorous growth and development when planted.

1. Species: Tifway Bermuda (419).

B. Sod: (For Sports Fields) Certified Tift Sport Hybrid Bermuda grass produced under the rules and regulations of the Georgia Crop Improvement Associations, Inc. The sod shall be harvested from vigorously growing, properly fertilized field(s) harvested in 30 inch width rolls. The required use of the Certified Tift Sport Hybrid Bermuda grass shall be limited to the soccer, baseball, softball, band practice, football practice and stadium fields.

1. Species: Certified Tift Sport Hybrid Bermuda grass

2.3 TOPSOIL

A. Topsoil: Free of stones 1 inch or larger in any dimension, and other extraneous materials harmful to plant growth.

1. Topsoil Source: Reuse surface soil stockpiled on the site. Verify suitability of surface soil to produce topsoil meeting requirements and amend when necessary. Clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.

2.4 SOIL AMENDMENTS

A. Lime: ASTM C 602, Class T, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent, with a minimum 99 percent passing a No. 8 sieve and a minimum 75 percent passing a No. 60 sieve. An equivalent liquid lime is acceptable.

B. Herbicides: EPA registered and approved, of type recommended by manufacturer.

C. Water: Potable.

2.5 FERTILIZER

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast-and slow-release nitrogen, 50 percent derived from natural organic sources of urea-form, phosphorous, and potassium in the following composition:

1. First and Second Year Fertilizer Analysis: 6-12-12; 6% nitrogen, 12% phosphorus and 12% potassium.

2. Maintenance Composition: 1 lb per 1000 sq. ft. of actual nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

2.6 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Fiber Mulch: Biodegradable dyed-wood cellulose-fiber mulch, nontoxic, free of plant growth- or germination-inhibitors, with maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

C. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application, nontoxic and free of plant growth- or germination-inhibitors.

2.7 EROSION-CONTROL MATERIALS

A. Erosion Control Blanket: Wood excelsior blanket, encased between two layers of photo-degradable plastic netting. Include manufacturer's recommended steel wire staples, 8 inches long.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive lawns and grass for compliance with requirements and for conditions affecting performance of work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseed overspraying.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 PLANTING SOIL PREPARATION

A. Limit subgrade preparation to areas that will be planted in the immediate future.

B. Loosen subgrade to a minimum depth of 4 inches. Remove stones and clods larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter.

C. Mix soil amendments and fertilizers with topsoil at rates indicated. Delay mixing fertilizer if planting does not follow placing of planting soil within a few days. Either mix soil before spreading or apply soil amendments on surface of spread topsoil and mix thoroughly into top 4 inches of topsoil before planting.

1. Mix lime with dry soil prior to mixing fertilizer.

2. Uniformly mix 2000 lbs. of lime and 1500 lbs. of fertilizer per acre.

D. Spread planting soil mixture to depth required to meet thickness, grades, and elevations shown, after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen or overly wet.

1 Place approximately 1/2 the thickness of planting soil mixture required. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil mixture.

2 In sodded areas, allow for sod thickness.

E. Preparation of Unchanged Grades: Where lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare soil as follows:

1 Remove and dispose of existing grass, vegetation, and turf. Do not turn over into soil being prepared for lawns.

2 Till surface soil to a depth of at least 6 inches. Apply required soil amendments and initial fertilizers and mix thoroughly into top 4 inches of soil. Trim high areas and fill in depressions. Till soil to a homogenous mixture of fine texture.

3 Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

4 Remove waste material, including grass, vegetation, and turf, and legally dispose of it off the Owner's property.

F. Grade lawn and grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future. Remove trash, debris, stones larger than 1 inche in any dimension, and other objects that may interfere with planting or maintenance operations.

G. Moisten prepared lawn areas before planting when soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

H. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.

3.4 SEEDING NEW LAWNS

A. Sow seed with a spreader or a seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in 2 directions at right angles to each other. Hand distribution will not be permitted.

B. Sow seed at the rate shown on the drawings.

C. Rake seed lightly into top 1/8 inch of topsoil, roll lightly, and water with fine spray.

D. Protect seeded slopes exceeding jute or coir-fiber erosion-control mesh installed and stapled according to manufacturer's recommendations.

3.5 HYDROSEEDING NEW LAWNS

A. Hydroseeding: Mix specified seed, fertilizer, polyacrylamide emulsion, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.

1. Mix slurry with nonasphaltic tackifier.

2 Apply slurry uniformly to all areas to be seeded in a 1-step process. Apply mulch at the minimum rate of 1500 lb per acre dry weight but not less than the rate required to obtain specified seed-sowing rate.

3.6 SODDING NEW LAWNS

A. Lay sod within 24 hours of stripping. Do not lay sod if dormant, if ground is frozen or overly wet.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

C. Lay sod across angle of slopes exceeding 3:1.

1. Anchor sod on slopes exceeding 6:1 with wood pegs spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.

D. Saturate sod with fine water spray within 2 hours of planting. During first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below the sod.

3.7 SATISFACTORY LAWN

A. Seeded lawns will be satisfactory provided requirements, including maintenance, have been met and a healthy, uniform, close stand of grass is established, free of weeds, bare spots exceeding 6 by 6 inches, and surface irregularities.

B. Sodded lawns will be satisfactory provided requirements, including maintenance, have been met and healthy, well-rooted, even-colored, viable lawn is established, free of weeds, open joints, bare areas, and surface irregularities.

C. Replant lawns that do not meet requirements and continue maintenance until lawns are satisfactory.

3.8 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto surface of roads, walks, or other paved areas.

B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period until lawn is established.

END OF SECTION 02920

SECTION NO. 03100

CONCRETE FORMWORK

PART 1 - GENERAL

1.01 SCOPE

Furnish and install the concrete formwork as required by the concrete outlines shown and indicated on the Drawings and specified in this Section, complete.

1.02 FORM DESIGN

Provide the design of all forms for this work. Formwork shall comply with ANSI A10.9 and OSHA Construction Standards, Part 1926, Subpart Q, Concrete, Concrete Forms, and Shoring. In addition, the form designs shall meet the requirements of ACI 347.

1.03 SUBMITTALS

A. Do not provide submittals for the structural design of forms.

B. Form Tie Assemblies: Manufacturer's product data sheets fully describing the form tie assemblies.

C. Form Releasing Agent: Manufacturer's product data sheets fully describing the form coating.

D. Plywood Panels: Certification that the plywood panels for use on this work meet the specified standard.

1.04 STORAGE AND PROTECTION

All form materials and accessories shall be stored above ground on framework or blocking, shall be protected from precipitation and shall have adequate air circulation and ventilation.

PART 2- PRODUCTS

2.01 FORM MATERIAL

A. Smooth Form Finish: Forms for this finish shall be applied to surfaces specified in Section 03300 of these Specifications. Some of these surfaces will receive a brushed surface coating as specified in Section 03300 of these Specifications. Form facing material shall produce a smooth, dense, uniform texture on the concrete. Form facing shall be one of the following:

1. Plywood, meeting the requirements of U.S. Department of Commerce Product Standard (PS). PS 1 - Construction and Industrial Plywood, B-B Concrete Form Panels. The arrangement of the facing material shall be orderly with the number of seams kept to a practical minimum.

2. Patented forms may be used, subject to acceptance by the Engineer, provided they produce a smooth, even surface. This acceptance is for the finish these forms will leave on the contact surfaces and will not relieve the Contractor of the responsibility for the design and structural soundness of the forms. Patented forms shall be lined with the specified plywood. Plywood panels and form liners shall not be used more than three times unless further use is acceptable to the Engineer.

B. Rough Form Finish: Forms for this finish shall be applied to the surfaces specified in Section 03300 of these Specifications. Forms for this finish may be the same as specified for the Smooth Form Finish or may be constructed of used plywood panels, unlined steel forms or straight dressed lumber.

C. Formwork for "pan joist" construction shall be either of steel or reinforced fiberglass. Pans shall be of sufficient stiffness and strength to hold their shape and support construction loads during concrete casting. Do not use pans that are bent out of shape or rusty.

2.02 ACCESSORIES

A. Form ties for use in all liquid containment structure walls shall be one of the following:

1. Form clamp assemblies with smooth tie rods with a waterstop at their centers; or "she bolt" tie assemblies with a waterstop at their centers.

2. Both of the assemblies shall permit tightening of the forms and be of such type that leaves no tie metal, or any other tie material, within 1-1/2-inch of the surface after use. The assemblies shall provide cone-shaped depressions at the surface of the concrete at least 1-inch in diameter to allow filling and patching with the specified grout.

B. Form ties for use in all other walls shall be one of the assemblies specified in Article 2.02, paragraph A., except that waterstops are not required.

C. Form releasing agents shall be a non-staining form coating compound.

PART 3 – EXECUTION

3.01 FORM CONSTRUCTION

A. Formwork shall be in accordance with ACI 347 and as follows:

1. Forms shall conform to shape, lines and dimensions of members indicated and shall be sufficiently rigid and tight to prevent leakage of mortar. Forms shall be properly braced or tied together so as to maintain position and shape. Construct forms so that they can be removed readily without hammering or prying against the concrete. Forms for exposed concrete shall be carefully made and accurately placed to obtain correct shape and lines. Cambers shall be as noted on the Drawings.

2. Joints shall be butted tight. Arrangements of panels shall be orderly and symmetrical, and use of small pieces shall be avoided. Forms shall be chamfered 1-inch for external corners of concrete, including top of walls, which will be exposed to view in the finished work.

3. Provide adequate formwork in its entirety. Forms shall safely support loads they will sustain and shall maintain their dimensional and surface correctness to produce members required by the Drawings. Form ties shall be spaced close enough to avoid bulges and variations in the required cross-sectional dimensions shown on the Drawings for the members being cast.

4. Box out for chases, recesses or other openings required in the completed work.

5. Install all the items (sleeves, inserts, hangers, anchors, etc.) to be supported by the formwork as required by the work.

6. Install pipe sleeves, wall pipes and wall sleeves, as shown or specified, for all piping penetrating walls and slabs. The use of block-outs in walls is prohibited. Pipe sleeves shall be used in slabs for plumbing pipes and wiring conduits.

7. Provide a sufficient number of cleanout doors at the base of walls and columns to facilitate cleaning and the application of grout to the column bases.

8. The use of reinforcing steel, partially embedded in concrete, as toe pins or form spacers is prohibited.

3.02 TOLERANCES FOR FORMED SURFACES

A. Variation from Plumb

1. In the Lines and Surfaces of Columns, Piers, Walls:

a. In any 10 Feet of Height: 1/4-inch (walls 1/2-inch).
b. Maximum for the Entire Height: 1-inch.

2. For Exposed Corner Columns, Construction and Expansion Joint Grooves and Other Conspicuous Lines:

a. In any 20 Foot Height: 1/4-inch.
b. Maximum for the Entire Height: 1/2-inch.

B. Variation from the Level or from the Grades Shown on the Drawings:

1. In Slab Soffits, Beam Soffits and Tops of Slabs, Measured Before Removal of Supporting Shores:

a. In any 10 Foot Length: 1/4-inch.
b. In any Bay or in any 20 Foot Length: 3/8-inch.
c. Maximum for the Entire Length: 3/4-inch.

2. In Exposed Lintels, Sills, Parapets, Horizontal Grooves and Other Conspicuous Lines:

a. In any Bay or in any 20 Foot Length: 1/4-inch.
b. Maximum for the Entire Length: 1/2-inch.

C. Variation of the Linear Building Lines from Established Position in Plan and Related Position of Columns, Walls and Partitions:

1. In any Bay: 1/2-inch.

2. In any 20 Foot Length: 1/2-inch.

3. Maximum for the Entire Length: 1-inch.

D. Variation in the Sizes and Location of Sleeves for Plumbing Pipes and Electrical Conduits, Floor Openings and Wall Openings: +1/4-inch.

E. Variation in Cross-Sectional Dimensions of Columns and Beams and in the Thickness of Slabs and Walls: -1/4-inch, +1/2-inch.

F. Variation in Sizes of Pipe Sleeves, Wall Pipes and Wall Sleeves: None.

G. Variation in Location of Pipe Sleeves, Wall Pipes and Wall Sleeves: +1/8-inch.

H. Footings

1. Variations in Dimensions in Plan: -1/2-inch, +2-inches.

2. Misplacement or Eccentricity: Two percent of the footing width in the direction of misplacement but not more than: 2-inches.

3. Thickness: Decrease in specified thickness - none; increase in specified thickness 25 percent unless otherwise approved by the Engineer.

4. Tolerances above apply to concrete dimensions only, not to positioning of vertical reinforcing steel, dowels or embedded items.

I. Variation in Steps

1. In a Flight of Stairs:

a. Rise: ±1/4-inch.
b. Tread: ±1/4-inch.

2. In Consecutive Steps:

a. Rise: +0-inch, -1/8-inch.
b. Tread: ±1/8-inch.

3.03 APPLICATION OF FORM COATING

Before the placing of reinforcing, faces of all forms to be in contact with the concrete shall receive a thorough coating of the liquid form-releasing agent specified, applied in compliance with the manufacturer's instructions.

3.04 INSPECTION

Inspect all the work in accordance with Section 03300 of these Specifications.

3.05 REMOVAL OF FORMS

A. Forms shall be removed in a manner that will insure the complete integrity of the structure. The forms and shoring shall remain in place for the following minimum periods of time after the casting of the concrete is completed:

	Form Removal, Days	**Shoring, Days**
Beams and Slabs (Soffits)	7	14
Walls	1	0
Columns	1	0

B. Formwork for beam and slab soffits shall be designed so that they can be removed without removal of sufficient original shores to adequately support the work until such time that the concrete strength reaches its specified 28 day strength.

C. Removal of forms shall be coordinated with the selected specified method of curing concrete.

D. Wood forms shall be completely removed from all the work to avoid termite infestation.

END OF SECTION

SECTION NO. 03200

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 SCOPE

Furnish and install the concrete reinforcement as shown and indicated on the Drawings and specified in this Section, complete in place.

1.02 SUBMITTALS

A. Shop Drawings

1. All shop drawings shall be of the same size. Reproductions of the Drawings for use as shop drawings is not permitted. Shop drawings shall include placing drawings, bending details, and bar lists with bar marks. All details and notes appearing on the Drawings, giving information for the placing of reinforcing steel, shall be shown on the shop drawings. Shop drawings will not be reviewed without such information.

2. Wall reinforcing shall be shown in elevation.

3. Show location and size of all penetrations greater than 6-inches in diameter or across the opening with the corresponding added reinforcing around the penetrations.

4. Submittals shall be complete for each structure. Partial submittals are not permitted and will be returned unmarked. Each submittal shall clearly indicate the structure and Drawing numbers that the work is for. The identifying numbers of the shop drawings for each structure shall be in numerical order.

5. Location and arrangement of accessories shall be clearly indicated.

6. All shop drawings shall be checked by the fabricator and Contractor before being submitted to the Engineer.

B. Mill tests of reinforcing steel shall be submitted prior to use for each 15 tons or less shipped to the site. Tests shall be conducted in conformance with ASTM A 615, and methods prescribed therein.

1. Cost of mill tests shall be borne by Contractor.

2. Three copies of each test report stating whether the material meets the requirements of the ASTM specifications shall be submitted to the Engineer.

3. Certified copies of the mill tests may be considered evidence of compliance provided such tests are regularly conducted by the reinforcement supplier by experienced, competent personnel using adequate testing equipment. In case of doubt as to the adequacy or accuracy of the mill tests, the Engineer may require the Contractor to furnish, at no cost to the Owner, test results from an independent testing laboratory acceptable to the Engineer on mill samples or delivered steel reinforcement.

PART 2 – PRODUCTS

2.01 REINFORCING BARS

A. Bar reinforcement shall be deformed-type bars conforming to ASTM A 615. Reinforcement shall be manufactured from new billet steel of American manufacture, Grade 60.

B. Reinforcing steel shall be shop fabricated to shapes and dimensions indicated on the Drawings and in compliance with applicable provisions of ACI 315 and ACI 318.

C. Bars shall be bent cold. Bars shall be pre-fabricated to detail and delivered on the job plainly tagged and ready to set.

2.02 WELDED WIRE FABRIC

Welded wire fabric shall be in flat sheets conforming to ASTM A 185, with wire conforming to ASTM A 82.

2.03 ACCESSORIES

A. All chairs and bolsters shall have plastic-covered or galvanized steel legs at formed slabs and beams. For slabs on grade, bare metal is acceptable.

B. For slabs on grade 10-inches or less, all reinforcing shall be supported on chairs and/or bolsters as required to properly position the bars or welded wire fabric. The chairs and/or bolsters shall be supported on precast concrete pads bearing on the subgrade. The concrete pads shall be at least 6 x 6-inches and be no more than 1-1/2-inches thick. Pads shall be cast from Class "A" concrete or from mortar made up of one part cement and two parts sand, with tie wires embedded.

C. For slabs on grade greater than 10-inches, reinforcing shall be supported directly on concrete brick bearing on the subgrade or the system noted above for slabs 8-inches or less.

PART 3 - EXECUTION

3.01 STORAGE OF MATERIALS

Reinforcing steel delivered to the site, not immediately placed in forms, shall be protected from mud and excessive rust-producing conditions by storing in a well-drained area and supported off the ground. All reinforcing shall be properly tagged with their bar marks and location in the structure clearly noted.

3.02 TOLERANCES

A. Allowable tolerances for fabricating steel reinforcement shall be as follows:

Item	**Maximum Tolerance, Inches**	
Sheared Length of Bars	+1	-1
Depth of Truss Bars	+0.0	-1/2
Outside Dimensions of Stirrups, Ties and Spirals	+1/2	-1/2
Location of Bends	+1	-1

B. Allowable tolerances for placing steel reinforcement shall be as follows:

Item	Maximum Tolerance, Inches	
Concrete Cover from Outside of Bar to Finished Surface	+1/4	-0.0
Lateral Spacing of Bars in Plane of Reinforcement in Beams and Joists	+1/4	-0.0
Lateral Spacing of Bars in Plane of Reinforcement in Plane of Reinforcement in Slabs and Walls	+1	-1
Spacing of Stirrups, Ties and Spirals Along Longitudinal Axis of Member	+1/2	-1/4
Height of Bottom Bars in Slabs, Beams and Joists	+1/4	-1/4
Height of Top Bars in Slabs, Beams and Joists		
Depth 8" and Less	+1/4	-1/4
Depth 9" - 24"	+1/2	-1/2
Depths 25" & Greater	+1	-1

3.03 FIELD FABRICATION

Field fabrication of reinforcing steel is not permitted.

3.04 PLACEMENT AND ANCHORAGE

A. Space metal chairs, bolsters, spacers and hangers in accordance with ACI 315.

B. Reinforcement, at the time concrete is placed, shall be free from rust scale or other coatings that will destroy or reduce bond. Bars with kinks or bends not shown on the plans shall not be used.

C. Reinforcement shall be accurately placed in accordance with the Drawings and shall be adequately secured in position with not less than 16 gauge annealed wire or suitable clips at intersections. Reinforcement shall be held securely at the required distance from the forms. Nails shall not be driven into outside forms to support reinforcement.

D. Install welded wire fabric reinforcement for concrete slabs on ground and as otherwise indicated. Lap all joints 6-inches and wire securely. Extend mesh to within 2-inches of sides and ends of slabs. Sheets that do not lay flat when in their intended position will be rejected. Tags designating the wire size and spacing shall be left on each sheet until ready for use. Tuck ends of welded mesh well down into edge of beams or walls. Do not leave unreinforced border strips. Welded wire fabric shall not contain loose rust. All welded wire fabric shall be supported and tied in its proper location.

E. Conduits: Where conduits are permitted in slabs, low conduit shall be wired to the upper side of bottom reinforcing and top conduit shall be wired to lower side of top steel. Where parallel conduits occur, they shall be separated by at least 2-inches clear.

3.05 CONCRETE COVER

A. Unless otherwise shown on the Drawings, the following concrete cover shall be provided for reinforcement:

1. Bottom and Sides of Footing: 3 inches.

2. Walls: 2 inches.

3. Slabs (Framed)

a. Bottom: 3/4 inch.
b. Top: 1 inch.

4. Beams (Stirrups)

a. Bottom and Sides: 1-1/2 inch.
b. Top: 2 inches.

5. Columns (Ties, Spirals): 2 inches.

6. Slabs on Grades - Liquid Containment Structures

a. Bottom and Sides: 3 inches.
b. Top: See Drawings.

7. Slabs on Grade - Other Structures: See Drawings.

3.06 SPLICING

A. Splicing of reinforcement shall be as shown and indicated on the Drawings. Splices not shown on the Drawings shall be Class "B" splice, in accordance with ACI 318. Any changes to the location and type of splices desired by the Contractor must be specifically requested and must meet with the acceptance of the Engineer before they can be used.

B. Splices shall not be made at point of maximum stress and shall provide sufficient lap to transfer stress between bars by bond.

C. Mechanical splices may be used instead of lap splices provided that their location and type meets with the acceptance of the Engineer.

3.07 INSPECTION

Inspect all the work in accordance with Section 03300 of these Specifications.

END OF SECTION

SECTION NO. 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SCOPE

Furnish and install the cast-in-place concrete as shown and indicated on the Drawings and as specified in this Section, complete.

