FULTON COUNTY

Vision
People Families
Neighborhoods

Mission
To serve, protect and
govern in concert with
local municipalities

Values

INVITATION TO BID# 11ITB79458K-MH

S131 Northeast Creek Pump Station Upgrade

For

DEPARTMENT OF PUBLIC WORKS

BID DUE DATE AND TIME: August 22, 2011 11:00 AM
BID ISSUANCE DATE: July 26, 2011
PRE-BID CONFERENCE DATE: Thursday, August 4, 2011
PURCHASING CONTACT: MARK HAWKS at (404) 612-5812
E-MAIL: mark.hawks@fultoncountyga.gov

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

DIVISION 00 – BIDDING AND CONTRACTING REQUIREMENTS

00020 Invitation to Bid

Description of Project
Permits
Right of Way/Easements
Bid Documents
Subcontracting Opportunities
Term of Contract
No Contact Provision
Bid Contact
Basis of Award
Pre-Bid Conference

00100 Instructions to Bidders

Contract Documents
Bid Preparation and Execution
Addenda and Interpretations
Site Examination
Bidder's Modification and Withdrawal of Bonds
Bid and Contract Security
Right to Reject Bids
Applicable Laws
Examination of Contract Documents
Indemnification and Hold Harmless Agreement
Bid Opening
Determination of Successful Bidder
Georgia Utility Contractors License
General Contractors License
Professional Licenses
Wage Clause
Notice of Award of Contract
Execution of Contract Documents
Joint Venture
Contractors Compliance with Procurement
Georgia Security and Immigration Compliance Act
Bid General Requirements

Required Bid Submittal Checklist for ITB

00300 Bid Form

00410 Bid Bond

00420 Purchasing Forms & Instructions

Form A- Non-Collusion Affidavit of Prime Bidder/Offeror
Form B- Certificate of Acceptance of Request for Bid Requirements
Form C- Contractor's Georgia Utility License Certification
Form C1 – Georgia Utility License Contractors License
Form C2 – Georgia General Contractors License
Form C3 – Georgia Professional License
Form D- Certification Regarding Debarment
Form E- Disclosure Form & Questionnaire
Form F – Declaration of Employee-Number Categories
Form G – Georgia Security and Immigration Contractor Affidavit and Agreement
Form H – Georgia Security and Immigration Subcontractor Affidavit

00430 Contract Compliance Requirements

Non-Discrimination in Contracting and Procurement
Required Forms and EBO Plan
Exhibit A – Promise of Non-Discrimination
Exhibit B – Employment Report
Exhibit C – Schedule of Intended Subcontractor Utilization
Exhibit D – Letter of Intent to Perform As a Subcontractor or Provide Materials or Services
Exhibit E – Declaration Regarding Subcontracting Practices
Exhibit F – Joint Venture Disclosure Affidavit
Exhibit G – Prime Contractor/Subcontractor Utilization Report
Exhibit H – First Source Jobs Program Agreement
Equal Business Opportunity Plan (EOB)

00490 Insurance and Risk Management Provisions

00500 Owner – Contractor Agreement

00610 Performance Bond

00620 Payment Bond

00700 General Conditions

DIVISION 01 – GENERAL REQUIREMENTS

01 0000 General Requirements
01 1000 Summary
01 2219 Measurement and Payment
01 2900 Payment Procedures
01 3100 Project Management and Coordination
Exhibit 1---RFI Form
01 3200 Construction Progress Documentation
01 3233 Photographic Documentation
01 3300 Submittal Procedures
01 4000 Quality Requirements
01 4200 References
01 5000 Temporary Facilities and Controls
01 5713 Temporary Erosion Prevention and Sediment Control
01 6000 Product Requirements
Substitution Request Form
01 7300 Execution

01 7700	Closeout Procedures
01 7823	Operation and Maintenance Data
01 7839	Project Record Documents
01 7900	Demonstration and Training

DIVISION 03 – CONCRETE

03 3000	Cast-In-Place Concrete

DIVISION 05 – METALS

05 5000	Metal Fabrications

DIVISION 23 – MECHANICAL

23 1123	Facility Natural-Gas Piping

DIVISION 26 – ELECTRICAL

26 0500	Requirements for Electrical Work
26 2419	Low Voltage Motor Control Centers
26 3213	Engine Generator

DIVISION 31 – EARTHWORK

31 0000	Earth Moving
31 5000	Excavation Support and Protection

DIVISION 32 – EXTERIOR IMPROVEMENTS

32 1313.16	Walks and Pads
32 1313.33	Pavement and Curbs

DIVISION 33 – UTILITIES

33 0130.13	Wastewater Flow Control
33 0516	Precast Concrete Utility Vault
33 1216	Valves
33 3120	Ductile Iron Pipe and Fittings

DIVISION 40 – PROCESS

40 2300	Process Piping
40 9443	Programmable Logic Process Controller
40 9513	Process Control Panels and Hardware

DIVISION 44 – POLLUTION CONTROL EQUIPMENT

44 4256	Dry Pit Submersible Wastewater Pumps

INVITATION TO BID

1.1 NORTHEAST CREEK PUMP STATION UPGRADE

Sealed Bids for furnishing all materials, labor, tools, equipment and appurtenances necessary for the construction of Northeast Creek Pump Station Upgrade will be received by the Fulton County Department of Purchasing and Contract Compliance at 130 Peachtree Street, S.W. Suite 1168 Atlanta, GA 30303, until 11:00a.m., local time, on Monday, August 22, 2011, and then at said office publicly opened and read aloud.

A. Description of Project:

The Project consists of the following major elements: replacement of two dry pit pumps with dry pit submersible pumps, piping and valve replacement, MCC replacement, replacement of the existing diesel backup generator with a new natural gas generator, and installation of a new bypass and flowmeter system.

Permits:

No permits will be needed for this project.

Rights of Way/Easements:

No easements or rights of ways need to be obtained.

B. Bid Documents:

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

McGraw Hill Construction Dodge
3200 Riverside Dr
STE 310
Macon, Georgia 31210

Fulton County
Public Works Department
STE 6001
141 Pryor ST, S.W., 6th Floor
Atlanta, Georgia30303

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

CMD / Construction Market Data
30 Technology Blvd
STE 100
Norcross Georgia 30092

FW Dodge Corporation
4170 Ashford-Dunwoody Rd
STE 200
Atlanta, Georgia 30319

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

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

Applications for documents, along with a non-refundable $50.00 payment must be made to Department of Public Works, 141 Pryor Street, S.W., Suite 6001, Atlanta, Georgia 30303. Payment must be in the form of a company or personal check payable to Fulton County

Department of Public Works. Checks returned for any reason will result in the bid being deemed non-responsive. This amount includes all fees for printing and distribution and will be used to defray a portion of the printing cost that may have been incurred for the tendering of the Project. Partial sets of the bid document will not be issued.

For payment information, contact Keithly Wynter, Department of Public Works at 404-612-7556. All other questions should be addressed by the procedures outlined in this ITB to Mark Hawks, Fulton County Department of Purchasing and Contract Compliance at 404-612-5812, mark.hawks@fultoncountyga.gov.

Subcontracting Opportunities:

Potential prime contractors submitting a bid on this project for Fulton County and are seeking subcontractors and/or suppliers can advertise those subcontracting opportunities on the County's website, http://www.fultoncountyga.gov under "Subcontracting Bid Opportunities".

C. Term of Contract:

The Bidder agrees hereby to commence work under this Contract, with adequate personnel and equipment, on a date to be specified in a written order of the Contracting Officer and to fully complete all work under this Contract within 120 consecutive calendar days from and including said date.

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

D. No Contact Provision

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

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

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

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

E. Bid Contact

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

Fulton County Department of Purchasing and Contract Compliance
Attn: Mark Hawks, Assistant Purchasing Agent
Fulton County Public Safety Building
130 Peachtree Street, S.W. Suite 1168
Atlanta, GA 30303
Phone: (404) 612-5812
Fax: (404) 893-1744
Reference Bid # 11ITB79458K-MH

Or mark.hawks@fultoncountyga.gov

Basis of Award

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

F. Pre-Bid Conference

Date: **August 4, 2011**
Time: **10:00AM**
Location: **Northeast Creek Pump Station**
8086 Nesbit Ferry Road
Sandy Springs, Georgia

A pre-bid conference will be held at the Northeast Creek Pump Station jobsite, immediately followed by a site tour to allow potential bidders to inspect the facility. *Inquiries regarding the solicitation either technical or otherwise may be submitted in writing prior to the pre-bid conference and will be addressed at the pre-bid conference.* Any additional questions asked at the pre-bid conference must be submitted in written form at the pre-bid conference and will be responded to in the form of an addendum with the County's official responses.

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

END OF SECTION

INSTRUCTIONS TO BIDDERS

A. Contract Documents

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

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

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

B. Bid Preparation and Execution

All Bids must be made on the Bid forms contained herein. The original signed Bid with three (3) copies shall be submitted in a sealed envelope, addressed to the Department of Purchasing and Contract Compliance, Fulton County Public Safety Building, 130 Peachtree Street, S.W., Suite 1168 Atlanta, Georgia 30303, and labeled "Bid for ITB- S131 Northeast Creek Pump Station Upgrade.

Additionally, THE BIDDER IS ALSO REQUIRED TO WRITE THEIR GEORGIA UTILITY CONTRACTOR LICENSE NUMBER ON THE OUTSIDE OF THE SEALED BID ENVELOPE.

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

Bid Form
Acknowledgement of each Addendum
Bid Bond
Purchasing Forms (See Submittal Check List at end of this Section), fully executed
Contract Compliance Forms (See Submittal Check List at end of this Section), fully executed
Risk Management Insurance Provisions Form
References- 2- Waste Water Construction Experience- 5 years.

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

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

C. Addenda and Interpretations

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

Bidders requiring clarification or interpretation of the Contract Documents shall make a request in writing, either by mail, hand delivery, e-mail or fax, to the Purchasing Agent at the address below. To be given consideration, requests must be received no later than 2:00 PM, August 11, 2011. The County will not respond to any requests, oral or written, received after this date. Telephone inquiries will not be accepted.

Fulton County Department of Purchasing and Contract Compliance
Attn: Mark Hawks, Assistant Purchasing Agent
Fulton County Public Safety Building
130 Peachtree Street, S.W., 1168
Atlanta, GA 30303
Fax: (404) 893-1744
mark.hawks@fultoncountyga.gov
Reference Bid # 11ITB79458K-MH

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

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

D. Site Examination

Potential bidders are invited to examine the site immediately following the pre-bid meeting on August 4, 2011.

E. Bidder's Modification and Withdrawal of Bids

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

F. Bid and Contract Security

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

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

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

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

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

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

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

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

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

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

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

G. Right to Reject Bids

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

H. Applicable Laws

All applicable laws and regulations of the State of Georgia and ordinances and regulations of Fulton County shall apply. Protestors shall seek resolution of their complaints in the manner provided in the Fulton County Code of Laws §2-324, which is incorporated by reference herein.

I. Examination of Contract Documents

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

J. Indemnification and Hold Harmless Agreement

See Section 00490, Insurance and Risk Management Provisions page 3, Indemnification and Hold Harmless Agreement

K. Bid Opening

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

L. Determination of Successful Bidder

Fulton County desires to complete this work in a timely manner. The Contract will be awarded to the lowest responsive, responsible bidder(s), if awarded.

1. Responsibility: The determination of the bidder's responsibility will be made by the County based on whether the bidder meets the following minimum requirements:
The County reserves the right to reject any bid if the evidence submitted by, or investigation of, the bidder fails to satisfy the County that he/she is properly qualified to carry out the obligations of the Contract.
Maintains a permanent place of business individually or in conjunction with the prime contractor.
Has the appropriate and adequate technical experience. Designated Project Manager must be proficient in all aspects of contracted work.
Has adequate personnel and equipment to do the work expeditiously.
Has suitable financial means to meet obligations incidental to the work.

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

M. Georgia Utility Contractors License

GEORGIA UTILITY CONTRACTOR'S LICENSE

A Utility Contractor's License is required to perform this work in accordance with O.C.G.A. §43-14-8.2(h). Bids for utility contracting projects must be from a licensed utility contractor and that licensed contractor must be the prime on this project. **It is not permissible for an unlicensed individual/firm to subcontract with a licensed utility contractor for this project. Form C1: Georgia Utility License Certification in Section 5, Purchasing Forms must be completed and submitted by the contractor performing the work.**

N. General Contractors License

Effective July 1, 2008, all general contractors are required to be licensed by the State of Georgia to perform the following work; construction; construction management services; or design-build services as a prime contractor, joint venture partner, or as a subcontractor to a design professional acting as prime contractor as part of a design-build entity or combination, unless exempted from holding such license pursuant to Georgia law (O.C.G.A. 43-41-17). If exempted, Contractor must submit a copy of their Georgia Department of Transportation Certificate of Qualification with their bid submittal.

Bidders must complete Form C2: Georgia General Contractors License Certification in Section 6, Purchasing Forms. Failure to provide the required license shall deem your bid non-responsive.

O. Professional Licenses

The State of Georgia requires that the following professions are required by state law to be licensed:

Electricians
Plumbers
Conditioned Air Contractors
Low voltage Contractors

Bidders and any sub-contractors performing any of the above described work must provide a copy of their license for the work they will perform on this project. Bidders must complete Form C3: Georgia Professional License Certification in Section 6, Purchasing Forms Failure to provide the required license may deem your bid non-responsive.

P. Wage Clause

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

Q. Notice of Award of Contract

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

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

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

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

R. Execution of Contract Documents

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

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

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

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

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

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

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

S. Joint Venture

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

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

Should any Bidder submit a response to the County promising to provide a certain level of service for either the scope of work, MFBE participation, or any other matter, including where such promise or assurance is greater than what is required by the procurement documents, and should

this response containing the promise or assurance be accepted by the County and made a part of the Contract Documents, then this degree or level of service promised by the bidder relating to the scope of work, MFBE participation, or other matter shall be considered to be a material part of the Agreement between the bidder and the County, such that the bidder's failure to provide the agreed upon degree or level of service or participation shall be a material breach of the Agreement giving the County just cause to terminate the Agreement for cause, pursuant to the General Conditions of the Agreement.