1.02 SUBMITTALS

A. Mix designs for all groups and classes of concrete.

B. Strength and slump tests results.

C. Certificates of compliance for each of the following:

1. Cement
2. Aggregates
3. Fly ash
4. All admixtures

PART 2 – PRODUCTS

2.01 CEMENT

Cement shall be standard Portland Cement, of American manufacture, conforming to ASTM C 150, Type I or Type II, as approved by the Engineer. Only one brand of commercial Portland cement shall be used in the exposed concrete of the structure. Cement reclaimed by cleaning bags or from leaking containers shall not be used in this work. Each bag shall weigh approximately 94 pounds and contain one cubic foot.

2.02 CONCRETE AGGREGATES

A. Fine aggregate shall be sand having clean, hard, durable, uncoated grains and free from deleterious substances and shall conform to ASTM C 33.

B. Coarse aggregate shall be crushed stone having clean, hard, durable, uncoated particles conforming to ASTM C 33.

2.03 WATER

Water used in mixing concrete shall be clean and free from deleterious amounts of acids, alkalies or organic materials.

2.04 EXPANSION JOINT FILLER

See Section 03250 of these Specifications for expansion joint filler.

2.05 WATERSTOPS

See Section 03250 of these Specifications for waterstops.

2.06 VAPOR BARRIER

Vapor barrier shall be polyethylene sheeting, minimum 6 mil thickness, conforming to ASTM C 171. Sheeting shall be drilled with 1/2-inch holes at 6 to 10-inch centers each way.

2.07 ADMIXTURES

A. Water reducing admixture shall conform to ASTM C 494, Type A.

B. Water reducing, retarding admixture shall conform to ASTM C 494, Type D.

C. Non-Corrosive, Non-Chloride Accelerator: The admixture shall conform to ASTM C 494, Type C.

D. Air entraining admixture shall conform to ASTM C 260.

E. Fly ash shall conform to ASTM C 618, Type F.

F. High range water reducer (HRWR) shall conform to ASTM C 494, Type F or G and shall be one of the following:

1. Rheobuild 1000 and 716, manufactured by Master Builders

2. Daracem 100, manufactured by W.R. Grace

3. Sikament 320, manufactured by Sika Corporation

4. Eucon 37, manufactured by Euclid Chemical Company

G. Calcium Chloride: Calcium chloride or admixtures containing more than 0.1 percent chloride ions are <u>not</u> permitted.

2.08 CURING AND SEALING COMPOUNDS

A. Curing compound shall be acrylic based, conforming to ASTM C 309.

B. Sealing compound shall be one of the following:

1. Masterseal 340, manufactured by Master Builders

2. Sikaguard 701W, manufactured by Sika Corporation

3. Super Rez Seal, manufactured by Euclid Chemical Company

PART 3 - EXECUTION

3.01 CONCRETE QUALITY

A. Two groups of concretes are required. Group I is concrete with a HIGH RANGE WATER REDUCER (HRWR), Group II is concrete without HRWR. Group I concrete shall be used in all walls and columns in liquid containment vessels. Group II concrete shall be used for all other work.

1. Group I: All Group I concrete shall contain the specified fly ash. The combined weight of cement and fly ash shall contain no less than 20 percent nor more than 25 percent of fly ash. The combined weight of cement and fly ash shall be used as the weight of cement in the determining of the water-cement (w/c) ratio. The following class of concrete is required:

Class of Concrete	Compressive Strength @ 28 Days	Slump Range	Maximum W/C Ratio
A	4,000	1" - 2"	0.4

   a. The slump range in the above table is required prior to adding the High Range Water Reducer (HRWR). Slump tests shall be made prior to adding the HRWR. The HRWR shall be added to the concrete at the batch plant. The slump range required after the addition of the HRWR is 7 to 10-inches. HRWR shall be capable of maintaining 7 to 10-inch slump in excess of 60 minutes of continuous mixing at 4 to 6 rpm in a truck mixer and workability up to 90 minutes. After introduction of HRWR, concrete temperature shall be maintained within 3 degrees F for 90 minutes when concrete temperatures are in excess of 90 degrees F. Except for the air-entrainment admixture, no other admixture shall be used with the HRWR. Upon 72 hours notice, the HRWR manufacturer shall supply jobsite technical service to the Contractor. The manufacturer shall be consulted for mix proportions and dosage rates. No added chlorides shall be used. The initial set shall not be in excess of six hours at temperatures above 50 degrees F. HRWR shall be used with due consideration given to the air temperature at the time of batching and casting.
   b. Air Content: All concrete shall have an air content of 4.0 percent to 7.0 percent.
   c. Group I concrete shall be used in all walls and columns for liquid containment structures.

2. Group II: The following classes of concrete are required:

Class of Concrete	Compressive Strength @ 28 Days	Slump Range	Maximum W/C Ratio
A	4,000	3" - 5"	0.45
B	3,000	3" - 5"	0.56
C	1,500	3" - 5"	None Specified

   a. Air Content: All concrete shall have an air content of 4.0 to 7.0 percent.
   b. Admixture Usage: All concrete placed at air temperatures above 50 degrees F shall contain a water reducing admixture or water reducing-retarding admixture. All concrete placed at air temperatures below 50 degrees F shall contain the specified non-corrosive non-chloride accelerator.
   c. Group II concrete shall be used for all work not specified as Group I concrete.
   d. Fly ash is required in all slabs for liquid containment structures, either on grade or formed. Provisions for fly ash use in Group I concrete shall apply.
   e. The use of fly ash is not required for the remainder of Group II concrete, but is permitted. If used, the provisions for fly ash use in Group I concrete shall apply.

3.02 MIX DESIGNS

A. Mix design shall be proportioned in accordance with ACI 211.1 making maximum use of the coarse aggregate. The proportioning shall be based on the requirements of a well-graded high density plastic workable mix within the slump range and strengths required. The mix shall contain no less than 1,850 pounds of coarse aggregate per cubic yard of concrete, shall be based on conventional conveying and shall not be altered for use in pumping. Pumping equipment, if used, shall be of sufficient size and design to pump the mix designed for conventional conveyance.

B. Coarse Aggregate

1. Coarse aggregate for all concrete in liquid containment structures shall be Size No. 467.

2. Coarse aggregate for all other concrete work shall be Size No. 57.

3. Size No. 467 may be used in lieu of Size No. 57 in concrete members whose minimum size dimension is 8-inches or larger.

C. Submit samples, in adequate quantities for each mix design and verification, of all concrete materials to be used on the project to the designated testing laboratory. Do not use any concrete in this work without acceptance and verification of design mix by the testing laboratory and the approval of the Engineer.

D. If trial batches are used, the testing laboratory shall make strength tests from trial batches in the laboratory using materials and mix designs proposed for use by the Contractor. The testing laboratory shall prepare trial batches in accordance with ACI 211.1.

E. If field experience method is selected, the proposed mix design shall be accompanied by complete standard deviation analysis and at least 30 consecutive strength test that represent the proposed mix.

F. The proposed mix design and supporting data shall be submitted, in triplicate, to the testing laboratory for their review and comments at least 21 days prior to the expected start of concreting operations. The testing laboratory will forward two copies of the submittal to the Engineer with their comments. The Engineer will review the submittal and return one copy to the Contractor with the Engineer's comments.

G. Compression test specimens made to verify the mixes shall be made in accordance with ASTM C 192. All compression test specimens shall be tested in accordance with ASTM C 39.

3.03 PLANT MIXING

A. Proportioning Concrete

1. Proportions shall be in compliance with approved design mix for each class of concrete.

2. The mixing plant shall be provided with adequate equipment and facilities for accurate measurement and control of the quantities of material and water used in the concrete.

3. Concrete materials shall be measured by weight except that admixtures shall be measured by volume.

B. Batching

1. Provide all necessary equipment to accurately determine and control actual amount of materials entering into the concrete mix. Individual ingredients shall be weighted separately for each batch. Accumulative weighing will be allowed if equipment is in acceptable working order as determined by the testing laboratory and approved by the Engineer. Accuracy of all weighing devices shall be such that successive quantities can be measured to within one percent of the desired amount.

2. Completely discharge contents of the mixer before each new batch is loaded. Use of retempered concrete is not permitted.

3. Ready-mixed concrete shall be mixed and delivered in accordance with requirements of ASTM C 94 and the following:

   a. A separate water metering device (not truck tank) shall be used for measuring water added to the original batch.
   b. Use of wash water as a portion of the mixing water is not permitted. Wash water added to empty drums after discharging shall be dumped before a new batch is received.
   c. Centrally mixed concrete shall be mixed for the length of time specified herein, not "shrink-mixed".
   d. Mixing drums shall be watertight.
   e. Concrete shall be discharged within one hour from the time concrete was mixed, if centrally mixed, or from time the original water was added, if transit-mixed.
   f. Furnish delivery ticket with each load of concrete delivered under these Specifications. Delivery ticket shall show clearly the class and strength of concrete, size of coarse aggregate, water per cubic yard, its slump, quantities of all admixtures, the date and time of departure from the batching plant, and the time of placement.

3.04 CONVEYING EQUIPMENT

A. If concrete is to be transported in carts or buggies, the carts or buggies shall be equipped with pneumatic tires.

B. Equipment for chuting or other methods of conveying concrete shall be of such size and design as to insure a practically continuous flow of concrete at delivery without segregation of concrete.

3.05 CONVEYING

A. Concrete shall be conveyed from mixer to place of final placement by methods which will prevent separation or loss of the material.

B. Runway supports shall not bear upon reinforcing steel or fresh concrete.

C. All conveying equipment shall be thoroughly cleaned before each run of concrete is begun.

3.06 DELIVERY AND PROTECTION OF MATERIALS

A. Deliver ready-mixed concrete in compliance with requirements of ASTM C 94.

B. The following tests shall be made at the work site prior to placement of concrete:

1. Slump Tests: ASTM C 143.

2. Air Content: ASTM C 173 or C 231

3. Test Cylinders: ASTM C 31

3.07 SEVERE-WEATHER PROVISIONS

A. Hot Weather Concreting: Protect in accordance with ACI 305R except as modified herein.

1. Provide adequate methods of lowering temperature of concrete ingredients so that the temperature of concrete when placed does not exceed 90 degrees F.

2. Concrete shall not be placed when the air temperature is expected to exceed 100 degrees F within 12 hours after casting.

3. When the air temperature is 75 degrees F and above, forms and reinforcing shall be thoroughly wetted with water so that the concrete will be placed against wet and cooled surfaces. All excess water shall be removed before casting the concrete.

4. Protection and Curing - Slabs (On Grade and Formed)

   a. Protect slabs from damage due to dry winds and high temperatures.
   b. Protect slabs from direct sun at temperatures of 85 degrees F and above.
   c. Moist curing of all slabs shall start as soon as the surface of the fresh concrete is hard enough to permit curing without damage to the surface of the concrete.

5. Protection and Curing - Formed Surfaces: As soon as the concrete has set, wet the forms and keep the forms wet during the curing period. Provide for keeping the top of the walls, and other top surfaces, moist during the curing period.

B. Cold-Weather Concreting: Protect in accordance with ACI 306R except as modified herein.

1. Provide adequate equipment for heating concrete materials and protecting concrete from damage during freezing or near-freezing weather. No frozen materials, or materials containing ice, shall be used.

2. All concrete materials and all reinforcement, forms, fillers and ground with which concrete is to come into contact shall be free from frost.

3. Whenever the temperature of the surrounding air is below 40 degrees F and falling, all concrete placed in the forms shall have a temperature of between 70 and 80 degrees F, and adequate means shall be provided for maintaining a temperature of not less than 70 degrees F for three days, or 50 degrees F for five days, or for as much more time as is necessary to insure proper curing of the concrete. If high early strength concrete is used, the requirement for maintenance of 50 degrees F may be reduced to three days.

4. Use only the specified non-chloride accelerator. Calcium chloride or admixtures containing more than 0.1 percent chloride ions are not permitted.

5. Housing, covering or other protection used in connection with curing shall remain in place and intact at least 24 hours after the artificial heat is discontinued.

3.08 CONSTRUCTION JOINTS AND EXPANSION JOINTS

A. Formed Construction Joints in Containment Structures and Where Otherwise Shown: Prior to placing concrete next to the joint, the joint surface shall be thoroughly cleaned and dampened with water. Remove all free water so that the surface of the joint shows signs of drying before placing the adjacent concrete.

B. Construction joints in Beams, Girders and Slabs Where Waterstops are not Specified or Shown to be Installed: These joints shall be located at points of minimum shear and their locations shall be approved by the Engineer before they are bulkheaded. These joints shall be roughened and thoroughly cleaned of all foreign matter and laitence and dampened with water. Remove all free water and slush with a coat of neat cement grout before placing the adjacent concrete. Place the adjacent concrete before the next cement grout takes its initial set.

C. Construction Joints in Beams, Girders and Slabs: Where waterstops are specified or shown to be installed. These joints shall be treated as specified in paragraph A. above.

D. Construction Joints in Columns: These joints, unless otherwise shown on the Drawings, shall be located at the bottom of the girder, beam or slab it receives, and at the top of slabs when the column continues through a slab level. These joints shall be treated as specified in paragraph B. above.

E. Expansion Joints: Expansion joints shall be installed where shown on the Drawings.

3.09 WATERSTOPS

Waterstops shall be provided where specified and as indicated and noted on Drawings and shall be made continuous throughout their length.

3.10 INSPECTION OF WORK BEFORE PLACING CONCRETE

A. Inspect the area to receive concrete for any deficiencies which would prevent proper placing of concrete. Do not proceed with placing concrete until such deficiencies are corrected.

B. Do not place in the concrete any item that is not required to be in the concrete by the Drawings and Specifications. Insert all the items shown on the Drawings or specified properly positioned and secured. Openings other than those which are facilitated by sleeves shall be properly formed and positioned.

C. Remove hardened, or partially hardened, concrete on forms or reinforcement before placing concrete.

D. Do not place concrete on earth until the fill or excavation has been prepared as set forth under applicable sections of the Specifications for that work.

E. Give the Engineer at least 48 hours notice before any concrete is to be placed. Concrete shall not be placed until the Engineer has received a completed Concrete Preplacement Sign-Off Card signed by the superintendent. The Concrete Preplacement Sign-Off Card certifies that the formwork, reinforcing, and all inserts required for mechanical and electrical work, instrumentation, plumbing, process piping, metal embeds, and any other inserts or miscellaneous specialties required for the work are supported in their proper position; that the formed enclosure is clean, and the surfaces to receive concrete are prepared as specified. A sample of the Concrete Pre-Placement Sign-Off Card is attached to this Section.

3.11 PLACING

A. Place concrete as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Do not place concrete on work that has partially hardened or been contaminated by foreign material, and do not use retempered concrete. In no case shall Group II concrete be placed when the elapsed time after addition of water and cement to batch exceeds one hour. For Group I concretes, this elapsed time may be extended if sufficient data from this construction indicates a time extension is permissible and if approved by the Engineer.

B. Concrete shall be placed in a manner to avoid the displacement of reinforcing, and coating or spattering the reinforcing steel. The placing of concrete within form work shall be regulated so that the pressure within form work does not exceed the design pressure. In placing concrete each layer shall be placed following the preceding layer to prevent lines of separation or "cold joints" in the work. After the concrete reaches it initial set, jarring the formwork or placing strain or vibration on the ends of projecting reinforcing bars shall be avoided.

C. Group I concrete shall not be dropped more than 10 feet. Group II concrete shall not be dropped more than four feet. All concrete placed over PVC waterstops shall drop no more than 6-inches until there is at least one foot of concrete above the PVC waterstop, at which point the drop distances may be increased to those noted above.

D. Once concrete placing has started, it shall be carried on as a continuous operation until placing of the concrete between construction joints is completed.

E. Concrete shall be placed in layers not over 12-inches deep and each layer shall be compacted with the aid of mechanical internal-vibrating equipment supplemented by hand spading. Vibrators shall in no case be used to transport concrete. Use of form vibrators are not permitted. Internal vibrators shall maintain a speed of not less than 5,000 impulses per minute when submerged in the concrete. At least one spare working vibrator shall be on the job site as a back-up. Duration of vibrator use shall be limited to that necessary to produce satisfactory consolidation without causing objectionable segregation. Vibrator shall not be lowered into coarses that have begun to set. Apply vibrator at uniformly spaced points not further apart than the visible effectiveness of the machine. Type and use of vibrators shall be in accordance with ACI 301.

F. Provide vapor barrier under all slabs which are on soil, sand or stone. Use largest sheets practicable to reduce number of joints. Lap joints a minimum of 24-inches. Remove torn and punctured sheets and replace with new sheets prior to placing concrete. Placing of concrete shall be done in a manner that will not damage the vapor barrier material. The sub-base material shall be as shown and/or noted on the Drawings.

3.12 PROTECTION

Protect freshly placed concrete from damage or injury due to water, falling objects, persons or anything that may mar or injure finish surface on concrete. Only light use of slabs will be permitted for the first 14 days after placing of the concrete.

3.13 CURING

A. Curing shall conform to ACI 308 except as modified herein.

B. All Slabs on Grade: After placement and finishing, concrete shall be maintained in a moist condition for at least seven successive days during which the temperature of the concrete is 50 degrees F or above. For temperatures of 50 degrees F and below, curing period shall be 14 successive days. Concrete shall be kept moist by any one, or combination, of the following methods:

1. Ponding or Immersion: Continually immerse the concrete in water throughout the curing period. Water shall not be more than 20 degrees F less than the temperature of the concrete.

2. Fog Spraying or Sprinkling: Provide uniform and continuous application of water throughout the curing period.

3. Pervious Sheeting: Completely cover surface and edges of the concrete with two thicknesses of wet sheeting. Overlap sheeting 6-inches over adjacent sheeting. Sheeting shall be at least as long as the width of the surface to be cured. During application, do not drag the sheeting over the finished concrete nor over sheeting already placed. Wet sheeting thoroughly and keep continuously wet throughout the curing period.

4. Impervious Sheeting: Wet the entire exposed surface of the concrete thoroughly with a fine spray of water and cover with impervious sheeting throughout the curing period. Lay sheeting directly on the concrete surface and overlap edges 12-inches minimum. Provide sheeting not less than 18-inches wider than the concrete surface to be cured. Secure edges and transverse laps to form closed joints. Repair torn or damaged sheeting or provide new sheeting. Inspect surface of concrete daily for wetness. The surface shall be kept continuously wet during the curing period.

C. All Other Concrete: After placement, concrete shall be maintained in a moist condition for the same periods as specified above for slabs on grade.

1. Concrete in Formed Surfaces - Slabs, Beams, Columns and Building Walls: Keep forms and exposed surfaces wet with water during the curing period. If forms are removed before the end of the curing period, apply a curing compound within one hour after form removal.

2. Concrete in Formed Surfaces - Containment Vessel Walls: Keep forms wet with water during the curing period. If forms are removed before the end of the curing period, continue the moist curing in accordance with Paragraph A. of this article of these Specifications.

3.14 PATCHING

A. As determined by the Engineer, any concrete which is out of alignment or level, has a defective surface or has defects which reduce its structural adequacy, shall be considered as not conforming with the Drawings and Specifications and shall be rejected.

B. Do not take any remedial action on concrete with any defect without the permission of the Engineer.

C. Unless the Engineer grants permission to patch the rejected concrete, remove the rejected concrete and replace it with concrete that conforms to the Drawings and Specifications. The location of cut lines and the extent of removal will be determined by the Engineer.

D. If the Engineer grants permission to patch the rejected concrete, it shall be done in accordance with the following:

1. Permission to patch rejected concrete will not be a waiver of the Engineer's right to require complete removal of the rejected concrete if the patching does not, in the Engineer's judgement, restore the concrete to the requirements of the Specifications and Drawings.

2. Patching shall be accomplished after the curing is completed.

3. Defective areas shall be chipped away to a depth of not less than 1-inch, in all cases to sound concrete, with edges perpendicular to the surface. Feather edges will not be permitted. Remove all loose material and thoroughly clean the chipped surfaces with a high pressure air hose delivering air at 100 psi. The area to be patched and an area at least 6-inches wide surrounding it shall be dampened. A bonding grout shall be prepared using a mix of approximately one part cement to one part fine sand passing a No. 30 mesh sieve, mixed to the consistency of thick cream, and then well brushed into the surfaces as noted below in paragraph 5.

4. The patching mixture shall be made of the same materials and of approximately the same portions as used for the original concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than one part cement to two and one-half parts sand by damp, loose volume. White Portland cement shall be substituted for a part of the gray Portland cement to produce a color matching the color of the surrounding concrete, as determined by a trial patch. The quantity of mixing water shall be no more than necessary for handling and placing. The patching mortar shall be mixed in advance and allowed to stand with frequent manipulation with a trowel, without addition of water, until it has reached the stiffest consistency that will permit placing.

5. After surface water has evaporated from the area to be patched, the bond coat shall be well brushed into the surface. When the bond coat begins to lose the water sheen, the premixed patching mortar shall be applied. The mortar shall be thoroughly consolidated into place and struck off so as to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, it shall be left undisturbed for at least one hour before being finally finished. The patched area shall be kept damp for seven days. Finishing tools that produce a finish matching the surrounding shall be used.

E. Tie holes left by withdrawal of rods or the holes left by removal of ends of wall ties shall be filled solid with mortar after first being wetted. For holes passing through the wall, a plunger-type grout gun shall be used to force the mortar through the wall starting at the back face. A piece of burlap or canvas shall be held over the hole on the outside and when the hole is filled, the excess mortar shall be struck off with the cloth flush with the surface. Holes not passing through the walls shall be filled with a small tool that will permit packing the hole solid with mortar. Any excess mortar at the surface of the wall shall be struck off flush with a cloth. Mortar shall consist of one part cement, two and one-half parts sand and no more water than necessary for handling and packing.

3.15 FINISHES ON FORMED SURFACES

A. Upon completion of patching, surfaces of concrete shall be finished as follows:

1. Brushed Finish Surface Coating

   a. The brush finish surface coating shall be applied over a Smooth Form Finish (see Section 03100).
   b. The materials used shall be applied in two separate coats to provide a uniform finish on exposed surfaces that have received the initial rubbed finish. The materials shall be mixed and applied strictly in accordance with the written recommendations of the product manufacturer. The actual application of the material shall be performed by workers who have been instructed in the preparation and application of the material. The final brushing of the material during application shall be performed in such a manner as to present a uniform and attractive appearance, with the final brushing generally being done in one direction. The materials shall be especially manufactured for the purpose of waterproofing exterior concrete surfaces, and enhancing the appearance of the concrete surface. The final color of the finish shall be pearl gray, or near that of good quality cured natural concrete. Texture of material shall be approved by the Engineer. Material shall be Thorocoat as manufactured by Thoro System Products.
   c. The following surfaces shall receive a brushed finish surface coating:
      (1) All exterior wall concrete surfaces to levels not less than 6-inches below finish grade.
      (2) All interior wall concrete surfaces within buildings and other such surfaces exposed to view in the finished work (except floor slabs).
      (3) The interior side on containment tank walls to a level not less than 12-inches below normal liquid level, including top of walls.

2. Smooth Form Finish is required for all concrete surfaces exposed to view in the completed work and all liquid containment structure walls whether exposed to view or not in the completed work. Accomplish the required patching and the following touch-up:
   a. Remove all burrs.
   b. Remove all form marks.
   c. Smooth out lines of indentations.

3. Rough Form Finish shall be produced by filling all tie holes and honeycomb and in other respects leaving the surface as formed. All concrete surfaces which will be covered by earth and which will not be visible in the completed structure (except as noted above for liquid containment structure walls which shall have a Smooth Form Finish), may receive a Rough Form Finish.

3.16 STEEL TROWELED FINISH - FLOOR SLABS

A. Steel troweled finish shall be applied to the surface of all building and liquid containment structure floor slabs and interior equipment pads.

B. Concrete shall be placed, consolidated, struck-off and leveled to the proper elevation. After the surface has stiffened sufficiently to permit the operation and the water sheen has disappeared, the surface shall be wood floated, by hand or power floated, at least twice, to a uniform sandy texture. Floors shall be leveled such that depressions between high spots do not exceed 1/4-inch under a 10 foot straightedge except where drains occur, in which case the floors shall be pitched to the drains as indicated on the Drawings.

C. After the concrete has received a wood float finish, it shall be troweled at least twice to a smooth dense finish. The drying of the surface moisture before floating or troweling shall not be hastened by the dusting on of dry sand or cement. The first troweling shall be done by a power trowel and shall produce a smooth surface relatively free of defects. Additional troweling shall be done by hand after the surface has hardened sufficiently. The final troweling shall be done when a ringing sound is produced as the trowel is moved over the surface. The surface shall be thoroughly consolidated by the hand troweling operations. The finished surface shall be free of any trowel marks or other imperfections; shall be uniform in texture and appearance, and shall be in true plane within the tolerance specified. Any deviation from this condition which remains after the troweling is completed shall be corrected by grinding.

3.17 BROOM FINISH

A. Broom finish shall be applied to:

1. All exterior side walks, walkways and platforms.

2. All steps and landings, both interior or exterior.

B. The surface shall be given a floated finish as specified above, then finished with a flexible bristle broom or burlap belt drawn across the surface. Surface must be hardened sufficiently to retain the scoring or ridges. Scores or ridges shall be transverse to traffic or at right angles to the slope of the slab.

3.18 TESTING LABORATORY

A. The testing laboratory shall have access to all places where concrete materials and concretes are manufactured, stored, proportioned, mixed, placed and tested. Duties shall include, but not necessarily be limited to the following:

1. Make, store, transport, cure and test compression specimens made during placing of concrete. Compression test specimens shall be tested in accordance with ASTM C 39. Test reports shall show all pertinent data, such as class of concrete, exact location of pour, air temperature, date of pour, time of pour, truck number for ready-mixed concrete, date on which specimen was broken, age of specimen, compressive strength of specimen, concrete slump test results and air content of concrete from which the specimen was made. One copy each of all tests shall be sent to the Contractor and two copies each to the Engineer.

2. Each strength test requires four standard test cylinders.

3. Samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, nor less than once for each 100 cubic yards of concrete, nor less than once for each 5,000 square feet of surface area for slabs or walls.

4. Each class of concrete shall be tested with at least five strength tests.

5. From each set of four cylinders, two shall be tested at 28 days and shall comprise a strength test under the definition of these Specifications. One cylinder shall be broken at seven days and will be used as an aid in determining the early strength of the concrete and the 28 day strength, and one cylinder retained in reserve for later testing if required.

6. Test for unit weight of concrete when the first load of each class of concrete is delivered and thereafter at the discretion of the testing laboratory.

B. Periodically inspect the batching plant and file a report with the Engineer stating whether the supplier's equipment and methods meet the requirements of these Specifications.

C. Temperature and Placing Record: Temperature record shall be made each day during the concreting operations. Records shall also include location, quantity and starting and finishing time of placement for all concrete work. Copy distribution shall be as specified above for test reports.

3.19 EVALUATION OF COMPRESSION TESTS

A. Evaluation of compression test results shall be as follows: For each class of concrete, compression-strength tests for laboratory-cured cylinders shall be considered satisfactory if the averages of the results of all sets of three consecutive compression-strength tests equal or exceed the 28 day design compression-strength specified; and, no individual cylinder strength test falls below the required compression strength by more than 500 psi. Strength tests of specimens cured under field conditions may be required by the Engineer to check the adequacy of curing and protecting of the concrete placed. Specimens shall be molded by the field testing laboratory at the same time and from the same samples as the laboratory-cured specimens.

B. Faulty Concrete: Failure to comply with any of the specified conditions shall constitute faulty concrete. Unless otherwise directed by the Engineer, faulty concrete shall be removed and replaced with concrete as specified, at no expense to the Owner.

C. Additional Test: If permitted by the Engineer, additional tests shall be subject to the approval of the Engineer and at no expense to the Owner. Load tests, if permitted by the Engineer, shall be conducted in accordance with the loading criteria as required by the design of the structure, as determined by the Engineer.

D. Neither the results of laboratory verification tests nor any provision in the Contract Documents shall relieve the Contractor of the obligation to furnish concrete of the class and strength specified.

END OF SECTION

SECTION NO. 03602

NONMETALLIC GROUTING

PART 1 - GENERAL

1.01 SCOPE

This Section describes nonmetallic grout and grouting methods to be used in the setting of motors, compressors, pumps, aerators, vessels, tanks, pipe supports, structures and other miscellaneous items of equipment that require grout between their baseplate, bedplate or soleplate and the top of the concrete surface to which they are to be anchored.

1.02 GENERAL

A. The Contractor shall furnish all labor, grouting materials, water, equipment, forms and other items necessary or convenient to the Contractor for the proper preparation, placement and curing of grout.

B. Nonshrink, epoxy and sand-cement grouts shall be stored, mixed, handled and placed in accordance with the recommendations of the grout manufacturer and the American Concrete Institute (ACI), as applicable.

C. No grout shall be placed until the place of grouting has been inspected and approved by the Engineer.

1.03 SUBMITTALS

A. Prior to placement of any non-shrink or epoxy grout, the Contractor shall submit to the Engineer complete engineering and product data on the grout, including manufacturer's recommendations for mixing, placement and curing.

B. The Contractor shall also submit to the Engineer written evidence that the grout, cement and aggregate is in conformance with the material and mechanical requirements specified herein. Certified copies of independent laboratory test results or mill test results from the grout, cement and/or aggregate supplier may be considered evidence of compliance provided such tests are performed in accordance with the appropriate ASTM or Corps of Engineers testing standards by experienced, competent personnel. In case of doubt as to the accuracy or adequacy of mill tests, the Engineer may require that the Contractor furnish test reports from an independent testing laboratory on samples of grout, cement and/or aggregate.

1.04 STORAGE

All grout shall be stored above ground and shall be protected at all times from moisture, high humidity, oil and extremes of temperature. Grout or cement which has been re-sacked or has become caked or lumpy shall not be used.

1.05 SAFETY

Proper precautions shall be taken to protect workers during handling of epoxy resins and hardeners. All mixing and placement of epoxy grouts shall be done in well-ventilated areas. The specific safety recommendations of the manufacturer shall be strictly adhered to.

PART 2 – PRODUCTS

2.01 NONSHRINK GROUT

Column baseplates, all pumps, compressors, motors and other heavy equipment items shall be grouted in place with a nonmetallic, non-corrosive, nongaseous, non-shrink grout requiring no cutback or protective coating. Non-shrink grout shall show zero shrinkage from the placement volume or initial expansion volume as determined by ASTM C 827, and shall have an initial set time at 70 degrees F of not less than 45 minutes as determined by ASTM C 191. When tested in accordance with ASTM C 109, non-shrink grout shall have a one-day compressive strength of not less than 2,000 psi and a 28-day compressive strength of not less than 9,000 psi at a flow of not less than 100 percent determined in accordance with Corps of Engineers Specification CRD-C-621. The grout shall contain no corrosive irons, calcium chloride, oxidizing catalysts, gas-forming agents, harmful aluminums or corrosive chemicals and shall be resistant to oil, water and sewage. The grout shall be premixed and shall require only the addition of water prior to placement. The grout shall be delivered to the job site in unopened, plastic-lined bags and shall have the manufacturer's mixing instructions printed on the back of each bag. Non-shrink grout shall be EUCO N-S Grout as manufactured by the Euclid Chemical Company, Masterflow 713 Grout as manufactured by Master Builders Company, or Upcon High Flow Grout as manufactured by UPCO Division of Emhart Chemical Company.

2.02 SAND-CEMENT GROUT

A. Column baseplates, pipe support baseplates, tanks and miscellaneous small items of equipment shall be grouted in place using a sand-cement grout consisting of one part Portland cement, two parts fine aggregate and a maximum of 4.5 gallons of water per sack (cubic foot) of cement. Portland cement shall be Type III conforming to ASTM C 150. Fine aggregate shall be natural siliceous sand, consisting of hard, clean, sharp, dense, durable and uncoated particles.

B. Fine aggregate shall be free from organic material and injurious amounts of deleterious substances and shall be graded as follows:

Sieve Size No.	**Percent (by weight) Passing**
4	100
8	95 - 100
16	60 - 100
30	35 - 70
50	15 - 35
100	2 - 15

C. Except as modified herein, fine aggregate shall conform to the requirements of ASTM C 144.

D. Fine aggregate to be used with epoxy binders shall be dried prior to use to remove any free moisture.

2.03 EPOXY GROUT

Epoxy grout shall be used in special equipment grouting applications requiring high bonding or tensile strength where shown on the Drawings or directed by the Engineer. Epoxy grout shall be made from a two-component, 100 percent solids, polyamide epoxy binder and fine aggregate conforming to the requirements specified herein for sand-cement grout. Epoxy grout shall consist of not less than one part nor more than two parts, by weight, fine aggregate to one part epoxy binder. When cured at a temperature of 73 degrees F, neat epoxy binder shall have a one day compressive strength of not less than 5,000 psi and a 28 day compressive strength of not less than 12,000 psi when tested in accordance with ASTM D 695, and shall have a 14 day tensile strength of not less than 3,000 psi when tested in accordance with ASTM D 638. Polyamide epoxy binders shall be Sika "Sikadur Hi-Mod", Adhesive Engineering "Concressive 1001 LPL or 1001 Regular".

2.04 WATER

Water used in the preparation of nonshrink and sand-cement grout shall be clean, potable water, free from oil, alkali, acid, organic matter and other deleterious substances.

PART 3 - EXECUTION

3.01 FOUNDATION PREPARATION

A. Prior to setting equipment or placing grout, the foundation to receive grout shall be chipped or sandblasted so as to expose the coarse aggregate and create a roughened condition. All surfaces to be in contact with the grout, including the bottom of the baseplates or sole plates, shall be thoroughly cleaned until free of all oil, grease, laitence, dust, curing compounds and other foreign substances If the surface is to receive nonshrink or sand-cement grout, the roughened surface shall be washed with liberal amounts of clean water and shall be soaked for a least 24 hours immediately preceding grouting. Prior to placement, all free water shall be removed using an air hose or other suitable method.

B. Surfaces to receive an epoxy grout shall be completely dry and free from all visible moisture. Where it is impractical to obtain a moisture-free surface, the Engineer may authorize the use of epoxy grout on damp surfaces provided the epoxy formulation is moisture-compatible. When applying grouts to damp surfaces all free water shall be removed and the epoxy formulation shall be carefully selected so that localized boiling of entrapped moisture due to excessive exotherm does not occur.

3.02 MIXING

A. The specific recommendations and instructions of the grout manufacturer shall be strictly adhered to in all proportioning, mixing and placing of grout. The grout shall be mixed as close to the point of use as is practical. A mechanical mortar mixer may be used for mixing large quantities of nonshrink or sand-cement grout. No more grout shall be mixed than can be placed in the time preceding initial set. Grout that has stiffened prior to placement shall be discarded. Only that amount of water required to produce the necessary degree of flowability shall be used. The grout mixture shall not be retempered by adding water.

B. Components of epoxy grout systems shall be accurately proportioned and thoroughly mixed so as to produce a uniform and homogeneous mixture. Accuracy of proportioning of epoxy compounds shall be $\pm$ five percent of the manufacturer's specified mixing ratio. Mixing of small quantities (up to one quart) of epoxy grout may be accomplished by hand using spatulas, palette knives, or similar devices. For larger volumes, mechanically driven tumbling or paddle type mixers shall be used. Paddle type mixers shall be driven by a low speed (400-600 rpm) motor to prevent introduction of excessive amounts of entrained air into the mixture. Mixing shall continue until the mixture is uniform and homogeneous, but in no case less than three minutes. The manufacturer's recommended temperature range for mixing the epoxy grout shall be followed in all field mixing.

C. After mixing, epoxy grout shall be allowed to stand for approximately five minutes to allow initial air release.

3.03 PLACEMENT

A. Grout shall be carefully placed by troweling, ramming, or pouring, as is most suited to the application, so that all voids and cavities between the foundation and equipment baseplate or bedplate are filled. Air-relief holes shall be provided, if necessary, to eliminate entrapped air. If a pourable or flowable grout is required, suitable forms shall be provided for containing the grout. Forms shall be securely anchored and caulked to prevent leakage of grout. Grout shall be placed from one side only. Forms shall be of sufficient height to allow at least 6-inches of head on the grout above the bottom of the baseplate on the side where the grout is to be placed. Grout shall be placed until it protrudes from the entire perimeter area. Baseplates shall be located so as to provide a minimum clearance of 1-inch between the foundation and the bottom of the baseplate. The temperature of the foundation and baseplate or soleplate shall be maintained above 45 degrees F during placement and for at least 24 hours thereafter. Heating of foundation and baseplate surfaces shall be accomplished using heated enclosures, heat lamps or radiant heaters so as to achieve uniform heating. Use of direct flame shall be prohibited. Concrete structures shall be heated a minimum of four hours prior to grouting to ensure proper heating of the concrete mass. Temperature of heated surfaces shall not exceed 100 degrees F at the time of placement. When placing nonshrink or sand-cement grout under unusually hot or cold weather conditions, grouting practices shall comply with the requirements of ACI 305 and 306, respectively.

B. Epoxy grout formulations shall possess exotherm properties compatible with the anticipated substrate and placement conditions. Where large masses of epoxy are involved or if ambient or substrate temperatures are high, relatively low exotherm formulations shall be used. Conversely, where very small quantities or thin films of epoxy are involved or if ambient or substrate temperatures are low, a high exotherm formulation shall be used.

C. When placing epoxy grouts by pouring, care shall be taken to ensure that segregation of aggregate and epoxy binder or entrapment of entrained air does not occur prior to initial set. To prevent this condition, epoxy grout shall be placed in successive lifts under the baseplate or bedplate not to exceed 1-inch in thickness.

3.04 FINISHING AND CURING

A. Forms shall be left in place until the grout is hardened enough so that it cannot flow. Unconfined edges of grout shall be cut off flush or beveled and shall be troweled to produce a smooth finish. Wedges and shims used in levelling rotating, vibrating or other heavy items of equipment shall be removed after the grout has hardened three days. All voids shall be regrouted using the same grouting material. Removal of shims and wedges from column baseplates and pipe support baseplates is optional. Anchor bolts shall not be pulled up to final torques until shims and wedges have been removed and the grout is hard enough to permit equipment operation.

B. After placement, exposed edges of water-cured grout shall be wet cured by covering with wet burlap, wet sand, or polyethylene film for at least seven days. During cold weather grout shall be maintained at a temperature for a period of time following placement that will ensure proper hardening and curing.

END OF SECTION

VORTEX GRIT REMOVAL EQUIPMENT

TEMPLE, GEORGIA

PART 1 - GENERAL

1.01 SUMMARY

A. The CONTRACTOR shall furnish, install and place into satisfactory operating condition grit collection equipment, a new Control Panel that includes the screen drive and appurtenances as shown on the drawings and described in the specifications. Note: Existing Grit Pump is a 5-hp. Additionally the proposed Grit equipment will have larger horsepower: Grit Classifier = 1hp, Grit Pump = 5-7.5 hp, Grit Removal = 1hp. The existing control panel is 460v 3 phase 20A service.

B. It is the intent of these Specifications that all equipment called for under this Section shall be supplied by a single manufacturer. (It is assumed equipment and control panel will be different manufactors.)

1.02 REFERENCES

A. American Institute of Steel Construction (AISC)

B. American Society of Testing and Materials (ASTM)

C. American Society of Civil Engineers (ASCE)

D. American Welding Society (AWS)

E. Steel Structures Painting Council (SSPC)

1.03 SYSTEM DESCRIPTION

A. The grit collection equipment shall be of the “vortex” type, complete with drive unit, air bell, drive tube, paddle assembly, self-priming grit pump, cyclone separator, grit classifier, and necessary anchorage.

B. Systems for this project, other than a “vortex” type grit collection system will not be considered.

C. General Design Summary:

1. Number of Grit Systems ..... - 1
2. Maximum Grit Chamber Hydraulic Capacity, mgd ..... - 7.0

3. Average Design Flow, mgd ..... -
4. Peak Design Flow, mgd ..... -

D. Grit Chamber Design Summary:

1. Grit Chamber Inside Diameter, feet ..... - 10.0
2. Grit Hopper Inside Diameter, feet ..... - 3.0
3. Grit Chamber Drive Motor Size, hp ..... - 1.0
4. Grit Chamber Maximum Operating Speed, rev/min ..... - 14
5. Drive Tube Nominal Diameter, inches ..... - 10

E. Grit Cyclone Design Summary:

1. Maximum Capacity, gal/min ..... - 250
2. Inlet Diameter, inches ..... - 4
3. Outlet Diameter, inches ..... - 6
4. Vortex Finder, inches ..... - 4

F. Grit Classifier Design Summary:

1. Maximum Underflow from Cyclone, gal/min ..... - 60
2. Maximum Grit Conveying Capacity, cu ft/hr ..... - 30
3. Grit Classifier Motor Size, hp ..... - 1.0

G. Self-Priming Grit Pump Design Summary:

1. Maximum Capacity, gal/min ..... - 250
2. Total Dynamic Head, feet ..... -
3. Discharge Diameter, inches ..... - 4
4. Grit Pump Motor Size, hp ..... - 7.5
5. Area Classification ..... - Non-hazardous

1.04 SUBMITTALS

A. Unless named in the specifications, all equipment manufacturers who intend to bid on the equipment shall submit to the ENGINEER not less than fourteen (14) days prior to the bid date a complete pre-qualification package. The pre-qualification package shall include but not be limited to the following:

1. The equipment manufacturer shall have a minimum of Ten (10) years experience in the manufacture of Grit Collection Systems.

2. A complete set of drawings, specifications, catalog cut-sheets, and detailed descriptive material. This information shall identify all technical and performance requirements stipulated on the drawings and in the specification.

3. Detailed information shall be submitted for all items such as hardware, motors, reducers, motor controllers and instrumentation (field devices, major control panel devices, and anticipated control panel layout).

4. List showing materials of construction of all components.

5. Manufacturer's recommended spare parts.

6. Information on equipment field erection requirements including total weight of assembled components and weight of each sub-assembly.

7. A maintenance schedule showing the required maintenance, frequency of maintenance, lubricants and other items required at each regular preventative maintenance period, including all buy-out items.