U. Georgia Security and Immigration Compliance Act

This Invitation to Bid is subject to the Georgia Security & Immigration Compliance Act. Pursuant to the Georgia Security & Immigration Compliance Act of 2006, as amended on May 11, 2009, bidders and proposers are notified that all bids/proposals for services that are to be physically performed within the State of Georgia must be accompanied by proof of their registration with and continuing and future participation in the E-Verify program established by the United States Department of Homeland Security. A completed affidavit must be submitted on the top of the bid/proposal at the time of submission, prior to the time for opening bids/proposals. Under state law, the County cannot consider any bid/proposal which does not include a completed affidavit. It is not the intent of this notice to provide detailed information or legal advice concerning the Georgia Security & Immigration Compliance Act. All bidders/proposers intending to do business with the County are responsible for independently apprising themselves and complying with the requirements of that law and its effect on County procurements and their participation in those procurements. For additional information on the E-Verify program or to enroll in the program, go to: https://e-verify.uscis.gov/enroll.

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

V. Bid General Requirements

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

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

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

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

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

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

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

Any inquiries, questions, clarifications or suggestions regarding this solicitation should be submitted in writing to the Purchasing Contact Person. Contact with any other County personnel in regard to a current solicitation is strictly prohibited in accordance with Fulton County "No Contact Provision" policy outlined in S35 and in Section 00020, Invitation to Bid.

Show information and prices in the format requested. Prices are to be quoted F.O.B. Destination, and must include all costs chargeable to the Contractor executing the Contract, including taxes. Unless otherwise provided in the Contract, Fulton County shall have no liability for any cost not included in the price. The Contractor shall provide Fulton County the benefit through a reduction in price of any decrease in the Contractor's costs by reason of any tax exemption based upon Fulton County's status as a tax-exempt entity.

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

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

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

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

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

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

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

A successful Bidder's delivery ticket(s) and invoice(s) must list each item separately and must show Fulton County's purchase order number as well as the proper department and address to

which delivery was made, as listed on the purchase order or in the Bidder's contract with Fulton County.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Compliant to the specification – meets form, fit, and function requirements stated or implied in the specification.
Lowest cost to the County over projected useful life.
Administratively Compliant – Including all required bonds, insurance, established quality of work and general reputation, financial responsibility, relevant experience, and related criteria.

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

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

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

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

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

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

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

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

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

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

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

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

Item #	Required Bid Submittal Check List	Check (√)
1	Bid Form (Section 00300) – All dollar amounts must be both in writing AND figures and represent prices for the published scope of work without exceptions.	
2	Acknowledgement of each Addendum (acknowledged both on the Bid Form, Section 00300, and on the form included with each addendum).	
3	Bid Bond (Section 00410) (separate envelope if Public Works Construction project)	
4	Purchasing Forms (Section 00420) Form A - Non-Collusion Affidavit of Prime Bidder/Offeror Form B - Certificate of Acceptance of Request for Bid/Proposal Requirements Form C1- Georgia Utility Contractor License Form C2- Georgia General Contractors License Form C3- Georgia Professional Licenses Form D - Certificate Regarding Debarment Form E - Disclosure Form & Questionnaire Form F - Declaration of Employee-Number Categories Form G - Georgia Security and Immigration Contractor Affidavit and Agreement Form H - Georgia Security and Immigration Subcontractor Affidavit	
5	Office of Contract Compliance Requirements (Section 00430) Exhibit A - Promise of Non-Discrimination (for Prime and each Sub) Exhibit B - Employment Record (for Prime and each Sub) Exhibit C - Schedule of Intended Subcontractor Utilization Exhibit D - Letter of Intent to Perform as Subcontractor Exhibit E - Declaration Regarding Subcontractor Practices Exhibit F - Joint Venture Disclosure Affidavit Exhibit G - Prime Contractor/Subcontractor Utilization Report Equal Business Opportunity Plan (EBO Plan)	
6	Risk Management Insurance Provisions Form (Section 00490) and proof of insurance, either letter from insurer or Certificate of Insurance.	
7	Reference Requirements- 2- Wastewater Construction Experience- 5 years	

END OF SECTION

Section 00300

Bid Form

BID FORM

Submitted To: Fulton County Government

Submitted By: _____

For: Northeast Creek Pump Station Upgrade

Submitted on _____, 20__.

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

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

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

THE BASE BID IS THE AMOUNT UPON WHICH THE BIDDER WILL BE FORMALLY EVALUATED AND WHICH WILL BE USED TO DETERMINE THE LOWEST RESPONSIBLE BIDDER.

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

BASE BID AMOUNT, TOTAL, ITEMS 1 THROUGH 2 (BELOW) INCLUSIVE:

$

(Dollar Amount In Numbers)

_

(Dollar Amount in Words)

Method of Bidding

The unit or lump sum price for each of the several items in the Bid of each Bidder shall include its pro rata share of overhead and profit so that the sum of the products, obtained by multiplying the quantity shown for each item by the unit price, represents the total Bid. Any Bid not conforming to this requirement may be rejected. Additionally, Unbalanced Bids or conditional Bids will be

subject to rejection. The special attention of all Bidders is called to this provision, for should conditions make it necessary to revise the quantities, no limit will be fixed for such increased or decreased quantities nor extra compensation allowed.

ITEM 1 – Furnishing all products, materials and equipment and performing all labor necessary to complete and put into operation the Northeast Creek Pump Station Upgrade, including all work shown on the Drawings and/or Specified, and not included in Item 2 through 3 below, the amount of:

DOLLARS ($

).

ITEM 2 - ALLOWANCES

Owner directed allowance $50,000

BID DATA

The Bidder shall designate below the one manufacturer for each product to be furnished and installed if awarded the Work.

1. Product: Dry-Pit Submersible Wastewater Pumps
   Manufacturer:_____

2. Product: Natural Gas Generator
   Manufacturer:_____

3. Product: Motor Control Centers
   Manufacturer:_____

The Bidder agrees hereby to commence work under this Contract, with adequate personnel and equipment, on a date to be specified in a written order of the Contracting Officer and to fully complete all work under this Contract within One Hundred and Twenty (120) consecutive calendar days from notice to proceed.

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

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

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

–

Dollars

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

Section 00300

Bid Form

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

ADDENDUM # _____ DATED _____

ADDENDUM # _____ DATED _____

ADDENDUM # _____ DATED _____

ADDENDUM # _____ DATED _____

BIDDER: _____

Signed by: _____

[Type or Print Name]

Title: _____

Business Address: _____

Business Phone: _____

Bidder's Contractor License No: _____

[State/County]

License Expiration Date: _____

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

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

Section 00300

Bid Form

Name Address

END OF SECTION

Section 00410

Bid Bond

BID BOND

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

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

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

Section 00410

Bid Bond

BID BOND

S131 NORTHEAST CREEK PUMP STATION UPGRADE

FULTON COUNTY GOVERNMENT

KNOW ALL MEN BY THESE PRESENTS, THAT WE_____

_____

_____

hereinafter called the PRINCIPAL, and _____

_____

_____

hereinafter call the SURETY, a corporation chartered and existing under the laws of the State of _____

and duly authorized to transact Surety business in the State of Georgia, are held and firmly bound unto the Fulton County Government (COUNTY), in the penal sum of _____

_____Dollars and Cents

($_____

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

WHEREAS the PRINCIPAL has submitted to the COUNTY, for S131 Northeast Creek Pump Station Upgrade, a Bid;

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

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

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

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

_____

_____Dollars

($_____

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

(SIGNATURES ON NEXT PAGE)

Section 00410

Bid Bond

IN TESTIMONY THEREOF, the PRINCIPAL and SURETY have caused these presents to be duly signed and sealed this _____day of _____, 20__

ATTEST:

PRINCIPAL

_____ BY_

(SEAL)

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____

_____, certify that I am the Secretary of the Corporation

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

_____

SECRETARY
(CORPORATE SEAL)

_____

SURETY

_____ BY_____

(SEAL)

END OF SECTION

Section 00410

Bid Bond

2 PURCHASING FORMS & INSTRUCTIONS

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

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

Form A: Non-Collusion Affidavit of Prime Bidder/Offeror

Form B: Certificate of Acceptance of Request for Bid/Proposal Requirements

Form C: Professional License Certifications (if applicable)

Form C1 – Georgia Utility License Contractor License
Form C2 – Georgia General Contractors License
Form C3 – Georgia Professional License

Form D: Certification Regarding Debarment

Form E: Disclosure Form and Questionnaire

Form F: Georgia Security and Immigration Contractor Affidavit and Agreement

Form G: Georgia Security and Immigration Subcontractor Affidavit

3 FORM A: NON-COLLUSION AFFIDAVIT OF BIDDER/OFFEROR

3.1 STATE OF GEORGIA

3.2 COUNTY OF FULTON

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

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

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

_____
(COMPANY NAME)

_____
(PRESIDENT/VICE PRESIDENT)

Sworn to and subscribed before me this _____ day of _____, 20__.

_____
(SECRETARY/ASSISTANT SECRETARY)

(Affix corporate seal here, if a corporation)

Notary Public: _____

County: _____

Commission Expires: _____

NOTE:

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

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

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

5 REQUIREMENTS

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

Company: _____

Signature: _____

Name: _____

Title: _____

Date: _____

(Corporate Seal)

6 FORM C1: CONTRACTOR'S GEORGIA UTILITY LICENSE CERTIFICATION

Contractor's Name: _____

Utility Contractor's Name: _____

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.

Signed: _____

Date: _____

7 (ATTACH COPY OF LICENSE)

8 FORM C2: CONTRACTOR'S GEORGIA GENERAL CONTRACTOR'S LICENSE CERTIFICATION

Contractor's Name: _____

General 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.

Signed: _____

Date: _____

(ATTACH COPY OF LICENSE)

9 FORM C3: GEORGIA PROFESSIONAL LICENSE CERTIFICATION

NOTE: Please complete this form for the work your firm will perform on this project.

Contractor's Name: _____

Performing work as: Prime Contractor_____Sub-Contractor _____

Professional License Type: _____

Professional 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.

Signed: _____

Date: _____

(ATTACH COPY OF LICENSE)

10 FORM D: CERTIFICATION REGARDING DEBARMENT

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

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

INSTRUCTIONS FOR CERTIFICATION

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

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

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

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

DEBARMENT ORDINANCE

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

(a) Authority to suspend.

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

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

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

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

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

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

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

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

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

Falsification of any documents.

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

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

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

[SIGNATURES ON NEXT PAGE]

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

On this day of, 20

(Legal Name of Offeror)

(Date)

(Signature of Authorized Representative)

(Date)

(Title)

FORM E: DISCLOSURE FORM AND QUESTIONNAIRE

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

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

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

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

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

LITIGATION DISCLOSURE:

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

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

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

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

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

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

Circle One: YES NO

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

Circle One: YES NO

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

Circle One: YES NO

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

Circle One: YES NO

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

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

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

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

[SIGNATURES ON NEXT PAGE]

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

On this day of , 20

(Legal Name of Proponent)

(Date)

(Signature of Authorized Representative) (Date)

(Title)

Sworn to and subscribed before me,

this day of 20

(Notary Public)(Seal)

Commission Expires
(Date)

FORM F: GEORGIA SECURITY AND IMMIGRATION CONTRACTOR AFFIDAVIT AND AGREEMENT

Instructions:

Contractors must attest to compliance with the requirements of O.C.G.A 13-10-91 and the Georgia Department of Labor Rule 300-10-01-.02 by executing the Contractor Affidavit provided. The affidavit should be executed by Contractors who have indicated on Form F, Declaration of Employee-Number Categories, that they have 100 or more employees.

STATE OF GEORGIA

COUNTY OF FULTON

10.1 FORM F:GEORGIA SECURITY AND IMMIGRATION CONTRACTOR AFFIDAVIT AND AGREEMENT

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract with [insert name of prime contractor] _____ on behalf of Fulton County Government has registered with and is participating in a federal work authorization program* [any of the electronic verification of work authorization programs operated by the United States Department of Homeland Security or any equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603], in accordance with the applicability provisions and deadlines established in O.C.G.A. 13-10-91.

The undersigned further agrees that, should it employ or contract with any subcontractor(s) in connection with the physical performance of services to this contract with Fulton County Government, contractor will secure from such subcontractor(s) similar verification of compliance with O.C.G.A/ 13-10-91 on the Subcontractor Affidavit provided in Rule 300-10-01-.08 or a substantially similar form. Contractor further agrees to maintain records of such compliance and provide a copy of each such verification to the Fulton County Government at the time the subcontractor(s) is retained to perform such service.

_____
EEV/Basic Pilot Program* User Identification Number

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

_____
Title of Authorized Officer or Agent of Subcontractor

_____
Printed Name of Authorized Officer or Agent

Sworn to and subscribed before me this _____ day of _____, 20__.

Notary Public: _____

County: _____

Commission Expires: _____

Notary Public: _____

County: _____

Commission Expires: _____

NOTE:

* As of the effective date of O.C.G.A. 13-10-91, the applicable federal work authorization program is the “EEV/Basic Pilot Program” operated by the U.S. Citizenship and Immigration Services Bureau of the U.S. Department of Homeland Security, in conjunction with the Social Security Administration (SSA).

FORM G: GEORGIA SECURITY AND IMMIGRATION SUBCONTRACTOR AFFIDAVIT

Instructions:

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

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

STATE OF GEORGIA

COUNTY OF FULTON

10.2 FORM G: GEORGIA SECURITY AND IMMIGRATION SUBCONTRACTOR AFFIDAVIT

By executing this affidavit, the undersigned subcontractor verifies its compliance with O.C.G.A. 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract with [insert name of prime contractor] _____behalf of Fulton County Government has registered with and is participating in a federal work authorization program* [any of the electronic verification of work authorization programs operated by the United States Department of Homeland Security or any equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603], in accordance with the applicability provisions and deadlines established in O.C.G.A. 13-10-91.

_____
EEV/Basic Pilot Program* User Identification Number

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

_____
Title of Authorized Officer or Agent of Subcontractor

_____
Printed Name of Authorized Officer or Agent

Sworn to and subscribed before me this _____ day of _____, 20__.

Notary Public: _____

County: _____

Commission Expires: _____

Section 00420

Purchasing Forms & Instructions

NOTE:

* As of the effective date of O.C.G.A. 13-10-91, the applicable federal work authorization program is the “EEV/Basic Pilot Program” operated by the U.S. Citizenship and Immigration Services Bureau of the U.S. Department of Homeland Security, in conjunction with the Social Security Administration (SSA).