8. Complete list of deviations from the drawings and specifications.

B. Refer to **Section 01340** for shop drawing submittal requirements.

1.05 PERFORMANCE

A. The grit removal system shall be engineered to meet the following requirements at the peak design flow noted in paragraph 1.03.C.4:

1. Remove 95% of grit greater than 50 mesh in size.

2. Remove 85% of grit greater than 70 mesh in size.

3. Remove 65% of grit greater than 100 mesh in size.

The efficiency level relates to grit having a specific gravity of 2.65 and to the difference in grit content in the influent channel as compared to that of the effluent in the effluent channel.

B. The grit classifier shall be designed to receive underflow from the cyclone separator up to a maximum flow rate as noted in paragraph 1.03.F.1 and to convey a maximum grit capacity as noted in paragraph 1.03.F.2.

1.06 QUALITY ASSURANCE

A. In order to assure uniform quality, ease of maintenance and minimal parts storage, it is the intent of these Specifications that all equipment called for under this Section shall be supplied by a single manufacturer. The equipment manufacturer shall, in addition to the CONTRACTOR, assume responsibility for proper installation and function of the equipment.

B. Naming a manufacturer in paragraph 2.01.A does not relieve them from complying with the performance and salient features of the Contract Documents. The Contract Documents represent the minimum acceptable standards for the grit removal equipment for this project. All equipment shall conform fully in every respect to the requirements of the respective parts and sections of the drawings and specifications. Equipment which is a "standard product" with the manufacturer shall be modified, redesigned from the standard mode, and shall be furnished with special features, accessories, materials of construction or finishes as may be necessary to conform to the quality mandated by the technical and performance requirements of the specification.

PART 2 – PRODUCTS

2.01 MANUFACTURER

A. The grit collection system shall include all necessary equipment and appurtenances as manufactured by Lakeside Equipment Corporation, Huber, Hydrodyne Engineering or Approved Equal.

2.02 GRIT CHAMBER

A. Drive Unit

1. The grit removal drive mechanism shall consist of an electrical motor, a helical reduction unit, and an enclosed final reduction unit consisting of one pinion and an integral gear/bearing. All components are directly coupled, eliminating the use of chains and V-belts. The drive mechanism shall not be overloaded under normal operating conditions and shall be designed for heavy duty 24 hour per day service.

2. The external tooth gear shall be an external gear/bearing unit such as manufactured by Rotek, Inc., Kaydon, Inc., or equal. The gear teeth shall be AGMA grade 6 or higher. The gear teeth

shall have a core hardness of 250 to 300 BHN, and shall be induction hardened to a surface hardness of 52 to 60 Rc. The bearing raceway shall be hardened to 58 to 60 Rc, precision ground and have a minimum 20.5-inch ball path diameter. The main bearing shall be oil bath lubricated and have a B10 life in excess of 100 years. The main bearing shall have a seal to prevent contamination of the bearing raceway.

3. The final reduction pinion shall be made of heat-treated alloy steel and shall be mounted on the output shaft of the reduction gearbox. The gear teeth shall have a core hardness of 300-350 BHN, and shall be induction hardened to a surface hardness of 52 to 60 Rc.

4. The final reduction pinion and main gear shall have a service factor of 5.0, or greater, at the operating speed as noted in paragraph 1.03.D.4.

5. The helical reduction unit shall drive the pinion of the final reduction unit. The helical reduction unit shall have a minimum service factor of 2.0. The helical reduction unit bearings shall have an average B10 life in excess of 100,000 hours.

6. The helical reduction unit shall be driven by a C-flanged, 1,800 rev/min, 3 phase, 60 Hertz, 230/460 volt, ball bearing, continuous-duty, totally-enclosed, fan-cooled motor with leads to a large conduit box for outdoor operation. Motor size shall be as noted in paragraph 1.03.D.3.

7. The fabricated and machined steel final reduction unit housing shall be manufactured of A36 steel plate. All welds shall conform to applicable specifications of the American Welding Society (AWS). After welding, all mounting and mating surfaces shall be machined to insure proper fit and alignment of the drive pinion and mating gear.

8. The base plate on which the gear/bearing is mounted shall be a minimum of 1.125-inches thick. The surface on which the gear/bearing is mounted shall be flat within 0.005-inches. The steel plate to which the helical reduction unit is mounted shall be a minimum of 0.875-inches thick.

9. The final reduction unit housing shall be designed to prevent water from entering the housing in case of flooding by means of an air bell.

B. Drive Tube

1. The drive tube, which is driven by the main gear, shall have a nominal diameter as noted in paragraph 1.03.D.5. The drive tube shall be fabricated of steel pipe with a minimum thickness of ¼-inches.

C. Paddle Assembly

1. The paddle assembly shall consist of four (4) fixed blades that are affixed to the drive tube by means of a two (2)-piece collar. The collar shall allow adjustment of the blade assembly in either an upward or downward position to ensure maximum grit removal. Each of the paddle blades shall be tapered with an ample rounded leading edge and a fixed pitch of 45^{o}. The paddle assembly shall be of steel construction.

D. Floor Plate

1. To minimize the possibility of organic capture, the grit collector shall have a ½-inch thick steel floor plate in the grit chamber. The floor plate shall consist of two (2) removable sections to allow access to the grit storage hopper.

E. Inlet Baffle

1. A ¼-inch thick steel baffle shall be furnished at the inlet channel to optimize the chamber's hydraulic conditions.

F. Grit Fluidizing System

1. A water supply line for the purpose of fluidizing settled grit shall be furnished at the bottom of the grit storage hopper. The water supply line shall include a 1.5-inch diameter manual stainless steel ball valve for flow adjustment and a 1.5-inch diameter solenoid valve to control the intermittent operation of the grit fluidization.

2. Solenoid valve shall be brass body suitable for 120 VAC operation, normally closed, and rated for up to 100 psig. The Solenoid valve shall be slow close type to minimize water hammer.

2.03 SELF-PRIMING GRIT PUMP

A. The grit pump shall be a Gorman-Rupp Company Super Series T Model T4A71S-B/F, or equal, self-priming pump. The pump shall be a 4-in. by 4-in. design and shall be capable of pumping a grit slurry flow rate as noted in paragraph 1.03.G.1. at a total dynamic head as noted in paragraph 1.03.G.2.

B. The pump casing shall be Gray Iron No. 30 with a maximum operating pressure of 86 psig. The impeller shall be a two-vane design to handle a 3-in. maximum sphere size and shall be fabricated of G-R Hard Iron material for superior abrasion resistance. The impeller shaft shall be 4150 alloy steel. The pump shall be provided with a replaceable wear plate of hardened alloy steel for superior abrasion resistance. A removable cover plate shall be provided of Gray Iron No. 30.

C. The suction side of the pump shall be provided with a flap valve fabricated of steel reinforced neoprene.

D. The bearing housing shall be fabricated of Gray Iron No. 30. The seal plate shall be G-R Hard Iron material for superior abrasion resistance. The shaft sleeve shall be 4130 alloy steel. The radial bearing shall be an open single ball bearing design. The thrust bearing shall be an open double ball bearing design. The bearing and seal cavity shall be oil lubricated by SAE No. 30 non-detergent oil. The bearing and seal cavity shall be provided with oil level sight gauges.

E. The pump suction and discharge connections shall be 125 lb flanges fabricated of Gray Iron No. 30. Gaskets shall be Buna-N, synthetic fibers, vegetable fibers, PTFE, cork and rubber. O-rings shall be Buna-N.

F. Mounting hardware shall be standard plated steel. A brass pressure relieve valve shall be provided.

G. The pump seal shall be cartridge type, mechanical, oil-lubricated, double floating, self-aligning complete with tungsten carbide rotating and stationary faces, AISI Type 316 stainless steel seat, Viton fluorocarbon elastomers and 18-8 stainless steel cage and spring.

H. Motor size shall be as noted in paragraph 1.03.G.4., and shall be rated for an environment as noted in paragraph 1.03.G.5.

I. Power transmission from the motor to the pump shall be by means of a set of V-belts and sheaves. Belts and sheaves shall be designed with a minimum 1.5-service factor based on motor horsepower. Sheaves shall be two section units for both drive and driven sheaves and shall consist of a tapered split shaft bushing with three tapped holes to which the sheave is attached by three cap screws. Changing sheaves shall not require a wheel puller. Belts and sheaves shall be covered with a fabricated steel belt guard.

J. Pump and motor shall be provided on a fabricated steel base with an adjustable motor base for belt tension.

2.04 CYCLONE

A. Each cyclone shall consist of a heavy-duty fabricated steel volute feed chamber with cylindrical and conical sections. Each section of the cyclone shall be completely lined and protected from the high velocity grit by a replaceable neoprene liner. The cyclone shall be constructed so any section liner can be replaced independently. The inlet and overflow connections shall be of 150 lb. ANSI FF steel flanges.

B. The cyclone vortex finder shall be made of an abrasion-resistant alloy with an approximate hardness of 500 Brinell. A hinge and quick disconnect clamp shall be provided between the apex assembly and lower cone section to allow removal of material which may clog the apex, without disconnecting any piping on the cyclone itself. The apex shall consist of a steel or aluminum housing with a replaceable manually adjustable neoprene liner. Each cyclone inlet shall be tapped for a 1.25" NPT gauge connection and shall be furnished with a diaphragm-protected pressure gauge.

C. The cyclone underflow shall feed into the classifier for washing and dewatering, and will be sized so that the proper hydraulic loading is provided to the classifier.

D. The cyclone overflow piping shall be furnished by the contractor, which must be adequately vented to prevent siphoning.

2.05 GRIT CLASSIFIER

A. Each classifier shall be designed to handle a maximum underflow from the grit cyclone as noted in paragraph 1.03.F.1. The grit classifier shall comprise a complete steel assembly including drive, helicoid screw conveyor, fabricated trough with supports and necessary anchorage parts.

B. Grit from the grit cyclone shall be discharged into the dewatering section of the trough and removed by the helical screw conveyor oriented at the angle of 16 degrees. The grit screw conveyor shall be capable of handling a maximum quantity of grit as noted in paragraph 1.03.F.2. The screw conveyor shall be 12-inch minimum diameter fabricated with steel flights welded to a rotating 3-inch diameter Schedule 40 steel pipe torque tube. The sectional flights shall be a ½ pitch design fabricated of ¼inch minimum thickness with either a field renewable ½-inch wide Lincore 60G hardened continuous weld on leading face of the screw flights or shall be provided with field replaceable Nihard wear shoes. The drive end of the conveyor screw shall consist of 3-inch minimum diameter steel stub shaft that is shrink-fit and welded to the upper end of the screw conveyor torque tube. The lower end of the screw shall have a 3-inch minimum diameter steel shaft shrink-fit and welded to the lower end of the screw conveyor torque tube. Bolting the upper and lower stub shafts to the screw conveyor torque tube will not be acceptable for this project. The lower end of the grit dewatering screw shall be supported with a sealed, self-lubricated polymeric composite sleeve bearing with a stainless steel wear sleeve. The removable bearing housing, which is greased packed, shall be mounted to the outside of the classifier tank via a bolted connection for ease of field replacement.

C. The grit conveyor screw shall operate in a washing-classifying trough fabricated with ¼-inch steel minimum plate, fitted with a grit inlet and discharge connection. Cyclone inlet housing to the classifier shall be fabricated of 12 gauge steel sheet. The grit discharge chute shall be fabricated of Schedule 10 steel pipe. The grit classifier tank shall be provided with a 4-inch diameter plain end Schedule 40 steel overflow pipe stub. A 2-inch diameter Schedule 40 steel NPT half coupling with pipe plug shall be provided to drain the tank. The supports for the grit cyclone and grit classifier tank shall be fabricated of structural steel sections with a ¼-inch minimum thickness. The grit classifier shall be provided with an 11 gauge minimum thick steel split cover. The cover shall be provided with both a section that is bolted to the classifier tank and a hinged cover section complete with stainless steel butt hinges and stainless steel lifting handle to open up the hinged cover section. A neoprene gasket shall be glued to the upper classifier tank lip to prevent leakage between the classifier tank and the cover.

D. Grit laden wastewater piping from the grit pump to the grit classifier and wash water return piping from the grit classifier shall be provided by the CONTRACTOR.

E. The grit classifier screw conveyor shall be driven by a direct-connected cycloidal-helical hollow-shaft high-thrust in-line speed reducer design for a maximum output speed of 12 rev/min. The cyclo element of the speed reducer shall be designed to take a 500 percent shock load without damage. The speed reducer manufacturer shall be a member of AGMA. Combination gear motor designs will not be acceptable for this project.

F. The speed reducer shall be bolted to the drive adaptor flange at upper end of the grit classifier tank. The reducer shall utilize a taper grip bushing to connect to the drive shaft of the screw conveyor. The use of keys and keyways will not be an acceptable connection method for this project.

G. The speed reducer shall be driven by a field replaceable NEMA C-flanged, 1,800 rev/min, ball bearing, continuous-duty, totally enclosed, fan-cooled motor with leads to a large conduit box for outdoor operation.

H. Motor size shall be as noted in paragraph 1.03.F.3.

2.06 CONTROL SYSTEM

A. All controls necessary for the fully automatic operation of the screen and grit removal system shall be provided and shall be compliant with NEMA.

B. The electrical control system shall provide for automatic control of the screen via a high liquid level using a liquid level control system in connection with an adjustable time clock. The screen shall operate at a high liquid level or a pre-determined time sequence to provide a variable time between cleaning operations.

C. The float switches shall be a hermetically sealed, axially non-position sensitive type, mercury-switch activated and enclosed in a polypropylene housing. The switches shall operate over a narrow switching angle and have a minimum rating of 1 amp at 120 volts. A 20 ft PVC jacketed power cable, weight, grip cord, and stainless steel mounting bracket shall be furnished as part of the switch assembly. The level switching circuit shall be rated intrinsically safe by inclusion of a UL approved switch isolator with relay output. The switch isolator shall be rated for 120-volt service with output contacts rated for 2 amps minimum. A second high-level float switch shall be included for alarm indication.

D. A timer in the PLC shall be used to control the self-priming vortex grit pump and grit cyclone-classifier, and the grit fluidizing solenoid valve.

E. The local-mounted main control panel shall include the following items:

1. Door interlocked fused disconnect
2. Allen-Bradley MicroLogix 1100 Programmable Logic Controllers (PLC's); one for the screen and one for the grit system
3. NEMA reversing starter for the screen
4. NEMA starter for the grit paddle drive
5. NEMA starter for the self-priming vortex grit pump
6. NEMA starter for the grit classifier
7. Control power transformer fused primary and secondary with 120VAC transient voltage surge suppressor (TVSS)
8. Full voltage LED pilot lights for the following:
    a. Control power on (White)
    b. Screen run (Green)
    c. Grit paddle drive run (Green)
    d. Self-priming vortex git pump run (Green)

e. Grit Classifier run (Green)

f. Multifunctional overload shutdown/screen/paddle drive/pump/classifier fault pilot light (Red)

g. High screen upstream channel level pilot light (Amber)

9. E-stop push button (Red)
10. Cycle start / Re-set push button (Black) l l . Hand-Off-Auto selector switches for the following:
    a. Screen drive
    b. Screen common wash system solenoid valves
    c. Grit lower hopper fluidizing system solenoid valve
    d. Self-priming vortex grit pump
    e. Grit classifier
    f. Grit classifier spray wash solenoid valve
12. On-Off selector switch for the following:
    a. Grit paddle drive
13. Forward-Off-Reverse selector switch (spring return to center) for the following:
    a. Screen drive
14. Door-mounted elapsed time meters for the following:
    a. Screen
    b. Grit paddle drive
    c. Self-priming vortex grit pump
    d. Grit Classifier
15. Remote dry contact outputs for the following:
    a. Screen running
    b. Grit paddle drive
    c. Self-priming vortex grit pump running
    d. Grit Classifier running
    e. Common malfunction alarm
    f. High screen upstream channel alarm
16. Weather protection system heat tracing circuit breaker
17. Plant water heat fracing (250 WATTS MAX BY CONTRACTOR) circuit breaker
18. Set spare fuses
19. White phenolic nameplates with black lettering
20. 600 VAC terminal block
21. U.L. 508 label
22. Electrical enclosure shall be NEMA 4X stainless steel.

A.

2.07 ANCHOR BOLTS

A. Equipment manufacturer shall furnish all anchor bolts of ample size and strength required to securely anchor each item of equipment. Anchor bolts, hex nuts, and washers shall be AISI Type 304 stainless

steel unless noted otherwise. Anchor bolts shall be J-type embedded. Expansion type anchors will not be acceptable.

B. Anchor bolts shall be set by the CONTRACTOR. Equipment shall be placed on the foundations, leveled, shimmed, bolted down, and grouted with a non-shrinking grout.

2.08 SHOP SURFACE PREPARATION AND PAINTING

A. All fabricated carbon steel or cast iron components for submerged service shall be near-white blast cleaned per SSPC-SP10 and given a 2.5 to 3.5 mil dry film thickness coat of Tnemec Series 1 Omnithane Primer.

B. All fabricated carbon steel or cast iron components for non-submerged service shall be commercial blast cleaned per SSPC-SP6 and given a 2.5 to 3.5 mil dry film thickness coat of Tnemec Series 1 Omnithane Primer.

C. Electric motors, speed reducers, drive units, and other self-contained or enclosed components shall be supplied with the manufacturer's standard finish coating.

D. Apply rust preventative compound to all machined, polished, and nonferrous surfaces that are not to be painted.

2.09 SOURCE QUALITY CONTROL

A. All structural steel components shall be fabricated in the United States and shall conform to the requirements of the "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" published by the American Institute of Steel Construction.

B. Except where specifically indicated otherwise, all plates and structural members shall have a minimum thickness of ¼-inch.

C. The equipment manufacture’s shop welds and welding procedures shall be in accordance with the requirements of the latest edition of ANSI/AWS D1.1 “Structural Welding Code – Steel” published by the American Welding Society.

D. Bolts, nuts and washers shall be AISI 304 stainless steel furnished in accordance with ASTM A193.

E. The fabrication facility shall successfully meet the quality certification requirements of the AISC Quality Certification Program with a Category I or higher. The AISC Quality Certification Program will confirm that the AISC certified shop has the personnel, organization, experience, procedures, knowledge, equipment, capability and commitment to produce fabricated steel or stainless steel of the required quality for the wastewater treatment equipment.

2.10 ORIGINAL WWTP CONSTRUCTION DRAWINGS

Structural

- S-01 - Structural Notes, Legend and Abbreviations
- S-02 – Headworks Foundation Plan
- S-03 – Headworks Intermediate Level Plan

Mechanical

- M-01–Mechanical Legend
- M-02- Mechanical Site Layout
- M-07- Headworks Mechanical Layout

Electrical

- E-01 – Electrical Legend, Symbols and General Notes
- E-02 – Partial Power Plans – Headworks and SBR Tanks

Instrumentation

- I-01 – Instrumentation Legend, Symbols and Abbreviations
- I-02 – Process and Instrument Diagram – Influent Treatment Unit
- I-07 – PLC/SCADA System Network Topology
- Pictures (4) of existing Control Panel

PART 3 – EXECUTION

3.01 FIELD PREPARATION AND PAINTING

A. Finish field preparation and painting shall be performed as specified in Section_____.

B. The CONTRACTOR shall touch-up all shipping damage to the paint as soon as the equipment arrives on the job site.

C. The CONTRACTOR shall supply paint for field touch-up and field painting.

D. Prior to assembly all stainless steel bolts and nut threads shall be coated with a non-seizing compound by the CONTRACTOR.

3.02 INSTALLATION

A. The manufacturer shall schedule at a minimum one (1) trip to the project site for equipment start-up assistance and inspection of installed equipment for proper operation as noted in paragraph 3.02.B.,but manufacture shall provide services in accordance with sections 01645, 01655 and 01730.

B. After the CONTRACTOR has installed the grit removal system and the unit is capable of being operated, the equipment manufacturer shall furnish a qualified representative in accordance with sections 01645, 01655 and 01730.

B. After the equipment has been placed into operation, the manufacturer's representative shall make all final adjustments for proper operation.

3.03 OPERATOR TRAINING

A. Provide operator training for OWNER'S personnel after the system is operational. Training shall take place while manufacturer's representative is at the job site for equipment inspection.

END SECTION 11321

STRUCTURAL NOTES

GENERAL

1. THE CONTRACTOR AND ALL SUBCONTRACTORS SHALL VERIFY ALL DIMENSIONS AND CONDITIONS AT THE SITE.
2. ALL DETAILS MARKED "TYPICAL" OR (TYP) SHALL BE USED WHEREVER APPLICABLE, UNLESS OTHERWISE INDICATED ON PLANS.
3. ALL WORKMANSHIP AND MATERIALS SHALL CONFORM TO THE STANDARD BUILDING CODE, LATEST EDITION AND BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318 AND ACI 350), LATEST EDITION, AS A MINIMUM REQUIREMENT.
4. THE CONTRACTOR SHALL PROVIDE SAFE AND ADEQUATE BRACES, CONNECTIONS, SHORING OR OTHER DEVICES AS REQUIRED TO SUPPORT THE COMPONENT PARTS OF THE STRUCTURE AND ADJACENT FOUNDATION MATERIAL UNTIL THE WORK IS SUFFICIENTLY COMPLETE SO THAT THE STRUCTURES ARE SELF-SUPPORTING AND CAPABLE OF SUPPORTING ADJACENT FOUNDATION MATERIAL. CONTRACTOR TO CONFORM WITH OSHA SAFETY & HEALTH STANDARDS, LATEST EDITION.
5. THE CONTRACTOR SHALL VERIFY THE LOCATION AND DIMENSION OF ALL SLEEVES, PIPES, OPENINGS AND EMBEDDED OR ATTACHED ITEMS SHOWN ON THE CIVIL, ELECTRICAL, INSTRUMENTATION, AND MECHANICAL DRAWINGS.

FOUNDATIONS

1. FOR FOUNDATION RECOMMENDATION, REFER TO REPORT OF FOUNDATION RECOMMENDATIONS , PREPARED BY LAW ENGINEERING & ENVIRONMENTAL SERVICES, PROJECT No. 50123-2-0249, DATED SEPTEMBER, 2002.
2. MAXIMUM ALLOWABLE NET SOIL BEARING PRESSURE = 3,000 PSF.
3. ALL MAT FOUNDATION AREA SHALL BE PROVIDED WITH MINIMUM 3" THICK #57 CRUSHED STONE OR 3" MUD MAT.

WATERSTOPS AND CONSTRUCTION JOINTS

1. CONSTRUCTION JOINTS, WHERE INDICATED ON THE PLANS, SHALL EXTEND THROUGH HORIZONTAL AND VERTICAL CONCRETE SURFACES TO THE EXTENT OF THE CONSTRUCTION JOINT LINE SHOWN ON THE DRAWINGS.
2. WHERE WATERSTOPS ARE SHOWN IN THE STRUCTURAL SECTIONS, IT IS THE INTENT THAT THE WATERSTOPS BE CONTINUOUS AND FOLLOW THE LINE OF THE CONSTRUCTION JOINT WHERE IT MAY BE OFFSET, DEPRESSED OR SLOPED UNTIL SUCH POINT IS REACHED THAT IT MAY BE SPLICED WITH ANOTHER WATERSTOP OR WATERSTOPS AT INTERSECTING CONSTRUCTION JOINTS SO AS TO COMPLETELY SEAL THE PORTIONS OF STRUCTURE UNDER CONSIDERATION.
3. ALL WATERSTOPS AND CONSTRUCTION JOINTS SHOWN ARE REQUIRED. ADDITIONAL WATERSTOPS MAY BE REQUIRED TO COMPLETELY SEAL THE STRUCTURE PER ITEM (2) ABOVE.
4. WATERSTOP SPLICES SHALL BE IN ACCORDANCE WITH THE METHODS PRESCRIBED BY THE WATERSTOP MANUFACTURER.
5. WATERSTOPS SHALL BE 6" PVC WATERSTOP WITH CENTER BULB AT CONSTRUCTION JOINTS AND 9" PVC WATERSTOP WITH WITH CENTER BULB AT EXPANSION JOINTS AS MANUFACTURED BY GREENSTREAK OR EQUAL. SUBMIT PRODUCT DATA FOR ENGINEER'S REVIEW AND APPROVAL.

CONCRETE

1. ALL CONCRETE SHALL ATTAIN THE FOLLOWING 28-DAY ULTIMATE COMPRESSIVE STRENGTHS:
   A. CLASS A – 4,000 PSI; TO BE USED EXCEPT AS NOTED ON THE DRAWINGS.
2. CEMENT SHALL BE PORTLAND CEMENT, TYPE II CONFORMING TO ASTM C-150. CEMENT NEED NOT BE TESTED IF MILL TEST REPORTS ARE AVAILABLE.
3. ALL FINE AND COARSE AGGREGATES SHALL BE NON-REACTIVE (SEE SPECIFICATIONS), AND SHALL CONFORM TO ASTM C-33.
4. MAXIMUM AGGREGATE SIZE SHALL BE 3/4" FOR SECTIONS 5" THICK AND THINNER, 1" FOR SECTIONS 6" TO 12" THICK, AND 1 1/2" FOR SECTIONS THICKER THAN 12".
5. ADMIXTURE MAY BE ADDED AT CONTRACTOR'S OPTION PROVIDED IT COMPLIES WITH THE SPECIFICATIONS. SUBMIT PROPOSED ADMIXTURE AND QUANTITIES TO BE USED FOR ENGINEER'S REVIEW.
6. ALL REINFORCING STEEL , DOWELS, ANCHOR BOLTS, AND OTHER INSERTS SHALL BE SECURELY TIED IN PLACE PRIOR TO PLACING CONCRETE.
7. ALL WATER SHALL BE REMOVED FROM FOUNDATION EXCAVATIONS AND THE EXCAVATIONS SHALL BE COMPLETELY DRY BEFORE PLACING CONCRETE.
8. PROVIDE 3/4" CHAMFER ON ALL EXPOSED EDGES OF POURED CONCRETE UNLESS NOTED OTHERWISE.
9. THE CONTRACTOR SHALL SUBMIT DRAWINGS SHOWING LOCATIONS AND TYPES OF CONSTRUCTION JOINTS AND POURING SEQUENCES FOR APPROVAL. SUBMIT ALL CONCRETE CYLINDER TEST RESULTS FOR ENGINEER'S REVIEW.
10. THE CONTRACTOR SHALL SUBMIT CONCRETE MIX DESIGN FOR ENGINEER'S REVIEW.

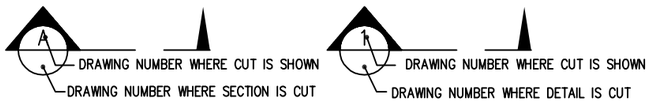
REINFORCING STEEL

1. ALL REINFORCING STEEL SHALL BE NEW BILLET STEEL DEFORMED BARS AND SHALL CONFORM TO ASTM A-615, GRADE 60. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A-185.
2. ALL BARS SHALL BE FREE FROM BENDS, KINKS AND OTHER IRREGULARITIES (EXCEPT AS DETAILED ON THE PLANS) AND SHALL BE FREE FROM ANY MATERIAL WHICH WOULD TEND TO REDUCE THE BOND.
3. ALL REINFORCING, EXCEPT FOR SLABS ON GRADE AND FOOTINGS, SHALL BE SUPPORTED OR SPACED WITH METAL CHAIRS. ALUMINUM CHAIRS WILL NOT BE ALLOWED. REINFORCING FOR SLABS ON GRADE AND FOOTINGS SHALL BE SUPPORTED ON CONCRETE CUBES. CUBES SHALL BE OF SAME GRADE AS CONCRETE BEING POURED.
4. ALL SPLICES IN REINFORCEMENT SHALL BE AS DETAILED ON PLANS. ALTERNATE METHODS OF SPLICING WILL BE REVIEWED BY THE STRUCTURAL ENGINEER ON REQUEST.
5. ALL REINFORCING, INCLUDING MESH, SHALL BE SECURELY TIED IN PLACE PRIOR TO PLACING CONCRETE.
6. THE MINIMUM CLEAR COVER OVER REINFORCING SHALL BE AS FOLLOWS:
   A. CONCRETE CAST AGAINST EARTH ---------- 3"
   B. FORMED CONCRETE AGAINST EARTH OR WATER ---------- 2"
   C. CONCRETE SLABS & WALLS NOT EXPOSED TO WEATHER ----- 3/4"
7. WELDING OF REINFORCEMENT MUST BE APPROVED BY THE ENGINEER PRIOR TO WELDING AND SHALL BE DONE WITH LOW-HYDROGEN ELECTRODES.

DESIGN LOADS

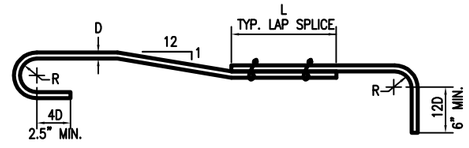
1. BUILDING:
   LIVE LOAD ON FRAMES: 12 PSF
   LIVE LOAD ON ROOF: 20 PSF
   WIND EXPOSURE CATEGORY C
   WIND LOAD: 90MPH
   IMPORTANCE FACTOR: 1.0
   DEAD LOAD: 4.5 PSF
   FLOOR LIVE LOAD = 250 PSF
   CONCENTRATED FLOOR LIVE LOAD = 3,000 POUNDS (5 PLACES)
   (BLOWER/THRUST/IMPACT)
2. PLATFORM AND CATWALK LIVE LOAD = 100 PSF
3. WIND LOAD: 100 MPH, STANDARD EXPOSURE
4. SEISMIC:
   PEAK VELOCITY RELATED ACCELERATION, AV = 0.10
   PEAK ACCELERATION, AA = 0.10
   SEISMIC HAZARD EXPOSURE GROUP = III
   SEISMIC PERFORMANCE CATEGORY = C
   SOIL PROFILE TYPE = S4
   BASIC STRUCTURAL SYSTEM AND SEISMIC RESISTING SYSTEM:
   a. BEARING WALL SYSTEM
      RESPONSE MODIFICATION FACTOR, R = 4 1/2
      DEFLECTION AMPLIFICATION FACTOR, CD = 4

LEGEND



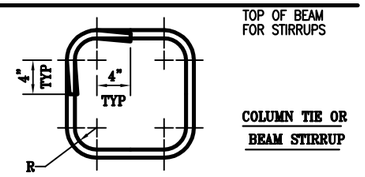
SECTION

DETAIL



HOOK OFFSET TYP. LAP SPLICE BEND

R: 3D FOR #7 & SMALLER
4D FOR #8 & #9
5D FOR #10 & LARGER



TYPICAL REINFORCING BAR DETAILS (1 / S-1)
SCALE: NONE

ABBREVIATIONS

CONST. JT.	CONSTRUCTION JOINT
E.F.	EACH FACE
EL.	ELEVATION
N.I.C.	NOT IN CONTRACT
O.C.	ON CENTER
PVC	POLYVINYL CHLORIDE
REINF.	REINFORCING BARS
T&B	TOP & BOTTOM
W.S.	WATERSTOP

LAP SPLICE **
BASED ON CLASS "B"-fy=60 KSI

BAR	3,000 PSI CONCRETE		4,000 PSI CONCRETE	
	BASIC L	TOP BAR L *	BASIC L	TOP BAR L *
#3	1'-3"	1'-9"	1'-3"	1'-9"
#4	1'-10"	2'-4"	1'-8"	2'-0"
#5	2'-3"	3'-0"	2'-0"	2'-6"
#6	2'-9"	3'-6"	2'-4"	3'-0"
#7	3'-2"	4'-1"	2'-9"	3'-6"
#8	3'-7"	4'-8"	3'-2"	4'-0"
#9	4'-0"	5'-3"	3'-6"	4'-8"
#10	6'-3"	4'-10"	4'-3"	5'-3"
#11	8'-0"	6'-0"	5'-2"	6'-8"

* HORIZONTAL BARS WITH 12" OR MORE OF CONCRETE BELOW.
** REFERENCE: CONCRETE REINFORCING STEEL INSTITUTE, CHAPTER 5, STRENGTH DESIGN OF FLEXURAL MEMBERS AND REBAR DEVELOPMENT AND SPLICE DATA.

TYPICAL LAP SPLICE (2 / S-1)
SCALE: NONE

Rev	Date	Description	By
1	x	RECORD DRAWINGS	RCL
0	4/16/04	ISSUE FOR CONSTRUCTION	RCL

Job No. 743061
Designed MML
Drawn SM
Checked MML
Reviewed FRT
Approved DSF
Reg. No.
Date 2/20/04

Issue Certification

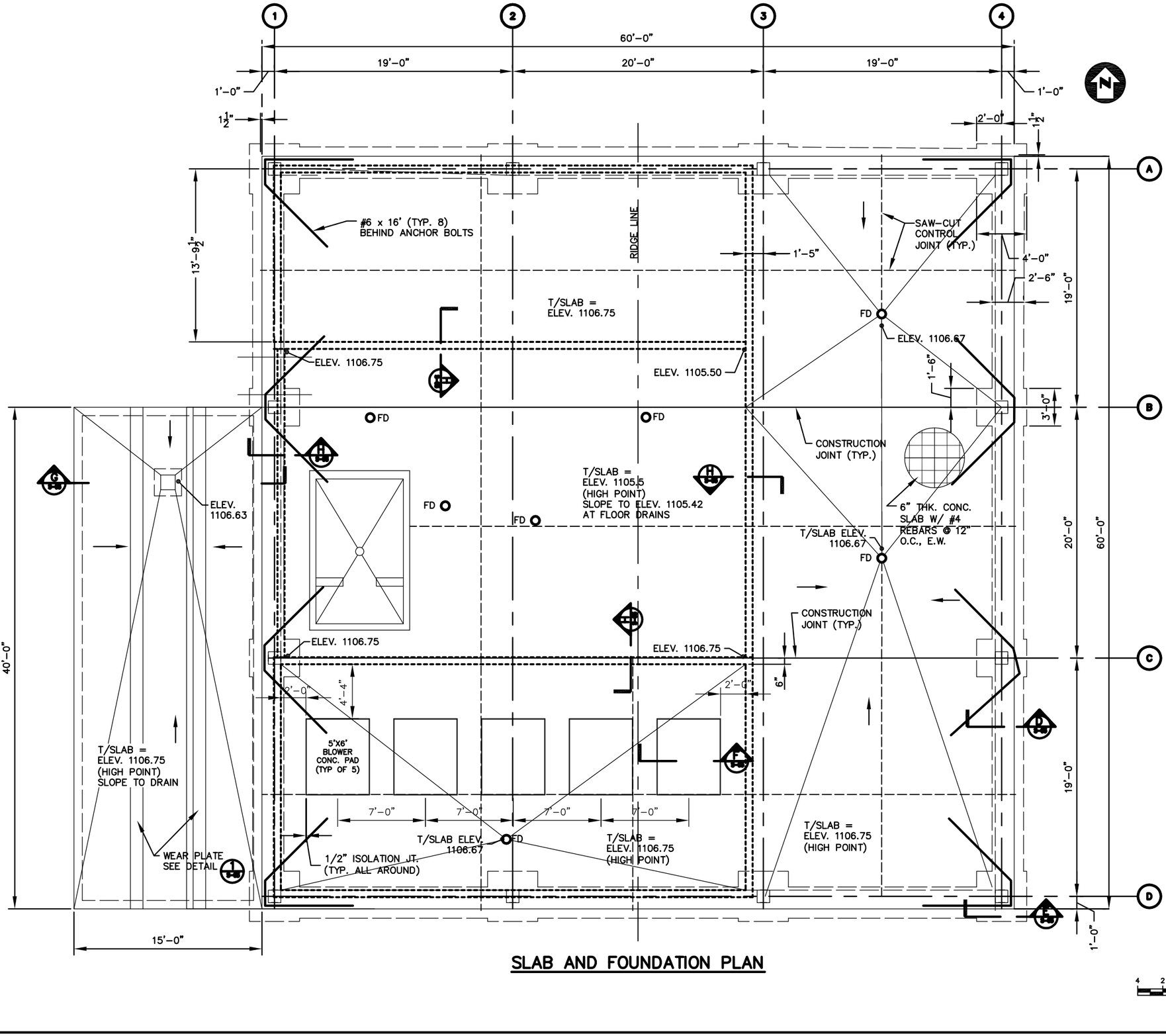
REYNOLDS INC.
121 ROBERTS ROAD, FAIRBURN, GA 30213

PARSONS
5390 Triangle Parkway, Suite 100,
Norcross, GA 30092, (770) 446-4900

City of Temple
Temple WRF

STRUCTURAL NOTES, LEGEND AND ABBREVIATIONS

DRAWING NO. S-01
REV. 0



SLAB AND FOUNDATION PLAN

By	Description	Date	Rev
RCL	RECORD DRAWINGS		1
RCL	ISSUE FOR CONSTRUCTION	4/16/04	0

Job No. 743061
Designed MML
Drawn SM
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City of Temple
Temple WRF

BFP, BLOWER, AND
ELECTRICAL BUILDING
SLAB AND FOUNDATION PLAN

DRAWING NO. S-02
REV. 0

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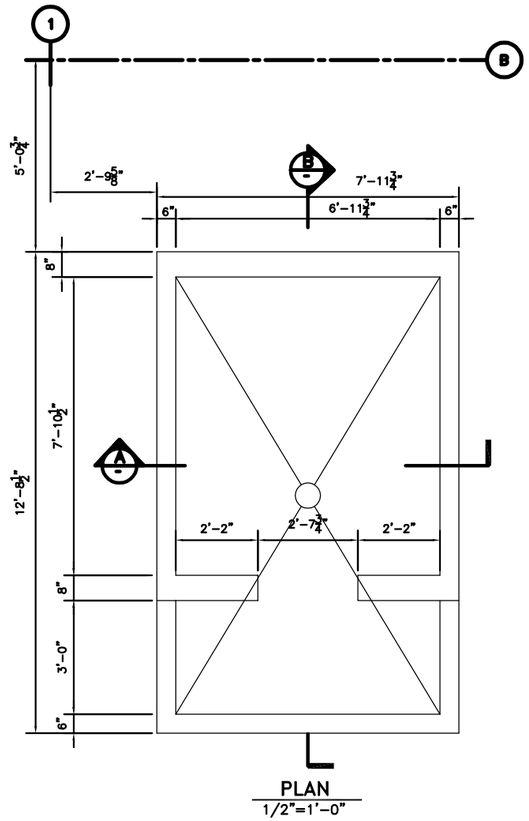
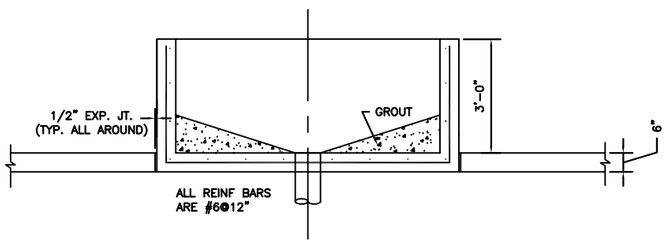
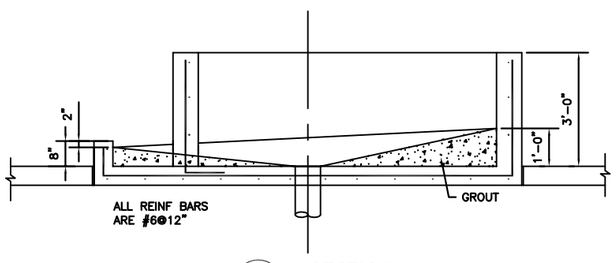


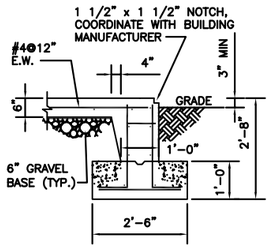
PLAN
1/2"=1'-0"



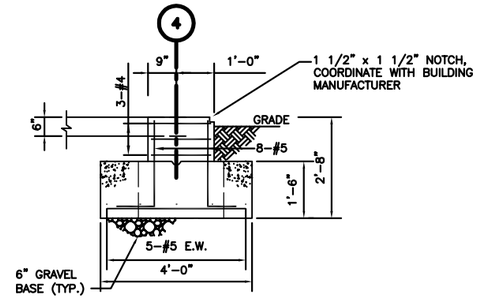
A — SECTION
1/2"=1'-0"



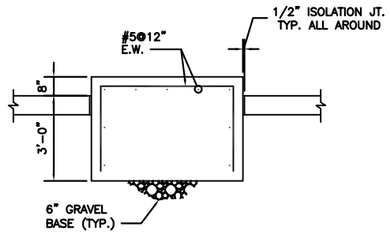
B — SECTION
1/2"=1'-0"



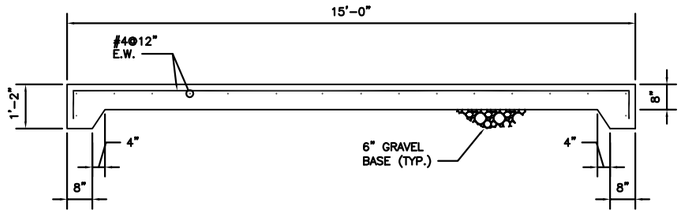
D — SECTION
S-02 — 1/2"=1'-0"



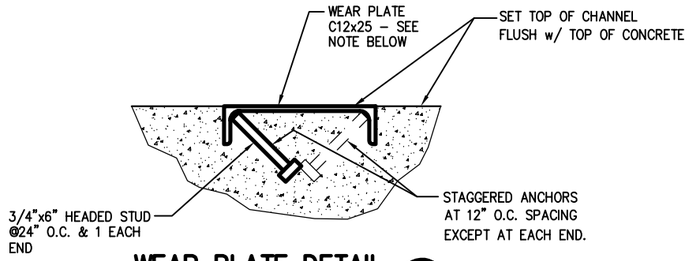
E — SECTION
S-02 — 1/2"=1'-0"



F — SECTION
S-02 — 1/2"=1'-0"

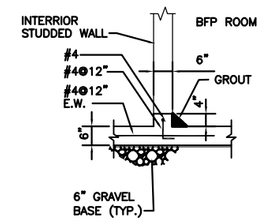


G — SECTION
S-02 — 1/2"=1'-0"



WEAR PLATE DETAIL 1/S-3
SCALE: 2" = 1'-0"

NOTE: CONTRACTOR MAY SUBMIT ALTERNATE WEAR PLATE DETAIL TO ENGINEER FOR APPROVAL.