END OF SECTION

CONTRACT COMPLIANCE REQUIREMENTS

NON-DISCRIMINATION IN PURCHASING AND CONTRACTING

It is the policy of Fulton County Government that discrimination against businesses by reason of the race, color, gender or national origin of the ownership of any such business is prohibited. Furthermore, it is the policy of the Board of Commissioners ("Board") that Fulton County and all vendors and contractors doing business with Fulton County shall provide to all businesses the opportunity to participate in contracting and procurement paid, in whole or in part, with monetary appropriations of the Board without regard to the race, color, gender or national origin of the ownership of any such business. Similarly, it is the policy of the Board that the contracting and procurement practices of Fulton County should not implicate Fulton County as either an active or passive participant in the discriminatory practices engaged in by private contractors or vendors seeking to obtain contracts with Fulton County.

Implementation of Equal Employment Opportunity (EEO) Policy

The County effectuates Equal Employment Opportunity thru Policy #800-8, Non-Discrimination in Contracting and Procurement. This policy considers racial and gender workforce availability. The availability of each workgroup is derived from the work force demographics set forth in the 2000 Census EEO file prepared by the United States Department of Commerce for the applicable labor pool normally utilized for the contract.

Monitoring of EEO Policy

Upon award of a contract with Fulton County, the successful bidder/proposer must complete an Equal Employment Opportunity Report (EEOR), describing the racial and gender make-up of the firm's work force. If the EEOR indicates that the firm's demographic composition indicates underutilization of employee's of a particular ethnic group for each job category, the firm will be required to submit an aggressive action plan setting forth steps the firm will take to address the identified underutilization.

Determination of Good Faith Efforts

During the course of the project, the Prime Contractor shall demonstrate that they have made all efforts reasonably possible to ensure that Minority and Female Business Enterprises (MFBE) have had a full and fair opportunity to compete and win subcontracts on this project. The Prime Contractor is required to include all outreach attempts that would demonstrate a "Good Faith Effort" in the solicitation of sub-consultants/subcontractors.

Written documentation demonstrating the Prime Contractor's outreach efforts to identify, contact, contract with or utilize Minority or Female owned businesses shall include holding pre-bid conferences, publishing advertisements in general circulation media, trade association publications, minority-focused media, and the County's bid board, as well as other efforts.

Include a list of publications where the advertisement was placed as well as a copy of the advertisement. Advertisement shall include at a minimum, scope of work, project location, location(s) of where plans and specifications may be viewed or obtained and trade or scopes of work for which subcontracts are being solicited.

Equal Business Opportunity Plan (EBO Plan)

In addition to the proposal submission requirements, each vendor **must** submit an Equal Business Opportunity Plan (EBO Plan) with their bid/proposal. The EBO Plan is designed to

enhance the utilization of a particular racial, gender or ethnic group by a bidder/proposer, contractor, or vendor or by Fulton County. The respondent **must** outline a plan of action to encourage and achieve diversity and equality in the available procurement and contracting opportunities with *this solicitation*.

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

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

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

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

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

REQUIRED FORMS AND EBO PLAN

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

Exhibit A – Promise of Non-Discrimination
Exhibit B – Employment Report
Exhibit C – Schedule of Intended Subcontractor Utilization
Exhibit D – Letter of Intent to Perform as a Subcontractor or Provide Materials or Services
Exhibit E – Declaration Regarding Subcontractors Practices
Exhibit F – Joint Venture Disclosure Affidavit
Equal Business Opportunity Plan (EBO Plan). This document is not a form rather a statement created by the bidder/proposer on its company letter head addressing the EBO Plan requirements.
Exhibit H – First Source Jobs Program Information, Form 2

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

Exhibit G – Prime Contractor's Subcontractor Utilization Report
Exhibit H – First Source Jobs Program Agreement, Form 3

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

EXHIBIT A – PROMISE OF NON-DISCRIMINATION

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

_____
Title

Firm Name

Hereinafter "Company", in consideration of the privilege to bid on or obtain contracts funded, in whole or in part, by Fulton County, hereby consent, covenant and agree as follows:

No person shall be excluded from participation in, denied the benefit of, or otherwise discriminated against on the basis of race, color, national origin or gender in connection with any bid submitted to Fulton County for the performance of any resulting there from,

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

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

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

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

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

SIGNATURE:_____

ADDRESS:_____

TELEPHONE NUMBER:_____

EXHIBIT B – EMPLOYMENT REPORT

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

JOB CATEGORIES	TOTAL EMPLOYED		TOTAL MINORITIES		WHITE (Not Hispanic Origin)		BLACK or AFRICAN AMERICAN (Not of Hispanic Origin)		HISPANIC or LATINO		AMERICAN INDIAN or ALASKAN NATIVE (AIAN)		ASIAN		NATIVE HAWAIIAN or OTHER PACIFIC ISLANDER (NHOP)		TWO or MORE RACES	
EXECUTIVE/SENIOR LEVEL OFFICIALS and MANAGERS																		
FIRST/MID LEVEL OFFICIALS and MANAGERS																		
PROFESSIONALS																		
TECHNICIANS																		
SALES WORKERS																		
ADMINISTRATIVE SUPPORT WORKERS																		
CRAFT WORKERS																		
OPERATIVES																		
LABORERS & HELPERS																		

SERVICE WORKERS																		
TOTAL																		

FIRMS'S NAME _____

ADDRESS _____

TELEPHONE _____

This completed form is for (Check only one): _____ Bidder/Proposer _____ Subcontractor

Submitted by: _____ Date Completed: _____

EXHIBIT C - SCHEDULE OF INTENDED SUBCONTRACTOR UTILIZATION

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

Prime Bidder/Proposer:_____

ITB/RFP Number:_____

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

_____

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

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

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

SUBCONTRACTOR NAME:_____
ADDRESS:_____
_____
PHONE:_____
CONTACT PERSON:_____
ETHNIC GROUP*:_____COUNTY CERTIFIED**_____
WORK TO BE PERFORMED:_____
_____
DOLLAR VALUE OF WORK: $ PERCENTAGE VALUE: %

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

SUBCONTRACTOR NAME:_____
ADDRESS:_____

_____
PHONE:_____
CONTACT PERSON:_____
ETHNIC GROUP*:_____COUNTY CERTIFIED**_____
WORK TO BE PERFORMED:_____

_____
DOLLAR VALUE OF WORK: $ PERCENTAGE VALUE: %

SUBCONTRACTOR NAME:_____
ADDRESS:_____

_____
PHONE:_____
CONTACT PERSON:_____
ETHNIC GROUP*:_____COUNTY CERTIFIED**_____
WORK TO BE PERFORMED:_____

_____
DOLLAR VALUE OF WORK: $ PERCENTAGE VALUE: %

SUBCONTRACTOR NAME:_____
ADDRESS:_____

_____
PHONE:_____
CONTACT PERSON:_____
ETHNIC GROUP*:_____COUNTY CERTIFIED**_____
WORK TO BE PERFORMED:_____

_____
DOLLAR VALUE OF WORK: $ PERCENTAGE VALUE: %

SUBCONTRACTOR NAME:_____
ADDRESS:_____

_____
PHONE:_____
CONTACT PERSON:_____
ETHNIC GROUP*:_____COUNTY CERTIFIED**_____
WORK TO BE PERFORMED:_____

_____
DOLLAR VALUE OF WORK: $ PERCENTAGE VALUE: %

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

Total Dollar Value of Subcontractor Agreements: ($)

Total Percentage Value: (%)

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

Signature:_____ Title:_____

Firm or Corporate Name:_____

Address:_____

Telephone: ( )_____

Fax Number: ( )_____

Email Address:_____

EXHIBIT D

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

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

To: _____
(Name of Prime Contractor Firm)

From: _____
(Name of Subcontractor Firm)

ITB/RFP Number:_____

Project Name:_____

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

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

(Prime Bidder)

Signature_____

Title_____

Date_____

(Subcontractor)

Signature_____

Title_____

Date_____

EXHIBIT E - DECLARATION REGARDING SUBCONTRACTING PRACTICES

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

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

perform 100% of the work required for_____
(ITB/RFP Number)

_____
(Description of Work)

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

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

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

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

AUTHORIZED COMPANY REPRESENTATIVE

Name: Title: Date:

_____

Signature:_____

Firm:_____

Address:_____

Phone Number:_____

Fax Number:_____

Email Address:_____

EXHIBIT F - JOINT VENTURE DISCLOSURE AFFIDAVIT

ITB/RFP No._____

Project Name_____

This form must be completed and submitted with the bid/proposal if a joint venture approach is to be undertaken.

In order to evaluate the extent of small, minority and female business involvement being proposed by a Bidder/Proposer, certain relevant information must be provided prior to contract award. The information requested below is to clearly identify and explain the extent of small business participation in the proposed joint venture. All items must be properly addressed before the business entity can be evaluated.

1) Firms:

1) Name of Business:_____
Street Address:_____
Telephone No.:_____
Nature of Business:_____

2) Name of Business:_____
Street Address:_____
Telephone No.:_____
Nature of Business:_____

3) Name of Business:_____
Street Address:_____
Telephone No.:_____
Nature of Business:_____

NAME OF JOINT VENTURE (If applicable):_____

ADDRESS:_____

_____

PRINCIPAL OFFICE:

OFFICE PHONE:_____

Note: Attach additional sheets as required

Describe the capital contributions by each joint venturer and accounting thereof.

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

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

Describe the estimated contract cash flow for each joint venturer.

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

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

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

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

Describe the experience and business qualifications of each joint venturer.

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

Percent of Minority/Female Business Enterprises ownership by each joint venture in terms of profit and loss sharing:_____

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

Number of personnel to be involved in project, their crafts and positions and whether they are employees of the Minority/Female Business Enterprises enterprise, the majority firm or the joint venture: _____

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

Name	Race	Sex	Financial Decisions	Supervision Field Operation

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

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

FOR_

_____

(Company)

Date: _____ _____

(Signature of Affiant)

(Printed Name)

(Company)

Date:_____ _____

(Signature of Affiant)

(Printed Name)

State of_____:

County of_____:

On this _____ day of _____, 20_____, before me, appeared _____, the undersigned officer, personally appeared _____ known to me to be the person described in the foregoing Affidavit and acknowledges that he (she) executed the same in the capacity therein stated and for the purpose therein contained.

EXHIBIT – G PRIME CONTRACTOR/SUB-CONTRACTOR UTILIZATION REPORT

This report **must** be submitted by the **tenth day** of each month, along with a copy of your monthly invoice (schedule of values/payment application) to Contract Compliance. Failure to comply **shall** result in the County commencing proceedings to impose sanctions to the prime contractor, in addition to pursuing any other available legal remedy. Sanctions may include the suspending of any payment or part thereof, termination or cancellation of the contract, and the denial of participation in any future contracts awarded by Fulton County.

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

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

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

SUBCONTRACTOR UTILIZATION (add additional rows as necessary)

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

TOTALS						

Executed By: _____
(Signature) (Printed Name)

Notary: _____ **Date:** _____ **My Commission Expires:**

_____

Should you have questions regarding any of the documents contained in Section 6, please feel free to contact the Office of Contract Compliance at (404) 763-6300, for further assistance.

EXHIBIT H

FULTON COUNTY FIRST SOURCE JOBS PROGRAM

STATEMENT OF POLICY:

It is the policy of Fulton County Government to provide employment opportunities to the citizens of Fulton County. This policy will apply to all contracts procured through the Department of Purchasing & Contract Compliance valued in excess of $200,000. The Prime Contractor is expected to utilize the First Source Jobs Program to fill 50% of the entry level jobs which arise as a result of any project funded in whole or in part with County funds with residents of Fulton County.

PURPOSE:

The purpose of this policy is to create a pool of employable persons who are residents of Fulton County to be called upon as a source to fill jobs created as a result of any eligible project funded in whole or in part with County funds in order to provide stable economic opportunities for families throughout the County. The First Source Jobs Program will be implemented by the Department of Purchasing & Contract Compliance and the Office of Workforce Development.

MONITORING POLICY:

Upon execution of a contract with Fulton County Government, the First Source Jobs Agreement (FSJ Form 2) will become a part of the contract between the bidder/proposer and Fulton County Government. The First Source Jobs Program will be monitored during routine site visits by the Office of Contract Compliance along with the Office of Workforce Development.

FORM 1

FULTON COUNTY

First Source Jobs Program Information

Company Name: _____

Project Number: _____

Project Name:

The following entry-level positions will become available as a result of the above referenced contract with Fulton County.

1.

2.

3.

4.

5.

6.

Include a job description and all required qualifications for each position listed above.

Identify a company representative and contact phone number who will be responsible for coordinating with the First Source Jobs Program:

Company Representative: _____

_____

_____

Phone Number: _____

_____

_____

Email Address: _____

FORM 2

FULTON COUNTY

First Source Jobs Program Agreement

Awarded Contractor's Name: _____

Formal Contract Name: _____

RFP/ITB Number: _____

Contact Person: _____

Contact Phone: _____

The contractor listed above agrees to the following:

The contractor shall make a good faith effort to fill 50% of the entry level position(s) created by this project using the Fulton County First Source Jobs Program.

The contractor shall provide the applicable details of every entry level job in writing within the required form.

The contractor shall be expected to present documentation that confirms employment terms to both the employee and Fulton County.

The Office of Contract Compliance will assist with monitoring the participation of First Source Jobs Program employees during routine site visits and report findings to the Office of Workforce Development for confirmation and follow-up. The Office of Workforce Development shall notify the Director of Human Services and the Purchasing Agent of any determination of non-compliance with the requirements of this policy and recommend a resolution or action to be taken.

Upon a determination by the Purchasing Agent and the Director of Human Services that a contractor has failed to comply with any portion of this policy, the County may impose the following:

1. Ten percent (10%) of all future payments under the involved eligible project shall be entitled to be withheld from a contractor that has violated this policy until the contractor complies with the provisions of this policy.

The undersigned agrees to the terms and conditions set forth in this agreement.
Contractor's Official Title: _____ Date: _____
Contractor's Name: _____
Contractor's Signature: _____
FORM 3

BLANK PAGE

Insurance and Risk Management Provisions
Northeast Creek Pump Station Upgrade

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

A letter from an insurance carrier stating that upon your firm/company being the successful Bidder/Respondent that a Certificate of Insurance shall be issued in compliance with the Insurance and Risk Management Provisions outlined below.
A Certificate of Insurance complying with the Insurance and Risk Management Provisions outlined below (Request for Bid/Proposal number and Project Name, Number and Description must appear on the Certificate of Insurance).
A combination of specific policies written with an umbrella policy covering liabilities in excess of the required limits is acceptable to achieve the applicable insurance coverage levels.