H — SECTION
S-02 — 1/2"=1'-0"

6" 3" 0 6" 1'-0"
2" = 1'-0"

2 1 0 2 4
1/2" = 1'-0"

Rev	Date	Description	By
1	x	RECORD DRAWINGS	RCL
0	4/16/04	ISSUE FOR CONSTRUCTION	RCL

Job No. 743061
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City of Temple
Temple WRF

SECTIONS

DRAWING NO. S-03
REV. 0

GENERAL MECHANICAL ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
AL	ALUMINUM
BF	BLIND FLANGE
BFV	BUTTERFLY VALVE
BLDG	BUILDING
BOT	BOTTOM
BV	BALL VALVE
CI	CAST IRON
CIP	CAST IRON PIPE
CLR	CLEAR, CLEARANCE
C/O	CLEAN–OUT
CONC	CONCRETE, CONCENTRIC
CP	CONTROL PANEL
CPVC	CHLORINATED POLYVINYL CHLORIDE
CTR	CENTER
CS	CARBON STEEL
CV	CHECK VALVE
CI	CHLORINE
℄	CENTER LINE
DET	DETAIL
DIA. OR ø	DIAMETER
DRN	DRAIN
DWG	DRAWING
DI	DUCTILE IRON
EA	EACH
ECC	ECCENTRIC
EF	EXHAUST FAN
EL (ELEV)	ELEVATION
ELL	ELBOW
EQUIP	EQUIPMENT
EUH	ELECTRIC UNIT HEATER
F/D	FLOOR DRAIN
FLG	FLANGE (D)
FM	FORCE MAIN
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FRP	FIBERGLASS REINFORCED PLASTIC
FTG	FOOTING
FFE	FINISH FLOOR ELEVATION
GAL	GALVANIZED
GBV	GLOBE VALVE
GPD	GALLONS PER DAY
GPM	GALLONS PER MINUTE
GV	GATE VALVE
HDPE	HIGH DENSITY POLYETHELYNE
HV	HAND VALVE
HVAC	HEATING, VENTILATING AND AIR CONDITIONING
HW	HOT WATER
HYD	HYDRAULIC
ID	INSIDE DIAMETER
IN	INCH
INV	INVERT
INV EL	INVERT ELEVATION
JB	JUNCTION BOX
JT	JOINT
MAG	MAGNETIC
MANUF/MFG	MANUFACTURER
MCC	MOTOR CONTROL CENTER
MECH JT, MJ	MECHANICAL JOINT
MGD	MILLION GALLONS PER DAY
MH	MANHOLE
MISC	MISCELLANEOUS
MTR	MOTOR
MX	MIXER
NTS	NOT TO SCALE
NaOCl	SODIUM HYPOCHLORITE
NaOH	SODIUM HYDROXIDE
OC	ODOR CONTROL
o.c.	ON CENTER
O/F	OVERFLOW
OPNG	OPENING
PB	POLYMER BLENDING
PE	PLAIN END
PI	PRESSURE INDICATOR
PV	PINCH VALVE
PNL	PANEL
PRV	PRESSURE REGULATING (REDUCING) VALVE
PV	PLUG VALVE
PVC	POLYVINYL CHLORIDE
RCP	REINFORCED CONCRETE PIPE
RED.	REDUCER
SCH	SCHEDULE
SECT	SECTION
SF	SUPPLY FAN
SG	SLIDE GATE, SLUICE GATE
SHT	SHEET
S.P.	STATIC PRESSURE
SQ. OR ☐	SQUARE
SS	STAINLESS STEEL
SV	SOLENOID VALVE
SWD	SIDE WATER DEPTH
TYP	TYPICAL
VB	VALVE BOX
VFD	VARIABLE FREQUENCY DRIVE
VNT	VENT
VTR	VENT THROUGH ROOF
WC	WATER CLOSET
W/	WITH
W/O	WITHOUT
WS	WATER SURFACE

GENERAL MECHANICAL SYMBOLS

SYMBOL	DESCRIPTION
	ELEVATION TARGET
	PIPE JOINTS – REFER TO PIPE SPECIFICATION FOR MATERIAL AND TYPE OF JOINT
	CENTERLINE
	GATE VALVE
	BALL VALVE
	BALL CHECK
OR	CHECK VALVE
	DIAPHRAGM VALVE
	BUTTERFLY VALVE
	PINCH VALVE
	GLOBE VALVE
K	KNIFE GATE VALVE
OR	CONC. OR ECC. REDUCER
S	SOLENOID VALVE
	ECCENTRIC PLUG VALVE
	CONCRETE
	GRATING
	CHECKER PLATE
	DIRECTION OF FLOW
	FLEXIBLE EXPANSION JOINT
	MECHANICAL COUPLING
OR	UNION
	PORTABLE FIRE EXTINGUISHER
	HOSE STATION
	EMERGENCY EYEWASH/ SAFETY SHOWER
	DIAPHRAGM

LEGEND

---------- BELOW GRADE

———— BY EQUIPMENT SUPPLIER

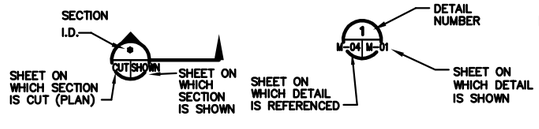
GENERAL MECHANICAL NOTES:

1. ELEVATIONS REFER TO USGS DATUM AND ARE SHOWN IN FEET.
2. HORIZONTAL AND VERTICAL CONTROL DIMENSIONS ARE SUBJECT TO ADJUSTMENTS IN THE FIELD IF NECESSARY TO AVOID CONFLICTS UPON APPROVAL OF THE ENGINEER.
3. ALL PIPING & EQUIPMENT ARRANGEMENTS & LOCATIONS SHALL BE PROPERLY REFERENCED AND RECORDED ON THE PROJECT "RECORD" DRAWINGS.
4. ALL PIPING CONNECTIONS OF DISSIMILAR PROPERTIES SHALL HAVE A COMPATIBLE DIELECTRIC COUPLING.
5. THE CONTRACTOR SHALL COORDINATE ALL WALL PENETRATIONS, SLEEVES, CAST–IN–PLACE INSERTS, WALL PLATES, AND OTHER APPURTENANCES REQUIRED WITH ALL DISCIPLINES AND MANUFACTURER'S APPROVED SHOP DRAWINGS.
6. THE CONTRACTOR SHALL VERIFY ALL PIPING/EQUIPMENT CONNECTIONS WITH MANUFACTURER'S APPROVED SHOP DRAWINGS.
7. ALL UNDERGROUND DUCTILE IRON PIPE JOINTS SHALL BE MECHANICAL JOINT TYPE, INDEPENDENT OF DEPICTION ON DRAWINGS.
8. ALL FIRE EXTINGUISHERS SHALL BE RATED 2–A OR HIGHER UNLESS OTHERWISE NOTED.

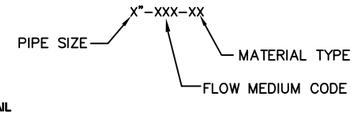
FLUID CODES

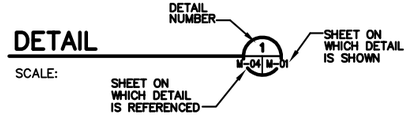
DEC	DECANT
DRN	DRAIN
EFF	EFFLUENT
NaOCl	SODIUM HYPOCHLORITE
PA	PLANT AIR
POT	POTABLE WATER
PW	PLANT WATER
REJ	REJECT
REUSE	REUSE WATER (TREATED PLANT EFFLUENT)
RR	REJECT RETURN
SLG	SLUDGE
WAS	WASTE ACTIVATED SLUDGE
WW	WASTEWATER

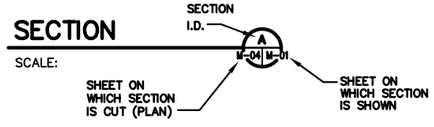
TYPICAL SECTION & DETAIL NUMBERING SYSTEM



PIPE DESIGNATIONS







Rev	Date	Description	By
1	*	RECORD DRAWINGS	RCL
0	4/16/04	ISSUE FOR CONSTRUCTION	RCL

Job No. 743061
Designed RCL / MRC
Drawn MRC
Checked RCL
Reviewed DSF
Approved DSF
Reg. No. .
Date 2/20/04

Issue Certification

REYNOLDS INC.
121 ROBERTS ROAD, FAIRBURN, GA 30213

PARSONS
5390 Triangle Parkway, Suite 100,
Norcross, GA 30092, (770) 446-4900

City of Temple
Temple WRF

MECHANICAL LEGEND

DRAWING NO. M–01

REV. 0

J:\743061 Temple WRF\Mech\061-M-01.dwg, Layout1, 6/27/2006 2:32:56 PM, 40328, 1:2

REJECT PUMP STATION
(SEE M-12)

HYPOCHLORITE GENERATOR
(SEE M-17)

AEROBIC DIGESTER
(FORMER ATU)
(SEE M-19)

BELT FILTER PRESS,
MCC, BLOWER, AND
MAINTENANCE BUILDING
(SEE M-03)

CHLORINE CONTACT
CHAMBER
(SEE M-11)

EFFLUENT FILTERS
(SEE M-09)

POST-EQ
(FUTURE SBR NO. 4)
(SEE M-15)

SBR NO. 2
(SEE M-13)

SBR NO. 3
(FUTURE)

SBR NO. 1
(SEE M-13)

HEADWORKS
(SEE M-07)

1
M-02 | M-20

6"-RR-DI
10"-DRN-DI
3"-PW-HDPE
2"-WW-HDPE
3"-POT-HDPE
2"-NaOCl-PVC
6"-PA-DI
4"-SLG-DI
6"-DRN-DI
6"-WAS-DI
10"-PA-DI
14"-REJ-DI
8"-DRN-DI
16"-DEC-DI
2"-WW-PVC
3"-REUSE-HDPE
14"-WW-D
8"-WW-HDPE
4"-WW-HDPE
445.63'

0 20' 40'
SCALE IN FEET

Rev	Date	Description	By
1	x	RECORD DRAWINGS	RCL
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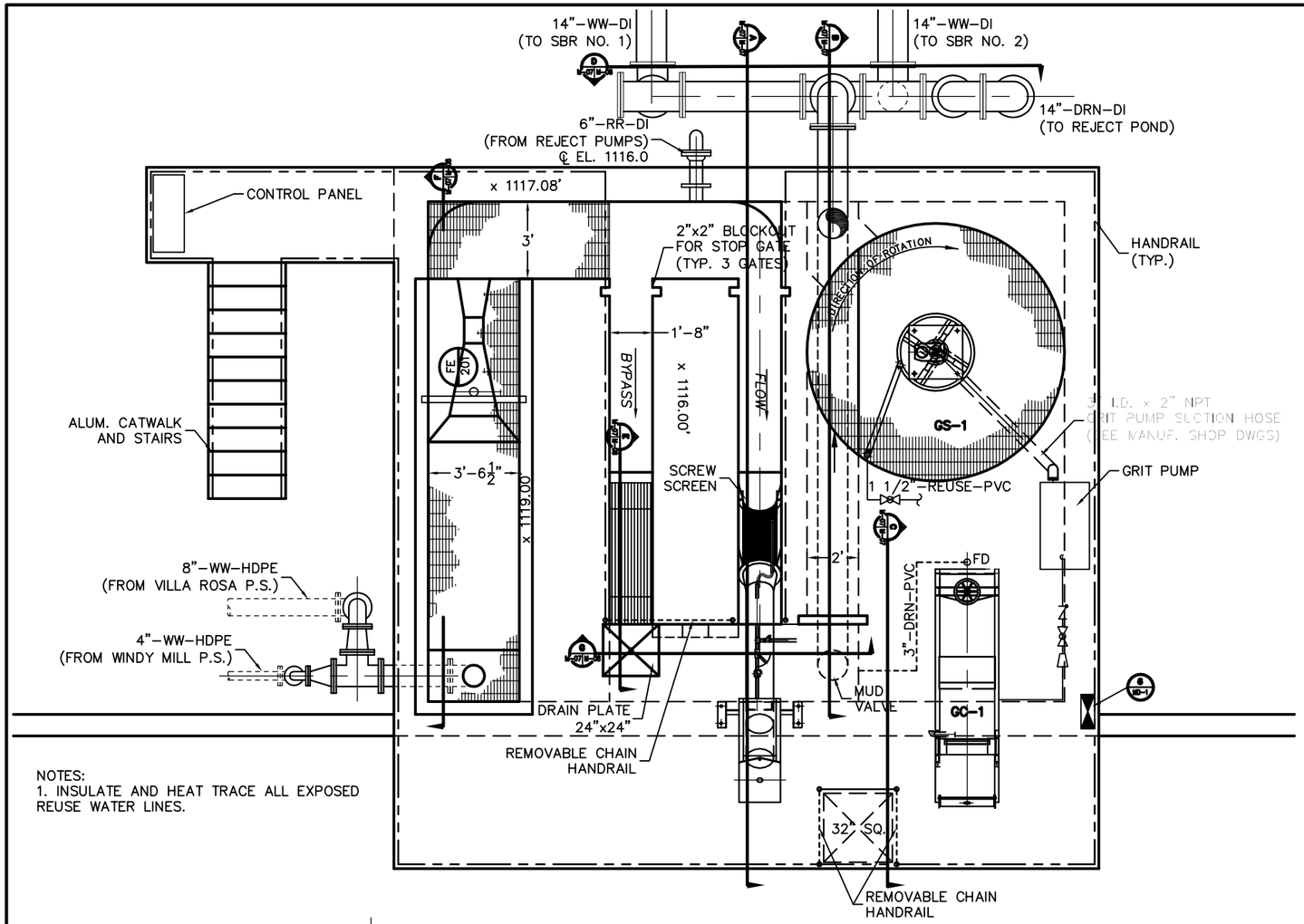
MECHANICAL SITE LAYOUT

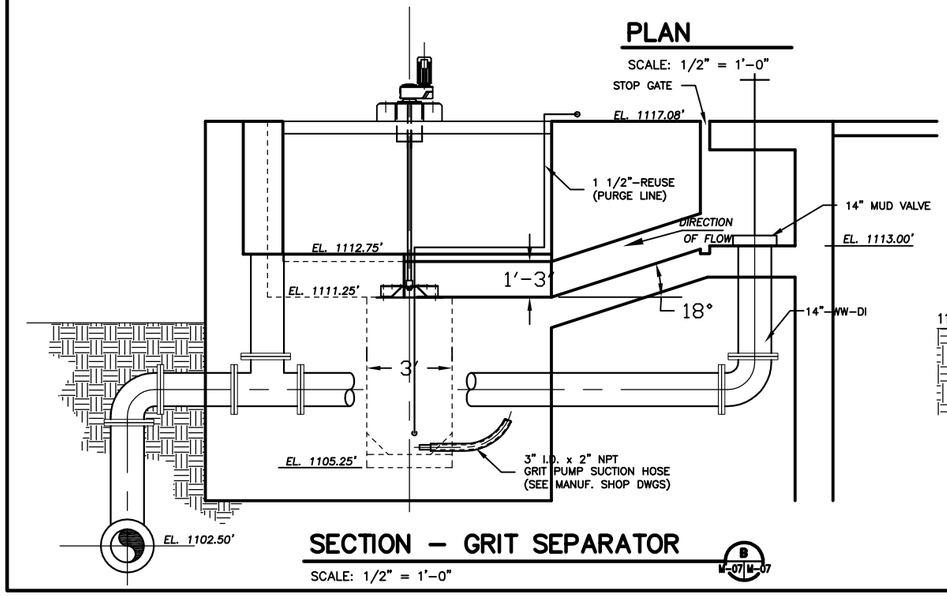
DRAWING NO. M-02
REV. 0



NOTES:
1. INSULATE AND HEAT TRACE ALL EXPOSED REUSE WATER LINES.

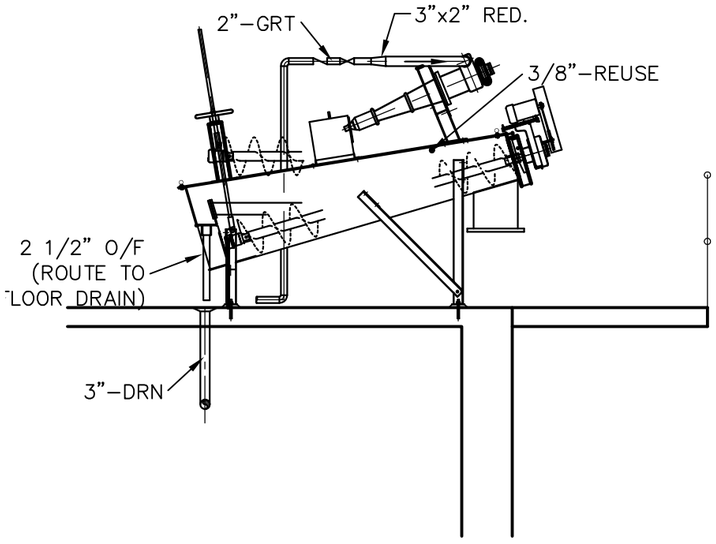
PLAN

SCALE: 1/2" = 1'–0"



SECTION – GRIT SEPARATOR

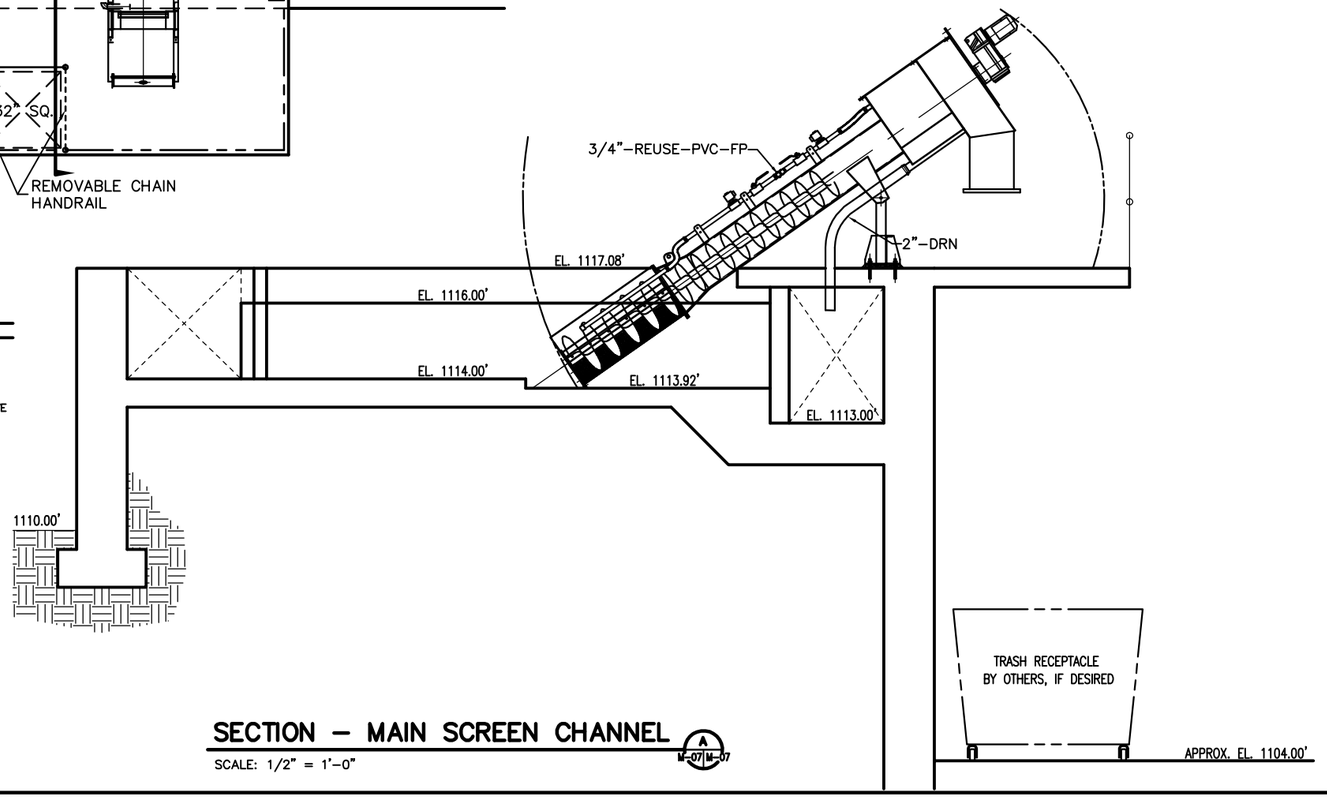
SCALE: 1/2" = 1'–0"



SECTION – GRIT CLASSIFIER

SCALE: 1/2" = 1'–0"

0' 2' 4'
SCALE IN FEET



SECTION – MAIN SCREEN CHANNEL

SCALE: 1/2" = 1'–0"

Rev	Date	Description	By
1	x	RECORD DRAWINGS	RCL
0	4/16/04	ISSUE FOR CONSTRUCTION	RCL

Job No. 743061
Designed RCL / MRC
Drawn MRC
Checked RCL
Reviewed DSF
Approved DSF
Reg. No. _____
Date 2/20/04

Issue Certification

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Norcross, GA 30092, (770) 446-4900

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Temple WRF

HEADWORKS MECHANICAL LAYOUT

DRAWING NO. M–07
REV. 0

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ELECTRICAL SYMBOLS ELEMENTARY DIAGRAMS

480V / 120V CPT — CONTROL POWER TRANSFORMER (CPT) (INDICATE VOLTAGE RATIO)

FUSE (INDICATE SIZE IN AMPERES)

CIRCUIT BREAKER (INDICATE SIZE IN AMPERES)

SINGLE POLE SINGLE THROW DISCONNECT SWITCH (SPST) (INDICATE SIZE IN AMPERES)

CONTROL RELAY OR CONTACTOR
- C – CONTACTOR
- CR – CONTROL RELAY
- M – MOTOR STARTER COIL
- LR – LATCHING RELAY (RESET COIL)
- LS – LATCHING RELAY (SET COIL)
- T – TIMER RELAY

NORMALLY OPEN CONTACT (N.O.)—FOR RELAY, TIMER, STARTER, OR CONTACTOR, CLOSED WHEN COIL IS ENERGIZED

NORMALLY CLOSED CONTACT (N.C.)—FOR RELAY, TIMER, STARTER, OR CONTACTOR, OPENS WHEN COIL IS ENERGIZED.

INDICATING LIGHT, (LETTER DENOTES COLOR)
- A – ORANGE
- B – BLUE
- C – CLEAR
- G – GREEN
- R – RED
- W – WHITE
- Y – YELLOW

OL — THERMAL OVERLOAD CONTACT (CONTROL CIRCUIT)

LIMIT SWITCH, NORMALLY OPEN, SWITCH CLOSED BY MECHANICAL OPERATION

LIMIT SWITCH, NORMALLY CLOSED, SWITCH OPENS BY MECHANICAL OPERATION.

FLOW SWITCH, (AIR, WATER, ETC.) NORMALLY CLOSED, OPENS ON FLOW.

FLOW SWITCH, (AIR, WATER, ETC.) NORMALLY OPEN, CLOSES ON FLOW.

LEVEL SWITCH, NORMALLY OPEN, CLOSES ON RISE ABOVE SET LEVEL

LEVEL SWITCH, NORMALLY CLOSED, OPENS ON RISE ABOVE SET LEVEL

PRESSURE OR VACUUM SWITCH, NORMALLY OPEN, CLOSES ON RISE IN PRESSURE

PRESSURE OR VACUUM SWITCH, NORMALLY CLOSED, OPENS ON FALL IN PRESSURE

SHIELD WIRE (WITH SHIELD GROUNDED)

INTERLOCK (MECHANICAL OR ELECTRICAL)

FIELD WIRING

INTERNAL WIRING

INDICATES TERMINAL OR DEVICE LOCATED ON VARIABLE FREQUENCY DRIVES

INDICATES TERMINAL OR DEVICE LOCATED IN MCC

INDICATES TERMINAL OR DEVICE LOCATED IN FIELD

INDICATES TERMINAL OR DEVICE LOCATED ON UNIT CONTROL PANEL

INDICATES TERMINAL OR DEVICE LOCATED ON MAIN CONTROL PANEL OR PLC

INDICATES TERMINAL OR DEVICE LOCATED ON RELAY PANEL

TEMPERATURE ACTUATED SWITCH, NORMALLY OPEN, CLOSES ON RISE IN TEMPERATURE

TEMPERATURE ACTUATED SWITCH, NORMALLY CLOSED, OPENS ON RISE IN TEMPERATURE

TIMER CONTACT, NORMALLY OPEN, CLOSES ON TIME DELAY AFTER COIL IS ENERGIZED (NOTC)

TIMER CONTACT, NORMALLY CLOSED, OPENS ON TIME DELAY AFTER COIL IS ENERGIZED (NCTO)

TIME CONTACT, NORMALLY OPEN, OPENS ON TIME DELAY AFTER COIL IS DE-ENERGIZED (NOTO)

TIMER CONTACT, NORMALLY CLOSED, CLOSES ON TIME DELAY AFTER COIL IS DE-ENERGIZED (NCTC)

PUSHBUTTON, MOMENTARY 1 NORMALLY OPEN CONTACT

PUSHBUTTON, MOMENTARY 1 NORMALLY CLOSED CONTACT

1 2 XO OX — 2 POSITION SELECTOR SWITCH X– DENOTES CONTACT IN CLOSED POSITION

1 2 3 XOO OXO OOX — 3 POSITION SELECTOR SWITCH X– DENOTES CONTACT IN CLOSED POSITION

HORN

SOLENOID

HEATER

GROUND

B — BUZZER

BATTERY (MULTICELL)

SURGE SUPPRESSOR

ELECTRICAL SYMBOLS ONE LINE DIAGRAMS

CURRENT TRANSFORMER

L.A. — LIGHTNING ARRESTER

LIGHTNING ARRESTER AND SURGE CAPACITOR

POWER TRANSFORMER

POTENTIAL TRANSFORMER

INDICATING METER
- A – AMMETER
- V – VOLTMETER
- W – WATTMETER
- WH – WATTHOUR METER
- PF – POWER FACTOR METER
- WHD – WATTHOUR DEMAND METER

AS — AMMETER SWITCH

WT — WATT TRANSDUCER

VS — VOLTMETER SWITCH

RECORDING METER

27 — ANSI/IEEE SWITCHGEAR DEVICE (RELAYING OR METERING)

ANSI NUMBER 27–UNDER VOLTAGE RELAY

DRAW-OUT DEVICE (FROM CABINET OR ENCLOSURE)

800 AF 600 AT LSIG E — POWER CIRCUIT BREAKER (600V OR BELOW) LSIG–INDICATES EQUIPPED WITH LONGTIME–SHORT TIME INSTANTANEOUS SETTING AND GROUND FAULT E–ELECTRICALLY OPERATED M–MANUAL OPERATED

AUTOMATIC TRANSFER SWITCH

TVSS — TRANSIENT VOLTAGE SURGE SUPPRESSOR

START-STOP PUSHBUTON STATION NO. OF DOTS INDICATES NO. OF PUSHBUTTONS.

J — JUNCTION BOX

FUSE

15 — UNIT HEATER NUMBER INDICATES KILOWATTS

O/L'S — THERMAL OVERLOAD

INDICATING LIGHT (LETTER DENOTES COLOR)

3A 1 — FULL VOLTAGE NONREVERSING (FVNR) COMBINATION MOTOR CIRCUIT PROTECTOR (MCP) MOTOR STARTER UNLESS NOTED OTHERWISE. 3A DENOTES CONTINUOUS RATING OF MAGNETIC BREAKER, 1 INDICATES NEMA SIZE STARTER.

15 HP — INDUCTION MOTOR NUMBER INDICATES HORSEPOWER

GROUND CONNECTION

480V, 3PH RECEPTACLE

PANELBOARD
- LP– LIGHTING PANEL
- RP– RECEPTACLE PANEL
- PP– POWER PANEL

UCP-9 — UNIT CONTROL PANEL

LOCAL CONTROL STATION. SEE ELECTRICAL SCHEMATICS FOR REQUIREMENTS.

40AT / 100AF — MOLDED CASE, THERMAL MAGNETIC CIRCUIT BREAKER. TOP NUMBER INDICATES TRIP RATING, BOTTOM NUMBER INDICATES FRAME SIZE.

DISCONNECT SWITCH (30A, UNLESS INDICATED OTHERWISE)

VFD — VARIABLE FREQUENCY DRIVE

UCP — VENDOR SUPPLIED UNIT CONTROL PANEL

DM — DIGITAL METER

ACT — ACTUATOR

MOTOR CONTROL CENTER

MCC MAIN BREAKER

MCC LOAD

MCC-xxx — MCC NUMBER

ELECTRICAL SYMBOLS POWER PLANS

EQUIPMENT

EQUIPMENT (EXISTING OR FUTURE)

CONDUIT RUN EXPOSED

CONDUIT RUN CONCEALED UNDER SLAB OR BELOW GRADE (CONCEALED IN SLAB WHERE SO NOTED OR WHERE ALLOWED PER SPECIFICATIONS).

CONDUIT RUN TURNS UP

CONDUIT RUN TURNS DOWN

CONDUIT CAPPED

HOMERUN TO PANELBOARD – SHORT SLASH LINE INDICATES NO. OF PHASE CONDUCTORS, LONG SLASH LINE INDICATES NO. OF NEUTRAL CONDUCTORS INDICATES GROUND CONDUCTOR – UNLESS OTHERWISE INDICATED, ALL WIRES TO BE NO. 12 AWG IN 3/4"C.

PANELBOARD
- LP– LIGHTING PANEL
- RP– RECEPTACLE PANEL
- PP– POWER PANEL

J — JUNCTION BOX

M — INDUCTION MOTOR

D — MOTORIZED DAMPER

DISCONNECT SWITCH

MANHOLE OR HANDHOLE

MAGNETIC STARTER

R — RELAY PANEL

DUCTBANK

T KVA — DRY TYPE TRANSFORMER KVA AS NOTED

C — LIGHTING CONTACTOR

LOCAL CONTROL STATION. SEE ELECTRICAL SCHEMATICS FOR REQUIREMENTS.

GROUND CONDUCTOR WITH EXOTHERMIC CONNECTION

GROUNDING DELTA (#4/0 BARE COPPER, GROUND CONDUCTOR UNLESS OTHERWISE NOTED)

GROUND ROD (3/4"ø x 10'-0" LONG)

PENDANT MOUNTED LIGHTING FIXTURE W/ SWITCHED QUARTZ LAMP

EXIT SIGN

PENDANT MOUNTED LIGHTING FIXTURE

STANCHION OR POLE MOUNTED LIGHTING FIXTURE

WALL MOUNTED LIGHTING FIXTURE

FLUORESCENT LIGHTING FIXTURE

FLUORESCENT LIGHTING FIXTURE WITH EMERGENCY BATTERY PACK

EMERGENCY LIGHTING UNIT

$ OR — SINGLE THROW, SINGLE POLE TOGGLE SWITCH

$M OR M — MANUAL MOTOR STARTER W/OVERLOAD ELEMENT

$3 — THREE-WAY TOGGLE SWITCH

$4 — FOUR-WAY TOGGLE SWITCH

480V, 3PH RECEPTACLE

T — THERMOSTAT

DUPLEX RECEPTACLE

INDICATES INSTRUMENT LOCATION, FOR INSTRUMENT DESIGNATION REFER TO DWG. I.1-1

SURVEILLANCE CAMERA

H — HORN

TELEPHONE OUTLET

S — SMOKE DETECTOR

PC — PHOTOCELL

SV — SOLENOID VALVE

ELECTRICAL ABBREVIATIONS

øA	–	PHASE A
øB	–	PHASE B
øC	–	PHASE C
1ø	–	SINGLE PHASE
3ø	–	THREE PHASE
A	–	AMPERES
AFF	–	ABOVE FINISHED FLOOR
AM	–	AMMETER
ATS	–	AUTOMATIC TRANSFER SWITCH
AUX	–	AUXILIARY
C	–	CONDUIT OR CONTACTOR
CAM	–	CAMERA
CKT BKR	–	CIRCUIT BREAKER
CNTL	–	CONTROL
CONT'D	–	CONTINUED
CPT	–	CONTROL POWER TRANSFORMER
DESIG	–	DESIGNATION
DISC	–	DISCONNECT
EA	–	EACH
ELEV	–	ELEVATION
EMERG	–	EMERGENCY
EMT	–	ELECTRICAL METALLIC TUBING
ETM	–	ELAPSED TIME METER
EUH	–	ELECTRIC UNIT HEATER
EXIST	–	EXISTING
FDR	–	FEEDER
FF	–	FINISHED FLOOR
FLUOR	–	FLUORESCENT
FP	–	FIELD PANEL
FS	–	FLOW SWITCH
FVNR	–	FULL VOLTAGE NON-REVERSING
FVR	–	FULL VOLTAGE REVERSING
GEN	–	GENERATOR
GFCI	–	GROUND FAULT CIRCUIT INTERRUPTER
GND, GRD	–	GROUND
GS	–	GROUND SENSOR
H	–	HOT
HH	–	HANDHOLE
HP	–	HORSEPOWER
HPS	–	HIGH PRESSURE SODIUM
HT	–	HEAT TRACING
HZ	–	HERTZ
K	–	KILO
KW	–	KILOWATT
LA	–	LIGHTNING ARRESTER
LCP	–	INSTRUMENTATION LOCAL CONTROL PANEL
LCS	–	LOCAL CONTROL STATION
LOR	–	LOCAL-OFF-REMOTE SWITCH
LP	–	LIGHTING PANEL
LSP	–	LOCAL SECURITY PANEL
LVR	–	LOUVER
LS	–	LEVEL SWITCH
MCC	–	MOTOR CONTROL CENTER
MCP	–	MOTOR CIRCUIT PROTECTOR
MEZZ	–	MEZZANINE
MH	–	MOUNTING HEIGHT OR MANHOLE
MICP	–	MAIN INSTRUMENT CONTROL PANEL
MPBCE	–	MICROPROCESSOR BASED CONTROL EQUIPMENT
MTR	–	MOTOR
MV	–	MERCURY VAPOR
NEUT, N	–	NEUTRAL
NO., #	–	NUMBER
OL	–	OPERATING LIGHT
OL'S	–	OVERLOADS
P	–	POLE
PNLBD	–	PANELBOARD
PNL	–	PANEL
PP	–	POWER PANEL
R	–	REACTOR
RGS	–	RIGID GALVANIZED STEEL CONDUIT
RP	–	RECEPTACLE PANEL
RVNR	–	REDUCED VOLTAGE NON-REVERSING
SC	–	SURVEILLANCE CAMERA
SCP	–	SYSTEM CONTROL PANEL
SD	–	SMOKE DETECTOR
SOV	–	SOLENOID OPERATOR VALVE
SS	–	SOLID STATE
SW	–	SWITCH
SWBD	–	SWITCHBOARD
SWGR	–	SWITCHGEAR
TPS	–	TWISTED PAIR SHIELDED
TYP	–	TYPICAL
TC	–	TRAY CABLE
UCP	–	UNIT CONTROL PANEL
UNO	–	UNLESS NOTED OTHERWISE
UPS	–	UNITERRUPTABLE POWER SUPPLY EQUIPMENT
V	–	VOLT OR VOLTAGE
VFD	–	VARIABLE FREQUENCY DRIVE
VM	–	VOLTMETER
W	–	WATTS
WP	–	WEATHER PROOF
WS	–	TORQUE SWITCH
WT	–	WATTS TRANSDUCER
XFER	–	TRANSFER
XFMR	–	TRANSFORMER
ZS	–	LIMIT SWITCH

Rev	Date	Description	By
1	x	RECORD DRAWINGS	RCL
0	4/16/04	ISSUE FOR CONSTRUCTION	RCL

Job No. 743061
Designed RL
Drawn XL
Checked RL
Reviewed JSD
Approved RL
Reg. No.
Date 2/20/04

Issue Certification

GEORGIA REGISTERED PROFESSIONAL ENGINEER No. 26779 XUEQING LIU

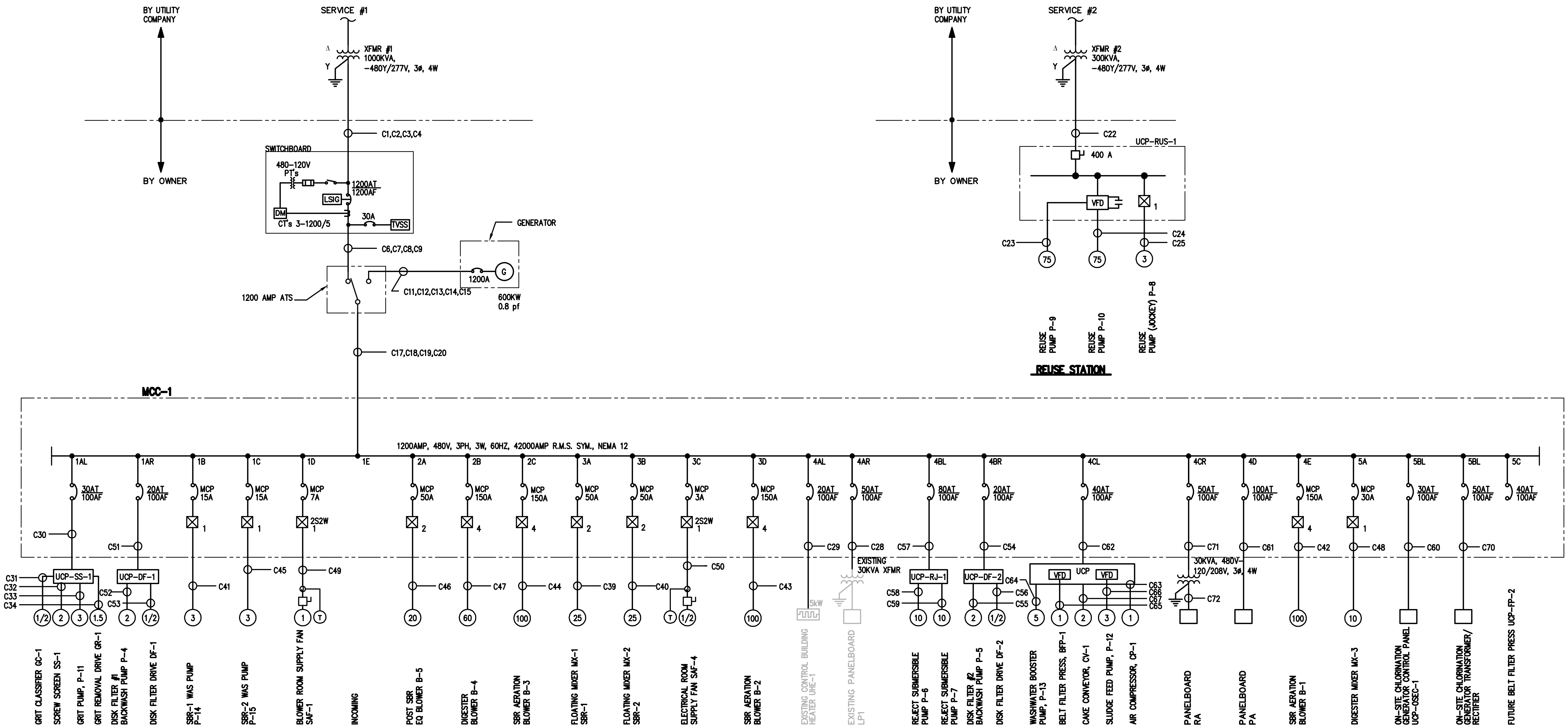
REYNOLDS INC.
121 ROBERTS ROAD, FAIRBURN, GA 30213

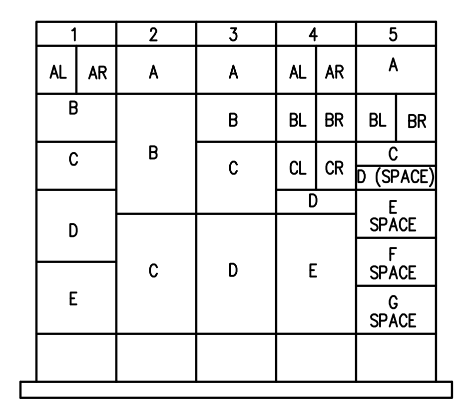
PARSONS
5390 Triangle Parkway, Suite 100,
Norcross, GA 30092, (770) 446-4900

City of Temple
Temple WRF

ELECTRICAL LEGEND, SYMBOLS AND GENERAL NOTES

DRAWING NO. E-01 REV. 0





MCC-1 ELEVATION

Rev	Date	Description	By
1	x	RECORD DRAWINGS	RCL
0	4/16/04	ISSUE FOR CONSTRUCTION	RCL

Job No. 743061
Designed RL
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ONE-LINE DIAGRAM

DRAWING NO. E-02
REV. 0

BASIC SYMBOLS

SINGLE FUNCTION | MULTIPLE FUNCTION

- OR — FIELD MOUNTED INSTRUMENT OR DEVICE
- OR — FRONT OF PANEL MOUNTED INSTRUMENT ON LOCAL PANEL
- OR — REAR OF PANEL MOUNTED INSTRUMENT ON LOCAL PANEL
- OR — FRONT OF PANEL MOUNTED INSTRUMENT ON MAIN PANEL
- OR — REAR OF PANEL MOUNTED INSTRUMENT ON MAIN PANEL
- OR — INTERLOCK
- PLC PROGRAMMED FUNCTION OPERATOR ACCESSIBLE THRU DEDICATED DISPLAY
- PLC PROGRAMMED FUNCTION NOT ACCESSING THRU DEDICATED DISPLAY
- SPD — TRANSIENT SURGE PROTECTION DEVICE

CODES AND ABBREVIATIONS

*	SUPPLIED WITH ELECTRICAL OR MECHANICAL EQUIPMENT
**	SUPPLIED BY REYNOLDS INC.
S/D	SHUTDOWN
O/R	OVERRIDE
OAC	OPEN–AUTO–CLOSE
HOA	HAND–OFF–AUTO
MOA	MANUAL–OFF–AUTO
S/S	START / STOP
SEL	SELECTOR
O/C	OPEN / CLOSE
O/O	ON / OFF
FOS	FAST–OFF–SLOW
LOS	LOCK OUT STOP
LAR	LOWER–AUTO–RAISE
L/R	LOWER/RAISE
F/R	FORWARD/REVERSE