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

Accordingly the Respondent shall provide a certificate evidencing the following:

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

Employer's Liability Insurance	BY ACCIDENT $500,000	EACH ACCIDENT
Employer's Liability Insurance	BY DISEASE	POLICY LIMIT $500,000
Employer's Liability Insurance	BY DISEASE $500,000	EACH EMPLOYEE

2.COMMERCIAL GENERAL LIABILITY INSURANCE (Including contractual Liability Insurance)
Bodily Injury and Property Damage LiabilityEach Occurrence $1,000,000
(Other than Products/Completed Operations) General Aggregate $2,000,000

Products\Completed Operation	$2,000,000	Aggregate Limit
Personal and Advertising Injury	$1,000,000	Limits
Fire Damage	Limits	$100,000

To Include Per Project/Location Aggregate and Completed Operations for 3 Years after final payment

3. BUSINESS AUTOMOBILE LIABILITY INSURANCE

Combined Single Limits
Each Occurrence $1,000,000
(Including operation of non-owned, owned, and hired automobiles).
Broadened Pollution Endorsement CA9948 and MCS 90

4. UMBRELLA LIABILITY
(In excess of above noted coverages) Per Occurrence/Aggregate $2,000,000/$2,000,000

5. CONTRACTORS POLLUTION LIABILITY Each Occurrence $1,000,000
Or by endorsement to General Liability Policy for sudden and accidental If Pollution provided by General Liability Endorsement with sudden and accidental, separate coverage is not required. Completed Operations to include three (3) years of extended Completed Operations coverage or a three (3) year extended reporting period.

6. BUILDERS' RISK:
To be written on a Builders Risk "All-risk" form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism, malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than caused by flood), and such other perils or causes of loss as may be specifically required by Supplementary Conditions) until Final Completion and Acceptance of the Project. Such policy of insurance shall contain at least the following sub-limits of insurance and deductibles:

Sub-limits:	
Property in Transit	$1,000,000
Property in Offsite Storage	$1,000,000
Plans & Blueprints	$25,000
Debris Removal	25% of Insured Physical Loss
Delay in Completion / Soft Cost	TBD
Ordinance of Law (Increased Cost of Construction)	$1,000,000
Flood and Earthquake	TBD – Full Contract Value
Deductibles:	
Flood and Earthquake	$25,000
Water Damage other than Flood	$100,000
All other Perils	$10,000

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

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

Certificates of Insurance

Certificates shall state that the policy or policies shall not expire, be cancelled or altered without at least forty-five (45) days prior written notice to Fulton County Government. Policies and

Certificates of Insurance are to list Fulton County Government as an Additional Insured (except for Workers' Compensation) and shall conform to all terms and conditions (including coverage of the indemnification and hold harmless agreement) contained in the Insurance and Risk Management Provisions. The General Liability Additional Insured language should apply to on-going and completed-operations, using ISO form CG 2010 (11/85 version) or equivalent.

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

The Contractor agrees to name the Owner and all other parties required of the Contractor/Vendor shall be included as additional insureds on the CGL, using ISO Additional Insured Endorsement forms CG 2010 11/85 or its equivalent coverage to the additional insureds. This insurance for the additional insureds shall be as broad as the coverage provided for the named insured Subcontractor. It shall apply as Primary Insurance before any other insurance or self-insurance, including any deductible, non-contributory, and Waiver of Subrogation provided in favor of Fulton County.

Additional Insured under the General Liability, Auto Liability, Umbrella Policies (with exception of Workers Compensation and Professional Liability), with no Cross Suits exclusion.

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

USE OF PREMISES

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

PROTECTION OF PROPERTY

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

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

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

INDEMNIFICATION AND HOLD HARMLESS AGREEMENT

To the fullest extent of the Law, Contractor/Vendor hereby agrees to release, indemnify, defend and hold harmless Fulton County, its Commissioners, officers, employees, subcontractors, successors, assigns and agents, from and against any and all losses (including death), claims, damages, liabilities, costs and expenses (including but not limited to all actions, proceedings, or investigations in respect thereof and any costs of judgments, settlements, court costs, attorney's fees or expenses, regardless of the outcome of any such action, proceeding, or investigation),

caused by, relating to, based upon or arising out of any act or omission by Contractor/Vendor, its directors, officers, employees, subcontractors, successors, assigns or agents, or otherwise in connection (directly or indirectly) with its acceptance, or the performance, or nonperformance, of its obligations under these agreements. Such obligations shall not be construed to negate, abridge or otherwise reduce any other rights or obligations of indemnity which would otherwise exist as to any party or person as set forth in this paragraph.

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

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

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

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

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

COMPANY: _____ SIGNATURE: _____

NAME: _____ TITLE: _____

DATE: _____

END OF SECTION

OWNER - CONTRACTOR
S131 Northeast Creek Pump Station Upgrade

10.3

Contractor: _____ **ProjectNo.** _____

Address: _____ **Telephone:** _____

Contact: _____ **Facsimile:** _____

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

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

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

10.4 PROJECT NUMBER: S131

S131 Northeast Creek Pump Station Upgrade

The Contractor shall commence the Work with adequate force and equipment within 10 days from receipt of Notice to Proceed from the County, and shall complete the work within 120 calendar days from the Notice to Proceed or the date work begins, whichever comes first. The Contractor shall remain responsible for performing, in accordance with the terms of the contract, all work assigned prior to the expiration of the said calendar days allowed for completion of the work even if the work is not completed until after the expiration of such days.

For each calendar day that any work remains uncompleted after the time allowed for completion of the work, the Contractor shall pay the County the sum of $ 500.00 not as a penalty but as liquidated damages, which liquidated damages the County may deduct from any money due the contractor. At the County's convenience and not to it prejudice the County may provide written notice of the commencement of the assessment of liquidated damages].

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

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

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

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

has been made therefore. The expense of said Bond shall be borne by the Contractor. [See General Conditions for similar provisions]

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

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

10.5 [SIGNATURES NEXT PAGE]

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

OWNER:	**CONTRACTOR:**
FULTON COUNTY, GEORGIA	**[Insert Contractor COMPANY NAME]**
John H. Eaves, Commission Chair **Board of Commissioners**	**[Insert Name & Title of person authorized to sign contract]**
ATTEST:	**ATTEST:**
Mark Massey **Clerk to the Commission (Seal)**	**Secretary/** **Assistant Secretary** **(Affix Corporate Seal)**
APPROVED AS TO FORM:	
Office of the County Attorney	
APPROVED AS TO CONTENT:	
[Insert Department Head Name] **[Insert Department Head Title]**	

10.6

END OF SECTION

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

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

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

PERFORMANCE BOND

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

WHEREAS, the Principal has entered, or is about to enter, into a certain written contract with the Owner, dated _____, which is incorporated herein by reference in its entirety (hereinafter called the "Contract"), for construction-type services of a project known as S131 Northeast Creek Pump Station Upgrade, as more particularly described in the Contract (hereinafter called the "Project");

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

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

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

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

In addition to performing as required in the above paragraphs, the Surety shall indemnify and hold harmless the Owner from any and all losses, liability and damages, claims, judgments, liens, costs and fees of every description, including

reasonable attorney's fees, litigation costs and expert witness fees, which the Owner may incur, sustain or suffer by reason of the failure or default on the part of the Principal in the performance of any or all of the terms, provisions, and requirements of the Contract, including any and all amendments and modifications thereto, or incurred by the Owner in making good any such failure of performance on the part of the Principal.

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

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

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

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

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

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

_____(SEAL)
(Principal)

By:_____

Attest:

_____
Secretary

_____(SEAL)
(Surety)

By:_____

Attest:

_____
Secretary

_____
(Address of Surety's Home Office)

_____
(Resident Agent of Surety)

11.1 END OF SECTION

12 PAYMENT BOND

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

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

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

PAYMENT BOND

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

WHEREAS, the Principal has entered, or is about to enter, into a certain written contract with the Owner, dated _____, which is incorporated herein by reference in its entirety (hereinafter called the "Contract"), for construction-type services of a project known as S131 Northeast Creek Pump Station Upgrade, as more particularly described in the Contract (hereinafter called the "Project");

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

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

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

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

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

This Bond is made for the use and benefit of all persons, firms, and corporations who or which may furnish any materials or perform any labor for or on account of the construction-type services to be performed or supplied under the Contract, and any amendments thereto, and they and each of them may sue hereon.

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

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

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

_____ **(SEAL)**
(Principal)

By:_____

Attest:

_____
Secretary

_____**(SEAL)**
(Surety)

By:_____

Attest:

_____
Secretary

_____

(Address of Surety's Home Office)

_____

(Resident Agent of Surety)

12.1

12.2 END OF SECTION

GENERAL CONDITIONS

GENERAL CONDITIONS:

00700-1 FAMILIARITY WITH SITE

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

00700-2 CONTRACT DOCUMENTS

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

A. Notice of Award of Contract:

B. Execution of Contract Documents

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

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

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

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

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

Drawings and Specifications:

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

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

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

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

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

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

00700-3 DEFINITIONS

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

Alternate bids – the amount stated in the bid or proposal to be added to or deducted from the amount of the base bid or base proposal if the corresponding change in project scope or alternate materials or methods of construction is accepted.

Base bid – the amount of money stated in the bid or proposal as the sum for which the bidder or proposer offers to perform the work.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Project Manual - The Contract Documents.

Provide shall mean to furnish and install.

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

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

00700-4 CODES

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

00700-5 REVIEW OF CONTRACT DOCUMENTS

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

00700-6 STRICT COMPLIANCE

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

00700-7 APPLICABLE LAW

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

00700-8 PERMITS, LICENSES AND BONDS

All permits and licenses necessary for the work shall be secured and paid for by the Contractor. If any permit, license or certificate expires or is revoked, terminated, or suspended as a result of any action on the part of the Contractor, the Contractor shall not

be entitled to additional compensation or time. The Contractor shall obtain and keep in force at all times performance and payment bonds payable to Fulton County in penal amounts equal to 100% of the Contract price.

00700-9 TAXES

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

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

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

00700-10 DELINQUENT CONTRACTORS

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

00700-11 LIEN WAIVERS

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

00700-12 MEASUREMENT

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

00700-13 ASSIGNMENT

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

00700-14 FOREIGN CONTRACTORS

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

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

The Contractor hereby assumes the entire responsibility and liability for any and all injury to or death of any and all persons, including the Contractor’s agents, servants, and

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

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

00700-16 SUPERVISION OF WORK AND COORDINATION WITH OTHERS

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

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

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

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

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

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

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

Should the Contractor be caused damage by any other contractor on the Project, by reason of such other contractor's failure to perform properly his contract with the County,

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

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

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

00700-17 ADMINISTRATION OF CONTRACT

The Program Manager and the Construction Manager shall provide administration services as hereinafter described.

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

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

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

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

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

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

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

Except as otherwise provided in this Contract, the Construction Manager shall issue a decision on any disagreement concerning a question of fact arising under this Contract. The Construction Manager shall reduce the decision to writing and mail or otherwise furnish a copy thereof to the Contractor. The decision of the Construction Manager shall be final and conclusive unless, within thirty (30) days from the date of receipt of such copy, the Contractor files a written appeal with the Director of Public Works and mails or otherwise furnishes the Construction Manager a copy of such appeal. The decision of the Director of Public Works or the Director's duly authorized representative for the determination of such appeals shall be final and conclusive. Such final decision shall not be pleaded in any suit involving a question of fact arising under this Contract, provided

such is not fraudulent, capricious, arbitrary, so grossly erroneous as necessarily implying bad faith, or is not supported by substantial evidence. In connection with any appeal proceeding under this Article, the Contractor shall be afforded an opportunity to be heard and to offer evidence in support of Contractor's appeal. Pending any final decision of a dispute hereunder, the Contractor shall proceed diligently with the performance of the Contract as directed by the Construction Manager.

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

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

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

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

00700-18 RESPONSIBILITY FOR ACTS OF EMPLOYEES

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

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

00700-19 LABOR, MATERIALS, SUPPLIES, AND EQUIPMENT

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

00700-20 DISCIPLINE ON WORK SITE

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

00700-21 HOURS OF OPERATION

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

00700-22 FAMILIARITY WITH WORK CONDITIONS

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

00700-23 RIGHT OF ENTRY

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

00700-24 NOTICES

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

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

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

00700-25 SAFETY

SAFETY, HEALTH AND LOSS PREVENTION

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

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

COUNTY'S SAFETY, HEALTH, AND LOSS PREVENTION PROCESS GUIDELINES AND REQUIREMENTS

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

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

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

All applicable laws, ordinances, rules, regulations and orders of any public, quasi-public or other governmental authority relating to the safety of persons and their protection against injury, specifically including, but in no event limited to, the Federal Occupational Safety and Health Act of 1970, as amended, and all rules and regulations now or hereafter in effect pursuant to said Act.

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

PROTECTION OF THE WORK

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

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

SAFETY EQUIPMENT

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

EMERGENCIES

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

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

SUSPENSION OF THE WORK

1. Should, in the judgment of the County or its agent(s), the Contractor or any Sub-Contractor fail to provide a safe and healthy work place, the County or its agent shall have the right, but not the obligation, to suspend work in the unsafe areas until deficiencies are corrected. All costs of any nature (including, without limitation, overtime pay, liquidated damages or other costs arising out of delays) resulting from the suspension, by whomsoever incurred, shall be borne by the Contractor.

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

CONTRACTOR’S INDEMNITY OF THE COUNTY FOR CONTRACTOR’S NON-COMPLIANCE WITH SAFETY PROGRAM

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

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

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

00700-26 BLASTING AND EXCAVATION

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

00700-27 HIGH VOLTAGE LINES

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

00700-28 SCAFFOLDING AND STAGING

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

00700-29 CLEAN-UP

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

00700-30 PROTECTION OF WORK

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

00700-31 REJECTED WORK

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

00700-32 DEFECTIVE WORK

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

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

00700-33 WARRANTY OF NEW MATERIALS

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

00700-34 CONTRACTOR'S WARRANTY OF THE WORK

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

00700-35 ASSIGNMENT OF MANUFACTURERS' WARRANTIES

Without limiting the responsibility or liability of the Contractor pursuant to this agreement, all warranties given by manufacturers on materials or equipment incorporated in the work are hereby assigned by the Contractor to the County. If requested, the Contractor shall execute formal assignments of said manufacturer's warranties to the County. All such warranties shall be directly enforceable by the County.

00700-36 WARRANTIES IMPLIED BY LAW

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

00700-37 STOP WORK ORDERS

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

00700-38 TERMINATION FOR CAUSE

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

00700-39 TERMINATION FOR CONVENIENCE

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

00700-40 TERMINATION FOR CONVENIENCE - PAYMENT

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

00700-41 TERMINATION FOR CONVENIENCE - PAYMENT LIMITATIONS

Except for normal spoilage, and except to the extent that the County shall have otherwise expressly assumed the risk of loss, there shall be excluded from the amounts payable to

the Contractor the fair value, as determined by the Construction Manager, of property which is destroyed, lost, stolen or damaged so as to become undeliverable to the County or to another buyer.