HS — CODES

+	SUMMATOR
−	SUBTRACTOR
√	SQUARE ROOT EXTRACTOR
>	HIGH SELECTOR
<	LOW SELECTOR
I/P	CURRENT TO PNEUMATIC CONVERTER
f(x)	NONLINEAR OR UNSPECIFIED
X	MULTIPLIER
÷	DIVIDER

LINE CODES

- PROCESS LINE OR MECHANICAL CONNECTION
- ELECTRICAL SIGNAL LINE (DIGITAL OR ANALOG)
- PNEUMATIC LINE
- HYDRAULIC LINE
- SHEET — PROCESS LINE CONTINUATION ON SHEET INDICATED
- FLEXIBLE HOSE
- CAPILLARY
- DATA HIGHWAY COMMUNICATIONS LINK
- HEAT TRACING

PROCESS SYMBOLS

VALVES

- GATE VALVE
- KNIFE GATE VALVE
- (SEAT SIDE) — PLUG VALVE
- BALL VALVE
- BUTTERFLY VALVE
- DIAPHRAGM VALVE
- ANGLE VALVE
- GLOBE VALVE
- NEEDLE VALVE
- 3–WAY VALVE
- SOLENOID VALVE (2–WAY)
- SOLENOID VALVE (3–WAY)
- SOLENOID VALVE (4–WAY)
- CONTROL VALVE
- SELF–CONTAINED PRESSURE REGULATING VALVE
- SELF–CONTAINED BACK PRESSURE REGULATING VALVE

GATES

- SLUICE GATE
- SLIDE GATE
- OR — STOP GATE

ACTUATORS

- M OR M — MOTOR
- PNEUMATIC CYLINDER
- V/S — MECHANICAL VARIABLE SPEED REDUCER
- HAND ACTUATOR (SHOWN W/BUTTERFLY VALVE)
- PNEUMATIC POSITIONER

PUMPS

- CENTRIFUGAL PUMP OR BLOWER
- PROGRESSIVE CAVITY PUMP
- METERING PUMP
- PD BLOWER
- SUBMERSIBLE PUMP

FLOW OR LEVEL ELEMENTS

- ORIFICE PLATE
- FI — ROTAMETER
- MAG — MAGNETIC FLOW METER
- VENTURI TUBE
- TURBINE OR PROPELLER METER
- FE — DOPPLER OR TRANSIT TIME SONIC FLOW ELEMENT
- FLOAT LEVEL ELEMENT
- LE — RESISTANCE PROBE TYPE LEVEL ELEMENT
- ULTRASONIC LEVEL SENSOR

MISCELLANEOUS MECHANICAL ITEMS

- "Y" TYPE STRAINER
- CHECK VALVE (FLOW DIRECTION)
- DIAPHRAGM CHECK (FLOW DIRECTION)
- RUPTURE DISC
- PRESSURE OR VACUUM RELIEF VALVE
- AIR RELIEF VALVE
- CHEMICAL DIAPHRAGM SEAL
- MIXER
- F OR F — FILTER
- VENT W/CAP OR SCREEN
- FLEXIBLE TUBING
- FLEXIBLE HOSE
- FLEXIBLE CONNECTOR
- SPRAY SYSTEM
- CHANNEL AIR DIFFUSER
- EJECTOR / EDUCTOR
- HOSE COUPLING
- SAMPLE TAP (REMOTE)
- SAMPLE TAP (LOCAL)
- PULSATION DAMPENER

CODES AND ABBREVIATIONS

PIPE DESIGNATIONS

PIPE SIZE (X"NX" DOUBLE CONTAINMENT PIPE SIZES) — PIPE MATERIAL CODE — FLOW MEDIUM CODE

FUNCTION PREFIX SCHEDULE

LETTER	FIRST LETTER: MEASURED OR INITIATING VARIABLE	FIRST LETTER: MODIFIER	SUCCEEDING LETTERS: READOUT OR PASSIVE FUNCTION	SUCCEEDING LETTERS: OUTPUT FUNCTION	SUCCEEDING LETTERS: MODIFIER
A	ANALYSIS		ALARM		
B	BURNER		PROGRAMMER		
C	CONDUCTIVITY (ELECTRICAL)			CONTROL	
D	DENSITY (MASS) OR SPECIFIC GRAVITY	DIFFERENTIAL		DIFFERENTIAL	
E	VOLTAGE (EMF)		PRIMARY ELEMENT		
F	FLOW RATE	RATIO (FRACTION)			
G	GAGING		GLASS		
H	HAND (MANUALLY INITIATED)				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME OR TIME SCHEDULE			CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	MOTOR	MOISTURE			MIDDLE OR INTERMEDIATE
N	VIBRATION	IGNITER			
O	OPERATION	OFFSET	ORIFICE (RESTRICTION)		
P	PRESSURE OR VACUUM		POINT (TEST CONNECTION)		
Q	QUANTITY OR EVENT	INTEGRATE OR TOTALIZE			
R	RADIOACTIVITY		RECORD OR PRINT		
S	SPEED OR FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTI–VARIABLE	TREND	MULTI–FUNCTION	MULTI–FUNCTION	MULTI–FUNCTION
V	VISCOSITY	VIBRATION		VALVE DAMPER OR LOUVER	
W	WEIGHT, FORCE OR TORQUE		WELL		
X	SPECIAL (SEE SPEC.)		SPECIAL (SEE SPEC.)		
Y				RELAY OR COMPUTE	
Z	POSITION				DRIVE, ACTUATE OR UNCLASSIFIED FINAL CONTROL ELEMENT

FIRST LETTER (S)
SUCCEEDING LETTERS
FIC 10A
ITEM DESIGNATOR USED WHEN THERE ARE IDENTICAL COMPONENTS WITH THE SAME P&ID SHEET & LOOP NUMBER.
LOOP NUMBER PER P&ID SHEET

GENERAL NOTES

1. ALL WORK SHALL COMPLY WITH THE LATEST NEC AND APPLICABLE LOCAL CODES.
2. WHEN LOCATED IN CLASSIFIED AREA, INTRINSIC SAFETY BARRIER SHALL BE SUPPLIED IF ENCLOSURES AND DEVICES ARE NOT RATED FOR EXPLOSION PROOF CLASSIFICATION.
3. TRANSIENT SURGE PROTECTIVE DEVICES (SPD) SHALL BE PROVIDED FOR BOTH POWER AND CONTROL CIRCUITS AT BOTH SOURCE AND DESTINATION END FOR DEVICES AND ENCLOSURES LOCATED OUTSIDE OF PROTECTIVE STRUCTURE. SPD FOR 24VDC FIELD DEVICES SHALL BE SURGETRAB S–PTI–2PE–24DC, SPD FOR ENCLOSURES WITH 120VAC POWER SERVICE SHALL BE VALVETRAB VAL–MS–120, SPD FOR ENCLOSURES WITH 480VAC POWER SERVICE SHALL BE FLSHTRAB FLT–25–400 AS MANUFACTURED BY PHOENIX CONTACT, OR APPROVED EQUAL. SPDs AT CONTROL PANELS SHALL BE TERMINAL TYPE, PROVIDE 1492–WD4SS BY ALLEN–BRADLEY, FOR 120VAC DISCRETE SIGNALS, 1492–HW2K024 BY ALLEN–BRADLEY FOR 24VAC/DC DISCRETE SIGNALS, AND TT–2–PE–24VDC BY PHOENIX CONTACTS FOR ANALOG SIGNALS. APPROVED EQUAL SPDs CAN BE USED.

Rev	Date	Description	By
1	x	RECORD DRAWINGS	RCL
0	4/19/04	ISSUE FOR CONSTRUCTION	RCL

Job No. 743061
Designed XL
Drawn XL
Checked RL
Reviewed JSD
Approved
Reg. No.
Date 2/20/04

Issue Certification

REYNOLDS INC.
121 ROBERTS ROAD, FAIRBURN, GA 30213

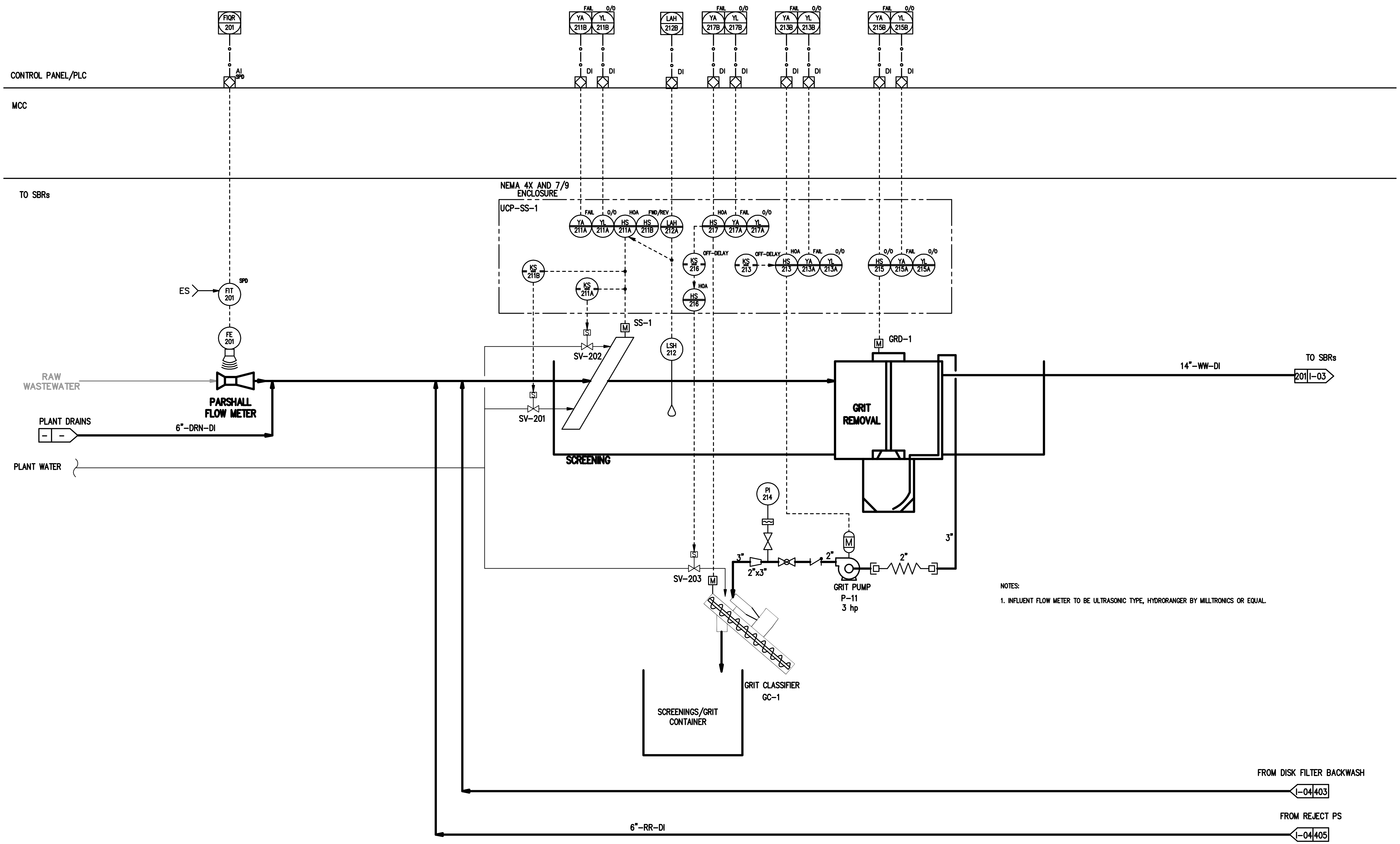
PARSONS
5395 Triangle Parkway, Suite 100
Norcross, GA 30092 (770) 446–4900

City of Temple
Temple WRF

INSTRUMENTATION LEGEND, SYMBOLS AND ABBREVIATIONS

DRAWING NO. I–01

REV. 0



NOTES:

1. INFLUENT FLOW METER TO BE ULTRASONIC TYPE, HYDRORANGER BY MILLTRONICS OR EQUAL.

Rev	Date	Description	By
1	x	RECORD DRAWINGS	RCL
0	4/16/04	ISSUE FOR CONSTRUCTION	RCL

Job No.	743061
Designed	XL
Drawn	XL
Checked	RL
Reviewed	JSD
Approved	RL
Reg. No.	
Date	2/20/04

Issue Certification

REYNOLDS INC.
121 ROBERTS ROAD, FAIRBURN, GA 30213

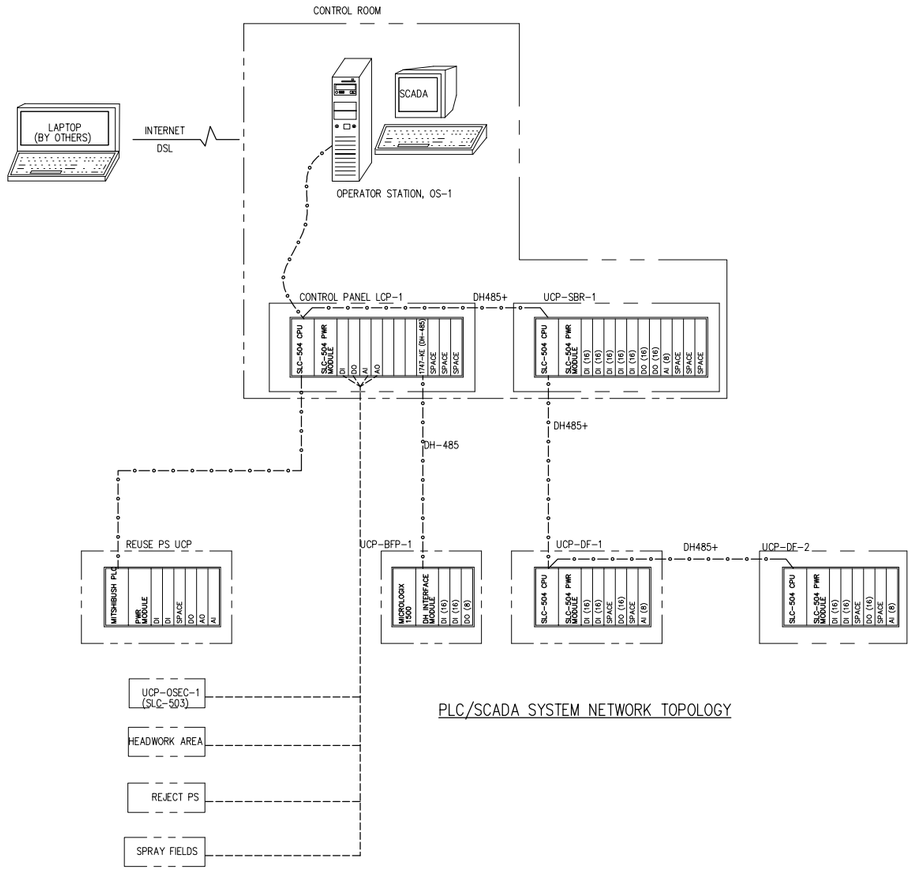
PARSONS
5390 Triangle Parkway, Suite 100,
Norcross, GA 30092, (770) 446-4900

City of Temple
Temple WRF

PROCESS AND INSTRUMENT DIAGRAM
INFLUENT TREATMENT UNITS

DRAWING NO. I-02

REV. 0



PLC/SCADA SYSTEM NETWORK TOPOLOGY

PLC COMMUNICATION CABLE
ELECTRICAL SIGNALS
FLEXIBLE CABLE

NOTES:
1. PLC I/O POINTS ARE SHOWN FOR SCHEMATIC PURPOSE, ACTUAL I/O POINTS NEED TO BE FIELD VERIFIED.

Rev	Date	Description	By
1	X	RECORD DRAWINGS	RCL
0	4/16/04	ISSUE FOR CONSTRUCTION	RCL

Issue Certification

Job No. 743061
Designed XL
Drawn XL
Checked RL
Reviewed JSD
Approved RL
Reg. No.
Date 2/20/04

REYNOLDS INC.
121 ROBERTS ROAD, FAIRBURN, GA 30213

PARSONS
5395 Triangle Parkway, Suite 100
Norcross, GA 30092, (770) 446-4900

City of Temple
Temple WRF

PLC/SCADA SYSTEM NETWORK TOPOLOGY

DRAWING NO. I-07

REV. 0

SCREEN

CPT

PUMP

WASHER

HAND OFF AUTO

FWD OFF REV

OFF ON

HAND OFF AUTO

HAND OFF AUTO

EMERGENCY STOP

HIGH TORQUE

HIGH TORQUE

HIGH TORQUE

HIGH TORQUE

HIGH LEVEL

RUN

RUN

RUN

FORWARD

REVERSE

WASH

3M

MS325

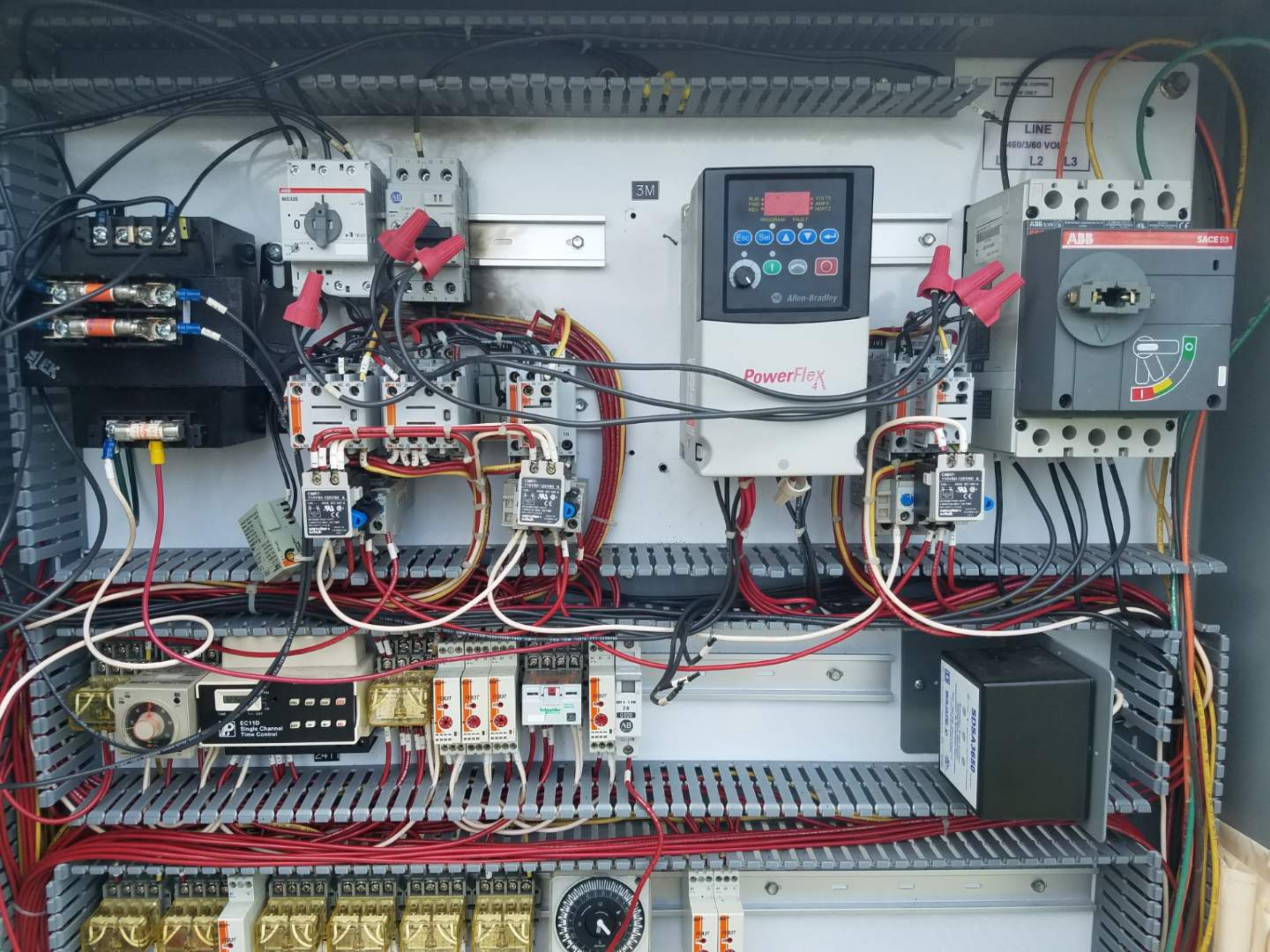
RUN
FWD
REV
VOLTS
AMPS
HERTZ
PROGRAM
FAULT
Esc
Sel
Allen-Bradley
PowerFlex 4

CMR7-110V50-120V60 A

EC11D
Single Channel
Time Control

FEA3T
FEB3T

G020


LINE
L2
L3
3M
Allen-Bradley
PowerFlex
ABB
SACE S3
EC11D
Single Channel
Time Control

POWER ON

RESET

SCREEN

HAND OFF AUTO

FWD OFF REV

EMERGENCY STOP

HIGH TORQUE

HIGH LEVEL

FORWARD

REVERSE

CPT

OFF ON

HIGH TORQUE

RUN

PUMP

HAND OFF AUTO

HIGH TORQUE

RUN

WASHER

HAND OFF AUTO

HIGH TORQUE

RUN

WASH

HAND OFF AUTO

RUN

SCREEN AND GRIT SYSTEM
SERIAL NO. 1616-03
SCHLOSS ENGINEERED EQUIPMENT, INC.