00700-42 COST TO CURE

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

00700-43 ATTORNEY'S FEES

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

00700-44 CONTRACTOR'S RESPONSIBILITIES UPON TERMINATION

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

1. Stop work under the contract on the date and to the extent specified in the notice of termination;

2.Place no further orders or subcontracts for materials, services or facilities, except as may be necessary for completion of such portion of the work under the agreement as is not terminated;

3.Terminate all orders and subcontracts to the extent that they relate to the performance of work terminated by the notice of termination;

4. Assign to the County in the manner, at the times, and to the extent directed by the Construction Manager, all of the rights, title and interest of the Contractor under the orders and subcontracts so terminated, in which case the County shall have the right, at its discretion, to settle or pay any and all claims arising out of the termination of such orders or subcontracts;

5.Settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts with the approval or ratification of the Construction Manager, to the extent the Construction Manager may require, which approval or ratification shall be final for all purposes;

6. Transfer title and deliver to the entity or entities designated by the Construction Manager, in the manner, at the times, and to the extent, if any, directed by the Construction Manager, and to the extent specifically produced or specifically acquired by the Contractor for the performance of such portion of the work as has been terminated:

The fabricated or un-fabricated parts, work, and progress, partially completed supplies, and equipment, materials, parts, tools, dyes, jigs, and other fixtures, completed work, supplies, and other material produced as a part of or acquired in connection with the performance of the work terminated by the notice of termination; and

The completed or partially completed plans, drawings, information, and other property to the work.

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

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

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

00700-45 RECORDS

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

00700-46 DEDUCTIONS

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

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

00700-47 REIMBURSEMENT OF THE COUNTY

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

00700-48 SUSPENSION, INTERRUPTION, DELAY, DAMAGES

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

00700-49 COMMENCEMENT AND DURATION OF WORK

The County may issue a Notice to Proceed at any time within 120 days following execution of the contract by the County. The Contractor shall commence work pursuant to this agreement within ten days of mailing or delivery of written notice to proceed. The Contractor shall diligently prosecute the work to completion within the time specified therefore in the Agreement. The capacity of the Contractor's construction and manufacturing equipment and plan, sequence and method of operation and forces employed, including management and supervisory personnel, shall be such as to insure completion of the work within the time specified in the Agreement. The Contractor and County hereby agree that the contract time for completion of the work is reasonable taking into consideration the average climatic conditions prevailing in the locality of the work and anticipated work schedules of other contractors whose activities are in conjunction with or may affect the work under this contract.

00700-50 TIME OF THE ESSENCE

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

00700-51 IMPACT DAMAGES

Except as specifically provided pursuant to a stop work order or change order, the Contractor shall not be entitled to payment or compensation of any kind from the County for direct or indirect or impact damages including, but not limited to, costs of acceleration arising because of delay, disruption, interference or hindrance from any cause whatsoever whether such delay, disruption, interference or hindrance is reasonable or unreasonable,

foreseeable or unforeseeable, or avoidable, provided, however, that this provision shall not preclude the recovery of damages by the Contractor for hindrances or delays due solely to fraud or bad faith on the part of the County, its agents, or employees. The Contractor shall be entitled only to extensions in the time required for performance of the work as specifically provided in the contract.

00700-52 DELAY

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

00700-53 INCLEMENT WEATHER

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

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

00700-54 DELAY - NOTICE AND CLAIM

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

00700-55 STATEMENT OF CLAIM - CONTENTS

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

00700-56 WORK BEHIND SCHEDULE, REMEDY BY CONTRACTOR

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

00700-57 DILIGENCE

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

00700-58 SET-OFFS

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

00700-59 REMEDIES CUMULATIVE

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

00700-60 TITLE TO MATERIALS

No materials or supplies shall be purchased by the Contractor or by any Subcontractor subject to any chattel mortgage or under a conditional sales contract or other agreement

by which any interest is retained by the seller. The Contractor hereby warrants that it has good and marketable title to all materials and supplies used by it in the work, and the Contractor further warrants that all materials and supplies shall be free from all liens, claims, or encumbrances at the time of incorporation in the work.

00700-61 INSPECTION OF MATERIALS

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

00700-62 CONSTRUCTION MANAGER'S PRESENCE DURING TESTING

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

00700-63 MATERIALS INCORPORATED IN WORK

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

00700-64 STORAGE OF MATERIALS

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

00700-65 PAYROLL REPORTS

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

00700-66 CONTRACTORS' REPRESENTATIVE

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

00700-67 SPECIALTY SUB-CONTRACTORS

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

00700-68 INSPECTION BY THE CONSTRUCTION MANAGER

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

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

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

00700-70 SCHEDULING OF THE WORK

The work of this contract shall be planned, scheduled, executed, and reported as required by the Contract Documents.00700-71 PROGRESS ESTIMATES

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

00700-72 PROGRESS PAYMENTS

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

00700-73 TIME OF PAYMENT

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

00700-74 RETAINAGE

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

00700-75 PAYMENT OF SUBCONTRACTORS

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

00700-76 COUNTY'S RESPONSIBILITIES TO SUBCONTRACTORS

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

00700-77 PROGRESS PAYMENTS - ACCEPTANCE OF WORK

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

00700-78 PAYMENTS IN TRUST

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

00700-79 JOINT PAYMENTS

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

00700-80 RIGHT TO WITHHOLD PAYMENT

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

00700-81 CERTIFICATE OF SUBSTANTIAL COMPLETION

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

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

00700-82 PAYMENT UPON SUBSTANTIAL COMPLETION

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

00700-83 COMMENCEMENT OF WARRANTIES

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

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

The acceptance of the Substantial Completion payment shall constitute a waiver of all claims by the Contractor except those previously made in writing and identified by the Contractor as unsettled at the time of application for payment at Substantial Completion and except for the retainage sums due at final acceptance. Following the Construction Manager's issuance of the certificate of Substantial Completion and the Contractor's completion of the work pursuant to this agreement, the Contractor shall forward to the Construction Manager a written notice that the work is ready for final inspection and acceptance. If after inspection the Construction Manager certifies that the work is complete and issues written notification of such to the Contractor, the Contractor shall forward to the Construction Manager a final application for payment. The Construction

Manager shall issue a certificate for payment, which shall approve final payment to the Contractor and shall establish the date of final completion.

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

00700-85 DOCUMENTATION OF COMPLETION OF WORK

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

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

The surety's consent to final payment; and

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

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

00700-86 GOVERNING LAW

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

00700-87 CHANGES IN THE WORK

CHANGE ORDERS

A Change Order is a written order to the Contractor signed to show the approval and the authorization of the County, issued after execution of the Contract, authorizing a change in the Work and/or an adjustment in the Contract Sum or the Contract Time. Change Orders shall be written using forms designated by the County with Contractor providing supporting documentation as required by the Construction Manager. The Contract Sum and the Contract Time may be changed only by approved Change Order pursuant to Fulton County Procedure 800-6. The amount payable by the Change Order is payment in full for all direct and indirect costs incurred and related to the work under said Change Order, including but not limited to delays, imports, acceleration, disruption and extended overhead. A Change Order signed by the Contractor indicates the Contractor’s agreement therewith, including the adjustment in either or both of the Contract Sum or the Contract Time.

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

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

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

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

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

By the method provided in Subparagraph A4 below.

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

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

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

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

Unless otherwise provided in the Contract Documents, “Cost” shall be limited to the following: cost of materials incorporated into the Work, including sales tax and cost of delivery; cost of direct labor (labor cost may include a pro rata share of foreman’s account of the change) including social security, old age and unemployment insurance, and fringe benefits required by agreement or custom; workers’ or workmen’s compensation insurance; rental value of equipment and machinery; costs for preparing Shop Drawings.

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

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

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

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

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

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

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

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

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

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

CONCEALED, UNKNOWN AND DIFFERING CONDITIONS

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

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

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

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

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

REQUESTS FOR ADDITIONAL COST

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

be determined by the Construction Manager. Any change in the Contract Sum resulting from such claim shall be documented by Change Order.

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

MINOR CHANGES IN THE WORK

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

BONDS

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

00700-88 DISAGREEMENT WITH ORDERS FOR CHANGE

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

00700-89 NO WAIVER OF REMEDIES

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

00700-90 LAND AND RIGHTS-OF-WAY

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

00700-91 COORDINATION WITH STATE DEPARTMENT OF TRANSPORTATION

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

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

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

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

I N D E X

EXHIBIT A

FINAL AFFIDAVIT

TO FULTON COUNTY, GEORGIA

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

_____

Signature

_____

Title

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

_____

Notary Public

:

_____

My Commission expires

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

The Project consists of the following major elements: replacement of two dry pit pumps with dry pit submersible pumps, piping and valve replacement, MCC replacement, replacement of the existing diesel backup generator with a new natural gas generator, and installation of a new bypass and flowmeter system.

1.3 GENERAL REQUIREMENTS

A. Prior to commencement of Work, the Contractor shall review the construction site with the Owner's representative to make permanent record of such existing damage as cracks, malfunctioning utility equipment and fixtures, or other similar damage. This record shall serve as a basis for determination of subsequent damage to the structures and adjacent areas due to Contractor's operations. Any damage to these structures and adjacent areas not noted in original review record shall be reported immediately to Owner. Permanent record shall include photographs and/or video graphic recording.

B. Patching and Repair: During the pre-construction site review, Contractor and Owner shall identify on patching and repairs of existing facilities to be addressed by Contractor. These repairs will be estimated individually by the Contractor and, if approved by the Owner, will be paid from the Patching and Repairs Allowance line item. Comply with requirements of Division 01 Section "Execution".

C. Smoking and Fire Precautions: No smoking, fire, or use of any fire- or explosion- producing tools or equipment will be permitted on the premises or at any locations where such may endanger said premises or the current operations thereon.

D. Manufacturers Qualifications: The manufacturers of all materials and equipment used must be approved by the Engineer and regularly engaged in the manufacture of the particular material or equipment for the use and service to which it will be subjected.

E. Compliance with state and local laws: Comply will all applicable requirements of state and local laws and ordinances to the extent that such requirements do not conflict with federal laws or regulations.

F. Protection of public and private property: The Contractor shall be responsible for preservation of and shall take special care in working areas to protect public and private property. The Contractor shall replace or repair at his own expense any damaged water pipes, power and communication lines, or other public utilities, roads, curbs, gutters,

sidewalks, drain pipes, drainage ditches, all properties and fixtures (both permanent and temporary), and all plantings, including grass or sod on the site of the work. Leave the site in original or better condition after all cleanup work has been done.

G. Markers: Preserve all surveyed and privately owned markers and monuments; do not remove or disturb any such markers without prior approval from the Owner of the marker. Any removal and replacement of such markers shall be at the expense of the Contractor.

H. Approved Chemicals: All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, must show approval of either EPA or USDA. The use of all such chemicals and the disposal of residues shall be in strict conformance with manufacturer's instructions.

I. Catalog Data for Owners: Provide duplicate complete, bound sets of a compilation of catalog data of each manufactured item of mechanical and electrical equipment used in the Work, for transmittal to the Owner before payment of more than ninety percent (90%) is made. Include descriptive data and printed installation, operating, and maintenance instructions (including a parts list for each item of equipment). Provide a complete double index as follows:
   1. List the products alphabetically by name.
   2. List alphabetically the names of manufacturers whose products have been incorporated in the work, together with their addresses and the names and addresses of the local sales representative.

J. Installation, Testing and Guarantee: Install all materials and equipment exactly in accordance with the manufacturer's recommendations. The completely installed system shall be guaranteed against any and all defects of manufacture, materials, workmanship, or installation for a period of one year from the date of Substantial Completion.

K. Operation and Maintenance of the Systems and Instruction to Owner: Where the specifications for equipment require that a factory service representative provide operation and maintenance instruction to the Owner for that equipment, this service shall be performed by prior arrangement with the Owner after and in addition to the manufacturer's instructions to the Contractor for installation and start-up. The individual performing the instructions to the Owner is to be trained and/or certified by the manufacturer as its authorized operation, maintenance, and service specialist. If the said specialist is not a regular, full-time employee of the manufacturer, the specialist's qualifications shall be submitted to the Owner for review and approval prior to scheduling the site visit for instructions to the Owner.

L. Drawings of Record: Provide and keep up-to-date a complete record set of drawings, which shall be corrected daily to show every change. Keep this set of prints at the job site, and use only as a record set. This shall not be construed as authorization for the Contractor to make changes in the approved layout without definite instructions in each case. Turn the set over to the Owner upon completion of the project.

M. Existing Utilities: The Contractor is to notify the Owner of all underground utilities no less than two days in advance of proposed utility interruption before beginning construction in the area. The Contractor is responsible for locating all existing utilities prior to construction and shall carefully protect from damage all utilities in the vicinity of the work at all times. The Contractor shall be responsible for repairing any utilities that were properly located and marked. If it is necessary to repair, remove, and/or replace any such utility in order to complete the work properly, do so in compliance with the rules, regulations, and approval of the particular utility involved. Any such work shall be considered incidental to the construction or repairs of utility lines, and no additional payment will be allowed therefore. Existing utilities shall remain in service at all times during construction. Contractor shall provide any temporary piping necessary to maintain utility service to existing customers.

N. The Contractor shall maintain access to the pump station at all times.

O. Inspection of Work: The Contractor shall provide full access to the project site at all times for inspection and observation of Work by the Owner, Engineer, and agents of any local, state, or federal agency having jurisdiction.

P. Flood Insurance: The Contractor is required to carry flood insurance for Work which is located in designated flood hazard areas unless insurance is not available.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 OPERATION OF EXISTING UTILITIES

A. The Work shall be performed so as to cause minimum interference or interruption with the normal operation of the existing utilities. The Contractor shall plan and conduct construction sequencing operations to avoid disturbing existing utilities and equipment, except as may be provided or approved by the Engineer. Contractor shall provide emergency power and / or bypass pumping, if necessary, to maintain operations at all times during construction.

END OF SECTION

PART 4 - GENERAL

4.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

4.2 SUMMARY

A. Section Includes:
1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Coordination with occupants.
5. Work restrictions.
6. Specification and drawing conventions.
7. Miscellaneous provisions.

B. Related Requirements:
1. Section 01 5000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

4.3 PROJECT INFORMATION

A. Project Identification: Northeast Creek Pump Station Upgrade.
1. Project Location: 8086 Nesbit Ferry Road, Sandy Springs, GA.

B. Owner: Fulton County Department of Public Works, 141 Pryor Street, SW Suite 6001 Atlanta, GA 30303
1. Project Manager: Keithly Wynter (404) 612-7556

C. Engineer: Dan Skalsky, P.E. Gresham Smith and Partners (678) 518-3681

4.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:
1. The Scope of work shall include all necessary labor, materials, equipment, permitting, coordination, and appurtenances required to upgrade the Northeast Creek Pump Station in operation in Fulton County, Georgia in accordance with the Plans and Specifications.

B. Items of work include, but may not be limited to:
1. The replacement of two existing dry pit pumps (2.5 MGD, 15 HP each), replacement of existing emergency generator, plug and pump check valves, new connection for emergency pump, new motor control centers, and facility/site improvements as described in the Plans and Specifications.

C. Type of Contract:
   1. Project will be constructed under a single prime contract.

4.5 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
   1. Limits: Confine construction operations to areas of work shown in Plans.
   2. Cutting, capping, and reconnecting utility systems outside limits of construction shall be performed by Contractor, unless otherwise noted.
   3. Conform to all laws, ordinances, permits and regulations affecting the Work on site.
   4. Owner Occupancy: Allow for Owner occupancy of Project site.
   5. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
      a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
      b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
   6. Do not unreasonably encumber site with equipment, materials, or vehicles.
   7. Return all improvements on or about site and adjacent property which are not shown to be altered, removed or otherwise changed, to conditions which existed previous to starting performance under the Contract.
   8. Parking for construction personnel including the use of Owner’s parking lot(s) shall be reviewed with Owner before construction start.

C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.
   1. Limit use and operation within existing facilities to areas indicated for construction work and as required to perform Work. Other areas within facility shall not be disturbed or disrupted.
   2. Perform Work so as not to interfere or inconvenience staff and Owner’s operation.
   3. Maintain and keep clear all required fire exit ways throughout facility within and in vicinity of construction areas. Coordinate alternate temporary egress routes with Owner and local fire authority.
   4. Do not load structure with weights that will endanger structure.
   5. Smoking is absolutely prohibited within facilities or on Owner’s property.

6. Audio devices and radios are prohibited; except that two-way radios, and their use within occupied facilities shall be limited so not to disrupt occupants.
7. T-shirts or other clothing with derogatory depictions, language, and/or slogans regarding alcohol, drugs, race or sexual in nature, shall not be worn on premises.
8. Derogatory language regarding race, sexual or religious in nature, shall not be used on premises.
9. Coordinate construction operations to assure that operations are carried out with consideration given to conservation of energy, water, and materials.
10. Make every effort to keep noise to a minimum in construction operation. Jackhammers shall not be permitted for use within the existing building without the Owner's consent.

4.6 COORDINATION WITH OPERATIONS STAFF AND CONTRACTOR

A. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
   1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
   2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.
   3. Contractor and his forces shall exercise special care during all aspects of construction activity including material deliveries, hoisting and installation activities.
   4. Control of traffic, dust, dirt, and construction related noise shall be maintained at all times.
   5. Schedule work at such time and in such a manner so as to minimize interference and inconvenience to staff and Owner's operations.
   6. Each Contractor must obtain authorization of General Contractor as approved by Owner, before starting any work within an existing area of building.
   7. Area immediately surrounding all areas of Work shall be protected from danger of materials being dropped or dislodged.
   8. Work shall be performed in a manner that will not impose avoidable hardship, danger, or inconvenience to staff.

4.7 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.
   1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Engineer and Owner not less than two days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
1. Notify Engineer and Owner not less than two days in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with disruptive operations.

D. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor-air intakes.

E. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

F. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
1. Maintain list of approved screened personnel with Owner's representative.

4.8 SPECIFICATION AND DRAWING CONVENTIONS

A. Project Manual: The Project Manual comprises written documents for the Work that include Specifications issued under the professional seals of the Engineer and its consultants, and documents prepared by the Owner or other entities for which the Engineer has no responsibility. The Project Manual may contain documents such as bidding requirements and information available to bidders that are not Contract Documents.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.

2. Abbreviations: Materials and products are identified by industry standard abbreviations and as scheduled on Drawings.

4.9 MISCELLANEOUS PROVISIONS

A. By execution of this Contract, Contractor acknowledges review of proposed details and specifications and agrees to provide warranties and bonds for products and systems specified herein, detailed on drawings and as approved as a substituted or comparable product or system in accordance with Division 01 Section "Product Requirements".

PART 5 - PRODUCTS (Not Used)

PART 6 - EXECUTION (Not Used)

PART 7 -
END OF SECTION

PART 8 - GENERAL

8.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. Related Sections include the following:
1. Division 01 Section "Quality Requirements" for administrative and procedural requirements for quality assurance and quality control.

8.2 SUMMARY

A. THE ENTIRETY OF THE PROJECT SHALL BE BID AS A “LUMP SUM”. The BIDDER agrees to perform all necessary work described in the CONTRACT DOCUMENTS. Alterations to the Construction Contract will be based on negotiated additions or deletions to the Base Contract, and the Bidder shall receive no additional compensation for items covered under this scope.

B. General:
1. It is recognized that the LUMP SUM is indicated in the Bid Form, and that the Owner-Contractor Agreement records acceptance or rejection of for the entirety of the project, either as bid or as otherwise agreed upon by the date of the Agreement.
2. It is recognized that the utilization of a lump sum price may involve the need for Change Orders as specified in General and Supplementary Conditions. If modifications to the Contract Sum are required, they shall be negotiated at the time of the change.

C. Owner reserves the right to reject the Contractor’s measure of work-in-place which involves the use of established unit prices, and at Owner’s expense to have the work measured by independent surveyor acceptable to Contractor

D. For work items included in the technical specifications and not listed herein, such work shall be considered part of or incidental to its related work.

E. All costs for items of work, which are not specifically mentioned to be included in the lump sum price indicated in the Bid Form, shall be considered incidental to the pay items and the cost of such shall be included in the listed lump sum item most closely associated with the work involved. The lump sum price and payment made for each item listed shall constitute full compensation for furnishing all labor, materials, machinery, equipment, tools, apparatus, service, and other necessary supplies and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for which separate payment is not otherwise provided.

F. When actual field conditions differ from assumed design conditions and result in a reduction in materials, equipment, and appurtenances to be installed, a negative adjustment will be made to the Contract. If items are provided on the bid form these items will be used for adjustment, otherwise, the Contractor shall provide costs for a Change Order.

G. The Contractor shall furnish all necessary labor, materials, machinery, equipment, tools, apparatus, service, and other necessary supplies and perform all work shown on the Drawings and/or described in the Specifications at the price listed on the Bid Form. The Work shall be complete-in-place and ready for operation.

H. The Contractor has become thoroughly familiar with the terms and conditions of the Bidding Documents and with local conditions affecting the performance and costs of the Work at the place where the Work is to be completed, and has fully inspected the site in all particulars informing himself fully regarding all conditions pertaining to the Work site.

PART 9 - PRODUCTS (Not Used)

PART 10 - EXECUTION (Not Used)

END OF SECTION

PART 11 - GENERAL

11.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

11.2 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

11.3 DEFINITIONS

A. Unit Price Schedule: An itemized list of additional work directives as the result of a Change Order. The schedule provides a unit cost for the identified work task.

B. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

C. Stored Materials: Product values that may be claimed on an Application for Payment. Product invoices must be provided with Application for Payment to substantiate the value of the Stored Materials claim. Stored Materials are associated with portions of the work that are represented by Bid Form or Schedule of Values line items and will be limited on the Application for Payment to a maximum of 30 percent of the total amount bid. Deviations to this standard shall be as approved by the Owner and Construction Manager. The Stored Materials value will be reduced on each Application for Payment based on the total contract value complete to date of said Application for Payment. The Stored Materials value will be reduced to zero upon original Substantial Completion date.

11.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
   1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
      a. Application for Payment forms with Continuation Sheets.
      b. Submittals Schedule.
   2. Submit the Schedule of Values to Construction Manager at earliest possible date but no later than 14 days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. When deemed necessary, the Construction Manager will provide the Contractor with a Schedule of Values list. Provide at least one line item for each Specification Section.

1. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
   a. Description of the Work.
   b. Change Orders (numbers) that affect value.
   c. Dollar value.
      1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
2. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
3. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
4. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
   a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.
5. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
6. Schedule Updating: Update and resubmit the Schedule of Values before the next Application for Payment when Change Orders or Construction Change Directives result in a change in the Contract Amount.

11.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Construction Manager and paid for by Owner.
   1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment have individual requirements.

B. Payment Application Times: The closing date for each progress payment shall be established at the pre-construction conference. The period covered by each Application for Payment starts on the day following the end of the preceding application period.

C. Payment Application Forms: Use Contractor’s Application for Payment (EJCDC Document C-620), or equivalent approved form.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Construction Manager will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
3. Include Stored Materials values, as applicable.

E. Transmittal: Submit 5 signed and notarized original copies of each Application for Payment to Construction Manager by a method ensuring receipt.

F. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
2. Schedule of Values.
3. Contractor's Construction Schedule (preliminary if not final).
4. Products list.
5. Schedule of unit prices.
6. Submittals Schedule (preliminary if not final).
7. List of Contractor's staff assignments.

G. Applications for Payment: The Construction Manager encourages a draft application for payment be submitted for review and comment. Contractor will address the comments and then submit a signed application for payment for review and approval. Comments made by the Construction Manager are generally needed to correct minor, infrequent typographical errors, mathematical errors, etc. If the signed application for payment has sufficient errors to required a second revision, the Owner will deduct the amount of the Construction Manager's compensation for the second revision and subsequent revisions from the final payment to the Contractor as provided on the Bid Form.

H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.

4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final, liquidated damages settlement statement.

PART 12 - PRODUCTS (Not Used)

PART 13 -

PART 14 - EXECUTION (Not Used)

END OF SECTION

PART 15 - GENERAL

15.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

15.2 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. Coordination Drawings.
   2. Administrative and supervisory personnel.
   3. Project meetings.
   4. Requests for Information (RFIs).

15.3 DEFINITIONS

A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

15.4 COORDINATION

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, which depend on each other for proper installation, connection, and operation.
   1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.
   4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
   1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of

the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.

D. Communication Procedures: The Owner and Contractor shall communicate with each other through the Engineer about matters related to the Contract, unless otherwise provided in the Contract Documents or when direct communications have been specially authorized. Communications by and with the Engineer's consultants shall be through the Engineer. Communications by and with subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

15.5 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
   1. Attendees: Inform participants and others involved, and individuals whose presence is required, in writing seven working days prior to each meeting, of date and time of meeting. Notify Owner and Engineer of scheduled meeting dates and times.
   2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
   3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Engineer, within three days of the meeting.

B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner, Construction Manager, and Engineer, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
   1. Attendees: Authorized representatives of Owner, Construction Manager, Engineer, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
   2. Agenda: Discuss items of significance that could affect progress, including the following:
      a. Tentative construction schedule.
      b. Phasing.
      c. Critical work sequencing and long-lead items.
      d. Designation of key personnel and their duties.
      e. Procedures for processing field decisions, Proposal Requests and Change Orders.

f. Procedures for RFIs.
g. Procedures for testing and inspecting.
h. Procedures for processing Applications for Payment.
i. Distribution of the Contract Documents.
j. Submittal procedures.
k. Procedures for Maintaining and Preparation of Record Documents.
l. Use of the premises and existing building.
m. Work restrictions.
n. Owner's occupancy requirements.
o. Responsibility for temporary facilities, utilities and controls.
p. Construction waste management and recycling.
q. Parking availability.
r. Office, work, and storage areas.
s. Equipment deliveries and priorities.
t. First aid.
u. Security.
v. Progress cleaning.
w. Working hours.
x. Infection Control Risk Assessment (IRCA).

C. Progress Meetings: Conduct progress meetings at monthly intervals. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to representatives of Owner, Construction Manager, and Engineer, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
   a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      1) Review schedule for next period.
   b. Review present and future needs of each entity present, including the following:
      1) Interface requirements.
      2) Sequence of operations.
      3) Status of submittals.
      4) Deliveries.
      5) Off-site fabrication.
      6) Access.
      7) Site utilization.
      8) Temporary facilities and controls.
      9) Work hours.
      10) Hazards and risks.

11) Progress cleaning.
12) Quality and work standards.
13) Status of correction of deficient items.
14) Field observations.
15) RFIs.
16) Status of proposal requests.
17) Pending changes.
18) Status of Change Orders.
19) Pending claims and disputes.
20) Documentation of information for payment requests.

3. Minutes: Engineer will record and distribute to Contractor the meeting minutes.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
   a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

15.6 REQUESTS FOR INFORMATION (RFIs)

A. Procedure: Immediately on discovery of the need for information of the Contract Documents, and if not possible to request information at Project meeting, prepare and submit an RFI in the form specified.
1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
3. Submittal of an RFI constitutes representation that the Contractor requires additional information about the Contract Documents AFTER he has made careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, and prior project correspondence or documentation.
4. If upon evaluation of the RFI the Engineer finds that the requested information is contained in the Contract Documents or by other documents and/or methods as outlined in paragraph above, the Owner has the option to obtain reimbursement from the Contractor for costs incurred by the Owner for the Engineer's services and expenses made necessary in answering such requests.
5. Content of the RFI: Include a detailed, legible description of item needing information and the following:
6. Project name.
7. Date submitted to the Engineer.
8. Name of Contractor.
9. Name of Engineer and Construction Manager.
10. RFI number, numbered sequentially by the Contractor as they are submitted to the Engineer.
11. Specification Section number and title and related paragraphs, as appropriate.
12. Drawing number and detail references, as appropriate.
13. Discipline (Architecture, Structural, Mechanical, Electrical, etc.).
14. Field dimensions and conditions, as appropriate.

15. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
16. Contractor's signature.
17. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
    a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
18. Date information required (See paragraph 1.8G).

B. Hard-Copy RFIs: Form at end of this Section.
1. Identify each page of attachments with the RFI number and sequential page number.

C. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Engineer's and Construction Manager's Action: Engineer and Construction Manager will review each RFI, determine action required, and return it. Allow three working days for Engineer's response for each RFI. RFIs received after 2:00 p.m. local time will be considered as received the following working day.
1. If the date of response requested is less than 3 working days, the Engineer will endeavor to respond when requested, however a failure to respond prior to the requested date shall not be the sole basis for any delay claims of time or money.
2. The following RFIs will be returned without action:
    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for coordination information already indicated in the Contract Documents.
    d. Requests for adjustments in the Contract Time or the Contract Sum.
    e. Requests for interpretation of Engineer's actions on submittals.
    f. Incomplete RFIs or RFIs with numerous errors.
3. Engineer's action may include a request for additional information, in which case Engineer's time for response will start again.
4. Engineer's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Engineer and Construction Manager in writing within 5 working days of receipt of the RFI response.

PART 16 - PRODUCTS (Not Used)

PART 17 - EXECUTION (Not Used)

END OF SECTION

BLANK PAGE

PART 18 - GENERAL

18.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

18.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
   1. Startup construction schedule.
   2. Contractor's construction schedule.
   3. Construction schedule updating reports.
   4. Daily construction reports.
   5. Material location reports.
   6. Site condition reports.
   7. Special reports.

18.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
   1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
   2. Predecessor Activity: An activity that precedes another activity in the network.
   3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless otherwise approved by Engineer.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.
   1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource

available to both parties as needed to meet schedule milestones and Contract completion date.

2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

18.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:
1. PDF electronic file.

B. Startup construction schedule.
1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.

F. Construction Schedule Updating Reports: Submit with Applications for Payment.

G. Daily Construction Reports: Submit at weekly intervals.

H. Material Location Reports: Submit at weekly intervals.

I. Site Condition Reports: Submit at time of discovery of differing conditions.

J. Special Reports: Submit at time of unusual event.

K. Qualification Data: For scheduling consultant.

18.5 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.
   1. Secure time commitments for performing critical elements of the Work from entities involved.
   2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 19 - PRODUCTS

19.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
   1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
   1. Activity Duration: Define activities so no activity is longer than 10 days, unless specifically allowed by Engineer.
   2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
   3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
   4. Startup and Testing Time: Include no fewer than 3 days for startup and testing.
   5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Engineer's and Construction Manager's administrative procedures necessary for certification of Substantial Completion.
   6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
   1. Phasing: Arrange list of activities on schedule by phase.
   2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.

3. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
4. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
1. See Division 01 Section "Payment Procedures" for cost reporting and payment procedures.

F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

H. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

19.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's construction schedule within 30 days of date established for the Notice of Award. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

19.3 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
   1. List of subcontractors at Project site.
   2. List of separate contractors at Project site.
   3. Approximate count of personnel at Project site.
   4. Equipment at Project site.
   5. Material deliveries.
   6. High and low temperatures and general weather conditions, including presence of rain or snow.
   7. Accidents.
   8. Meetings and significant decisions.
   9. Unusual events (see special reports).
   10. Stoppages, delays, shortages, and losses.
   11. Meter readings and similar recordings.
   12. Emergency procedures.
   13. Orders and requests of authorities having jurisdiction.
   14. Change Orders received and implemented.
   15. Work Change Directives received and implemented.
   16. Services connected and disconnected.
   17. Equipment or system tests and startups.
   18. Partial completions and occupancies.
   19. Substantial Completions authorized.

B. Material Location Reports: At weekly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
   1. Material stored prior to previous report and remaining in storage.
   2. Material stored prior to previous report and since removed from storage and installed.
   3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 20 - EXECUTION

20.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule two days before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Engineer, Construction Manager, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION

PART 21 - GENERAL

21.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

21.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:
   1. Preconstruction photographs.
   2. Periodic construction photographs.
   3. Final completion construction photographs.
   4. Preconstruction video recordings.
   5. Periodic construction video recordings.

B. Related Requirements:
   1. Division 01 Section "Submittal Procedures" for submitting photographic documentation.
   2. Division 01 Section "Closeout Procedures" for submitting photographic documentation as project record documents at Project closeout.

21.3 INFORMATIONAL SUBMITTALS

A. Digital Photographs: Submit image files within three days of taking photographs. A minimum of (15) fifteen image files with monthly pay applications.
   1. Digital Camera: Minimum sensor resolution of 8 megapixels.
   2. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.

B. Video Recordings: Submit video recordings within seven days of recording. Submit preconstruction video and pictures with first pay application.
   1. Submit video recordings in digital video disc format acceptable to Engineer.

21.4 USAGE RIGHTS

A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

B.

PART 22 - PRODUCTS

22.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 3200 pixels.

B. Digital Video Recordings: Provide high-resolution, digital video disc in format acceptable to Engineer.

PART 23 - EXECUTION

23.1 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
   1. Maintain key plan with each set of construction photographs that identifies each photographic location.

B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
   1. Date and Time: Include date and time in file name for each image.
   2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Engineer and Owner.

C. Preconstruction Photographs: Starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Engineer and Owner.
   1. Flag construction limits before taking construction photographs.
   2. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
   3. Take 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
   4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

D. Periodic Construction Photographs: Take photographs at regular intervals through out construction. Select vantage points to show status of construction and progress since last photographs were taken. Include readable photographs of all equipment nameplates.

E. Engineer and Owner-Directed Construction Photographs: From time to time, Engineer and Owner may instruct photographer about number and frequency of photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.

F. Final Completion Construction Photographs: Take 20 color photographs after date of Substantial Completion for submission as project record documents. Engineer or Owner will inform photographer of desired vantage points.

G. Additional Photographs: Engineer or Owner may request photographs, in addition to periodic photographs specified. Additional photographs are included in the Contract Sum.
1. Three days' notice will be given, where feasible.
2. In emergency situations, take additional photographs within 24 hours of request.
3. Circumstances that could require additional photographs include, but are not limited to, the following:
   a. Immediate follow-up when on-site events result in construction damage or losses.
   b. Substantial Completion of a major component of the Work.
   c. Extra record photographs at time of final acceptance.
   d. Owner's request for special publicity photographs.

23.2 CONSTRUCTION VIDEO RECORDINGS

A. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of construction. Display continuous running time and date. At start of each video recording, record weather conditions from local newspaper or television and the actual temperature reading at Project site.

B. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed, recent events, and planned activities. At each change in location, describe vantage point, location, direction (by compass point), and elevation or story of construction.
1. Confirm date and time at beginning and end of recording.
2. Begin each video recording with name of Project, Contractor's name, videographer's name, and Project location.

C. Preconstruction Video Recording: Before starting construction, record video recording of Project site and surrounding properties from different vantage points, as directed by Engineer or Owner.
1. Flag construction limits before recording construction video recordings.
2. Show existing conditions adjacent to Project site before starting the Work.
3. Show existing buildings either on or adjoining Project site to accurately record physical conditions at the start of construction.
4. Show protection efforts by Contractor.

D. Periodic Construction Video Recordings: Record video recording as requested by Engineer or Owner. Select vantage points to show status of construction and progress since last video recordings were recorded. Minimum recording time shall be 30 minutes(s).

END OF SECTION

PART 24 - GENERAL

24.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

24.2 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

B. Related Sections include the following:
   1. Division 01 Section “Closeout Procedures” for submitting warranties and Project Record Documents.
   2. Division 01 Section “Project Record Documents” for submitting Record Drawings, Record Specifications, and Record Product Data.

24.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Engineer's responsive action.

B. Informational Submittals: Written information that does not require Engineer's approval. Submittals may be rejected for not complying with requirements.

24.4 SUBMITTAL PROCEDURES

A. General: Electronic copies of base plans of the Contract Drawings for Contractor's use in preparing submittals will not be provided.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
      a. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
2. If resubmittal is necessary, process it in same manner as initial submittal.
3. Allow 15 days for processing each resubmittal.
4. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
5. Submittals out of sequence from agreed upon schedule may result in back charges to the Contractor.

D. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space on label or beside title block to record Contractor's review and approval markings.
3. Include the following information on label for processing and recording action taken:
   a. Project name.
   b. Date.
   c. Name and address of Contractor.
   d. Name and address of subcontractor.
   e. Name and address of supplier.
   f. Name of manufacturer.
   g. Unique identifier, including revision number.
   h. Number and title of appropriate Specification Section.
   i. Drawing number and detail references, as appropriate.
   j. Other necessary identification.
   k. Furnish as Submitted
   l. Furnish as Corrected
   m. Furnish as Corrected & Confirm
   n. Make Corrections Noted
   o. Revise & Resubmit
   p. Rejected

E. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals. Provide a copy of the pertinent product specification, with each paragraph check-marked to indicate compliance. Any deviations are to be noted and explained.

F. Copies: Unless additional copies are required for final submittal, and unless Engineer observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal.

G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Engineer will return submittals, without review, received from sources other than Contractor.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having

jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Use only final submittals with mark indicating action taken by Engineer in connection with construction.

PART 25 - PRODUCTS

25.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:
   a. Manufacturer's written recommendations.
   b. Manufacturer's product specifications.
   c. Manufacturer's installation instructions.
   d. Standard color charts.
   e. Manufacturer's catalog cuts.
   f. Wiring diagrams showing factory-installed wiring.
   g. Printed performance curves.
   h. Operational range diagrams.
   i. Mill reports.
   j. Standard product operating and maintenance manuals.
   k. Compliance with recognized trade association standards.
   l. Compliance with recognized testing agency standards.
   m. Application of testing agency labels and seals.
   n. Notation of coordination requirements.
4. Number of Copies: Submit three copies, plus the number of copies the Contractor desires to have returned.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Include the following information, as applicable:
   a. Dimensions.
   b. Identification of products.
   c. Fabrication and installation drawings.
   d. Roughing-in and setting diagrams.
   e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
   f. Shopwork manufacturing instructions.
   g. Templates and patterns.
   h. Schedules.
   i. Design calculations.
   j. Compliance with specified standards.
   k. Notation of coordination requirements.

l. Notation of dimensions established by field measurement.

2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

3. Number of Copies: Submit three copies plus the number of copies the Contractor desires to have returned of each submittal Engineer will retain three prints; remainder will be returned.

D. Samples: Prepare physical units of materials or products as applicable, including the following:

1. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

2. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

3. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Attach label on unexposed side that includes the following:
   a. Generic description of Sample.
   b. Product name or name of manufacturer.
   c. Sample source.
   d. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.

4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

E. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.

2. Number and title of related Specification Section(s) covered by subcontract.

3. Drawing number and detail references, as appropriate, covered by subcontract.

25.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit three copies of each submittal, unless otherwise indicated. Engineer will not return copies.

2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
3. Test and Inspection Reports: Comply with requirements in Division 1 Section "Quality Requirements."

B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and Engineers, and other information specified.

C. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.

D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.

F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.

G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.

H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.

I. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements.

J. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

K. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.

L. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a

qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

M. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section "Closeout Procedures."

N. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

O. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

P. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

PART 26 - EXECUTION

26.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's

approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

26.2 ENGINEER'S ACTION

A. General: Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
   1. Review of submittals by Engineer is only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.
   2. Review of submittals by Engineer is not for purpose of determining the accuracy and completeness of dimensions and quantities, or substantiating installation instructions.

B. Re-submittal Review: Submittals marked as "Revise & Resubmit" or "Resubmit" will be re-reviewed and stamped with an action stamp. Engineer will mark the stamp appropriately to indicate action taken. If the re-submittal is marked as "Revise & Resubmit" or "Resubmit", the Owner will deduct the amount of the Engineer's compensation for subsequent re-submittal review from the final payment to the Contractor as provided on the Bid Form.

C. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or modifications required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
   1. Furnish as Submitted: Where submittal is marked "Furnish as Submitted", the Work covered by the submittal may proceed provided it complies with the Contract Documents.
   2. Furnish as Corrected: Where submittal is marked "Furnish as Corrected ", the Work covered by the submittal may proceed provided it complies with both Engineer's notations and corrections on the submittal and the Contract Documents.
   3. Furnish as Corrected & Confirm: Where submittal is marked "Furnish as Corrected & Confirm", the Work covered by the submittal may proceed provided it complies with both Engineer's notations and corrections on the submittal and the Contract Documents, but Contractor must acknowledge Engineer’s comments in writing.
   4. Make Corrections Noted: Where the submittal is marked "Make Corrections Noted", do not proceed with the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity for the product submitted. Revise or prepare a new submittal according to Engineer's notations and corrections.
   5. Revise & Resubmit: Where the submittal is marked "Revise & Resubmit", do not proceed with the Work covered by the submittal. Prepare a new submittal for a product that complies with the Contract Documents.
   6. Rejected: Where the submittal is marked “Rejected”, Contractor shall prepare a new submittal for a different product that complies with the Contract Documents.

D. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

END OF SECTION

PART 27 - GENERAL

27.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

27.2 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
   1. Specific quality-assurance and quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
   2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
   3. Requirements for Contractor to provide quality-assurance and quality-control services required by Engineer, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections include the following:
   1. Divisions 02 through 44 Sections for specific test and inspection requirements.

27.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Engineer.

C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples.

D. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.

E. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

F. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.

G. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

H. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

I. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

J. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
   1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades-people of the corresponding generic name.

K. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

27.4 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Engineer for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Engineer for a decision before proceeding.

27.5 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
   1. Specification Section number and title.
   2. Description of test and inspection.
   3. Identification of applicable standards.
   4. Identification of test and inspection methods.
   5. Number of tests and inspections required.
   6. Time schedule or time span for tests and inspections.
   7. Entity responsible for performing tests and inspections.
   8. Requirements for obtaining samples.
   9. Unique characteristics of each quality-control service.

C. Reports: Prepare and submit certified written reports that include the following:
   1. Date of issue.
   2. Project title and number.
   3. Name, address, and telephone number of testing agency.
   4. Dates and locations of samples and tests or inspections.
   5. Names of individuals making tests and inspections.
   6. Description of the Work and test and inspection method.
   7. Identification of product and Specification Section.
   8. Complete test or inspection data.
   9. Test and inspection results and an interpretation of test results.
   10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
   11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
   12. Name and signature of laboratory inspector.
   13. Recommendations on retesting and reinspecting.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

27.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice and maintains current licensure in the state of Georgia, and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
   1. Requirement for specialists shall not supersede building codes and regulations governing the Work.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
   1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
   2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
   1. Contractor responsibilities include the following:
      a. Provide test specimens representative of proposed products and construction.
      b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
      c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
      d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.

e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Engineer, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

27.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made from testing and inspecting allowances, as authorized by Owner.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 1 Section "Submittal Procedures."

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control

services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
   1. Notify Engineer, Construction Project Manager and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
   2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
   3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
   4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
   5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
   6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
   1. Access to the Work.
   2. Incidental labor and facilities necessary to facilitate tests and inspections.
   3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
   4. Facilities for storage and field-curing of test samples.
   5. Delivery of samples to testing agencies.
   6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
   7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
   1. Schedule times for tests, inspections, obtaining samples, and similar activities.

H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 30 days of date established for commencement of the Work.
   1. Distribution: Distribute schedule to Owner, Engineer, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

27.8 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
   1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
   2. Notifying Construction Project Manager and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
   3. Submitting a certified written report of each test, inspection, and similar quality-control service to Engineer, with copy to Contractor and to authorities having jurisdiction.
   4. Submitting a final report of special tests and inspections at Substantial Completion, that includes a list of unresolved deficiencies.
   5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
   6. Retesting and re-inspecting corrected work.
   7.
   8.
   9.

27.9 PAYMENT FOR TESTING

A. Initial Services: Contractor shall employ, pay for, and schedule the services of all independent testing laboratories required to perform the inspections and tests specified in these documents.

B. Retesting: Should retesting be required to confirm non-compliance or confirm that reworked non-compliance items are now in compliance; Contractor shall pay for the testing.

C. Retesting at Construction Project Manager’s Request: Should the Engineer request additional testing over and above the retesting required to confirm compliance, cost for the testing shall be the responsibility of the Contractor, should the additional testing confirm the non-compliance of an item. If the testing requested by the Construction Project Manager fails to confirm non-compliance, cost for the testing shall be the responsibility of the Owner.

D. Disputed Testing Results: Should the compliance of an item remain in dispute after retesting is complete, the Contractor shall coordinate obtaining the services of a second laboratory to test the disputed item. Should the testing results or observations obtained from the second laboratory confirm the item in question is not in compliance, the Contractor shall pay all costs for the additional testing effort performed by second laboratory. Should the results/observations provided by the second laboratory confirm the item in question is in compliance, the Owner shall pay for the second laboratory’s testing/observation effort.

E. Contractor's Convenience Testing:
   1. Inspecting and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

PART 28 - PRODUCTS (Not Used)

PART 29 - EXECUTION

29.1 TEST AND INSPECTION LOG

A. Prepare a record of tests and inspections. Include the following:
   1. Date test or inspection was conducted.
   2. Description of the Work tested or inspected.
   3. Date test or inspection results were transmitted to Engineer.
   4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Engineer's reference during normal working hours.

29.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
   1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

PART 30 - GENERAL

30.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

30.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Engineer's action on Contractor's submittals, applications, and requests, "approved" is limited to Engineer's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Engineer. Other terms including "requested," "authorized," "selected," "approved," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

30.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

30.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association, Inc. (The) www.aluminum.org	(202) 862-5100
AASHTO	American Association of State Highway and Transportation Officials **www.transportation .org**	(202) 624-5800
ACI	ACI International (American Concrete Institute) www.aci-int.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AGA	American Gas Association www.aga.org	(202) 824-7000
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
AOSA	Association of Official Seed Analysts www.aosaseed.com	(505) 522-1437
APA	Architectural Precast Association www.archprecast.org	(239) 454-6989

ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (The American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (212) 591-7722
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9585
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
CDA	Copper Development Association Inc. www.copper.org	(800) 232-3282 (212) 251-7200
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CPPA	Corrugated Polyethylene Pipe Association www.cppa-info.org	(800) 510-2772 (202) 462-9607
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
EJCDC	Engineers Joint Contract Documents Committee www.asce.org	(800) 548-2723 (703) 295-6300
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
FCI	Fluid Controls Institute www.fluidcontrolsinstitute.org	(216) 241-7333
FM	Factory Mutual System (See FMG)	

FMG	FM Global (Formerly: FM - Factory Mutual System) www.fmglobal.com	(401) 275-3000
FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
GRI	Geosynthetic Research Institute (See GSI)	
GSI	Geosynthetic Institute www.geosynthetic-institute.org	(610) 522-8440
HI	Hydraulic Institute www.pumps.org	(888) 786-7744 (973) 267-9700
HI	Hydronics Institute www.gamanet.org	(908) 464-8200
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
ISO	International Organization for Standardization www.iso.ch	41 22 749 01 11
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864 (847) 577-7200
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.com	(703) 281-6613
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(281) 228-6200
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NCPI	National Clay Pipe Institute www.ncpi.org	(262) 248-9094
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NFPA	NFPA www.nfpa.org	(800) 344-3555 (617) 770-3000
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	NSF International	(800) 673-6275

	(National Sanitation Foundation International) www.nsf.org	(734) 769-8010
NSSGA	National Stone, Sand & Gravel Association www.nssga.org	(800) 342-1415 (703) 525-8788
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
SAE	SAE International www.sae.org	(724) 776-4841
SPI/SPFD	Society of the Plastics Industry, Inc. (The) Spray Polyurethane Foam Division (See SPFA)	
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWRI	Sealant, Waterproofing, & Restoration Institute www.swrionline.org	(816) 472-7974
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700
UL	Underwriters Laboratories Inc. www.ul.com	(800) 285-4476 (847) 272-8800
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

BOCA	BOCA International, Inc. (See ICC)	
CABO	Council of American Building Officials (See ICC)	
IAPMO	International Association of Plumbing and Mechanical Officials **www.iapmo.org**	(909) 472-4100
ICBO	International Conference of Building Officials (See ICC)	
ICBO ES	ICBO Evaluation Service, Inc. (See ICC-ES)	

ICC	International Code Council (Formerly: CABO - Council of American Building Officials) **www.iccsafe.org**	(703) 931-4533
ICC-ES	ICC Evaluation Service, Inc. **www.icc-es.org**	(800) 423-6587 (562) 699-0543
SBCCI	Southern Building Code Congress International, Inc. (See ICC)	

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CE	Army Corps of Engineers **www.usace.army.mil**	
EPA	Environmental Protection Agency **www.epa.gov**	(202) 272-0167
FAA	Federal Aviation Administration **www.faa.gov**	(202) 366-4000
NOAA	National Oceanic and Atmospheric Administration **www.noaa.gov**	(202) 482-3154
HUD	Department of Housing and Urban Development **www.hud.gov**	(202) 708-1112
OSHA	Occupational Safety & Health Administration **www.osha.gov**	(800) 321-6742 (202) 693-1999
RUS	Rural Utilities Service (See USDA)	(202) 720-9540
USDA	United States Department of Agriculture **www.usda.gov**	(202) 720-2791
USPS	United States Postal Service **www.usps.com**	(202) 268-2000

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list.

Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA) Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities Available from U.S. Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080
CFR	Code of Federal Regulations Available from Government Printing Office www.gpoaccess.gov/cfr/index.html	(866) 512-1800 (202) 512-1800

E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

F. Georgia

G. DNR Department of Natural Resources

H. EPD Environmental Protection Division

PART 31 - PRODUCTS (Not Used)

PART 32 - EXECUTION (Not Used)

END OF SECTION

PART 33 - GENERAL

33.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

33.2 SUMMARY

A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.

B. Temporary utilities include, but are not limited to, the following:
1. Sewers and drainage.
2. Water service and distribution.
3. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
4. Heating and cooling facilities.
5. Ventilation.
6. Electric power service.
7. Lighting.
8. Telephone service.

C. Support facilities include, but are not limited to, the following:
1. Temporary roads and paving.
2. Dewatering facilities and drains.
3. Project identification and temporary signs.
4. Waste disposal facilities.
5. Field offices.
6. Storage and fabrication sheds.
7. Lifts and hoists.
8. Temporary stairs.
9. Construction aids and miscellaneous services and facilities.

D. Security and protection facilities include, but are not limited to, the following:
1. Environmental protection.
2. Stormwater control.
3. Tree and plant protection.
4. Pest control.
5. Site enclosure fence.
6. Security enclosure and lockup.
7. Barricades, warning signs, and lights.
8. Covered walkways.
9. Temporary enclosures.
10. Temporary partitions.
11. Fire protection.

E. Related Sections include the following:

1. Division 01 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.

33.3 DEFINITIONS

A. Permanent Enclosure: As determined by Owner, permanent or temporary roofing is complete, insulated, and weather tight; exterior walls are insulated and weather tight; and all openings are closed with permanent construction or substantial temporary closures.

33.4 USE CHARGES

A. General: Cost or use charges for temporary facilities are not chargeable to Owner and shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:
1. Owner's forces.
2. Occupants of Project.
3. Owner.
4. Testing agencies.
5. Personnel of authorities having jurisdiction.

B. Sewer Service: Pay sewer service use charges for sewer usage, by all parties engaged in construction, at Project site.

C. Water Service: Use water from Owner's existing water system after notification and approval by Owner.

D. Electric Power Service: Pay electric power service use charges, whether metered or otherwise, for electricity used by all entities engaged in construction activities at Project site.

33.5 SUBMITTALS

A. Temporary Utility Reports: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.

33.6 QUALITY ASSURANCE

A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.
1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.
2. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

33.7 PROJECT CONDITIONS

A. Temporary Utilities: At earliest feasible time, when acceptable to Owner, change over from use of temporary service to use of permanent service.
   1. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

B. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:
   1. Keep temporary services and facilities clean and neat.
   2. Relocate temporary services and facilities as required by progress of the Work.
   3. Contractor shall coordinate with Owner on use of existing building and premises for storage of construction materials and equipment.

PART 34 - PRODUCTS

34.1 MATERIALS

A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Owner. Provide materials suitable for use intended.

B. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.

C. Water: Potable.

34.2 EQUIPMENT

A. General: Provide equipment suitable for use intended.

B. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.
   1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

C. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

D. Heating Equipment: Provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
   1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
   2. Heating Units: Listed and labeled, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use for type of fuel being consumed.

E. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.

34.3 PROJECT IDENTIFICATION AND SIGNS

A. Construct frame for identification and signs from new wood or galvanized steel.

B. Materials:
1. Corrugated plastic; for signs larger than 2 feet by 2 feet, mount on exterior grade plywood.
2. Aluminum; thickness of 0.04 gauge.
3. Medium Density Overlay Plywood.
4. Alumanite. ®
5. Dibond. ®
6. Lusterboard. ®

PART 35 - EXECUTION

35.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

C. Install project identification sign within thirty days after Notice to Proceed date.

35.2 TEMPORARY UTILITY INSTALLATION

A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.
1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.
3. Obtain easements to bring temporary utilities to Project site where Owner's easements cannot be used for that purpose.

B. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.

1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.

D. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed.

E. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

35.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:
1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.

B. Traffic Controls: Provide temporary traffic controls at junction of temporary roads with public roads. Include warning signs for public traffic and "STOP" signs for entrance onto public roads. Comply with requirements of authorities having jurisdiction.

C. Project Identification and Signs: Prepare Project identification and other signs in sizes indicated. Install signs where indicated to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs.

D. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility services. Sheds may be open shelters or fully enclosed spaces within building or elsewhere on-site. Contractor shall coordinate with Owner on use of existing building and premises for storage facilities.

35.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near Project site.

B. Stormwater Control: Provide earthen embankments, silt fences, check dams, and similar barriers in and around excavations and subgrade

construction, sufficient to prevent flooding and siltation by runoff of stormwater from heavy rains. All stormwater controls shall meet the requirements of the Georgia Environmental Protection Division.

C. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from construction damage. Protect tree root systems from damage, flooding, and erosion.

D. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

E. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.

F. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
2. Vertical Openings: Close openings of 25 sq. ft. or less with plywood or similar materials.
3. Horizontal Openings: Close openings in floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
4. Install tarpaulins securely using fire-retardant-treated wood framing and other materials.
5.

35.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
2. Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
3. Repair deterioration and damage to project identification and signs. Keep signs clean.

C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of

a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the property of Contractor. Owner reserves right to take possession of Project identification and signs.

END OF SECTION

PART 36 - GENERAL

36.1 SECTION INCLUDES

A. Work shall include providing erosion prevention and sediment control measures for all excavation and other construction activities within the limits of the site, any temporary or permanent easements, and within any borrow or spoil areas used during the entire duration of construction. During dry weather, sprinkle sites with water or use other means necessary to control dust.

36.2 QUALITY ASSURANCE

A. All erosion prevention and sediment control work shall comply with applicable requirements of governing authorities having jurisdiction and of the National Pollutant Discharge Elimination System (NPDES). The specifications, drawings and are not represented as being comprehensive, but rather convey the intent to provide complete erosion prevention and sediment control for the Owner's and adjacent properties. In the event of a discrepancy between these documents and requirements of authorities having jurisdiction, the more stringent of the two shall take precedence.

B. Erosion prevention and sediment control measures shall be provided prior to commencement of construction and diligently maintained for the entire duration of construction. On-site and off-site areas which are especially vulnerable to damage from erosion and sedimentation are to be identified and receive special attention.

C. All land-disturbing activities shall be planned and conducted to minimize the area and time of exposure and to prevent discharge of sediment laden water from the site.

D. Surface water runoff originating upgrade of exposed areas shall be diverted to reduce erosion and sediment loss during the period of exposure.

E. The Contractor is responsible for removal of sediment from all erosion prevention and sediment control structures, barriers and ponds when capacity of the feature is reduced by one-half [by authorities having jurisdiction].

F. The Contractor is required to perform inspections and document conditions of erosion prevention and sediment control measures. Frequency of inspection shall be as set forth in the by authorities having jurisdiction. Maintenance shall be performed promptly.

G. The Contractor is responsible for obtaining all required land disturbance permits associated with construction activity at this site for the Project.

PART 37 - PRODUCTS

37.1 MATERIALS

A. Crushed stone for stabilized construction entrance/exit shall be clean and 2 to 3.5 inches in diameter. Filter fabric for stabilized construction entrance/exit shall be Mirafi 135N or equivalent.

B. Silt fence shall be "Envirofence" preassembled silt fence by Mirafi, Inc., or equivalent. Tensile Strength (Lbs. Minimum) warp 120, fill 100 per ASTM D-4632; Elongation (% Maximum) 40, per ASTM D-4632; Apparent Opening Size #30 per ASTM D-4751; Flow Rate (Gal/Min/Sq. Ft.) 25, Ultraviolet Stability of 80 per ASTM D-4632 after 300 hours of weathering per ASTM D-4355); Bursting Strength (PSI, Minimum) 175 per ASTM D-3786.

C. Gravel Filled Bags: Bags shall be of like material to silt fence. Gravel shall be clean #57 or #67 crushed stone. Filled bags shall be at least 2 feet long, 1’-6” wide and 6 inches thick.

D. Rock for check dam structures shall be clean, small rip rap (2 to 15 inches in diameter).

E. Strawbales: Bales shall be either wire bound or string tied and placed with bindings orientated around sides rather than top and bottom.

F. Temporary Vegetation: Seed mixtures including rye, annual ryegrass, wheat, oats, barley, Sudan grass, wheat, oats, Fescue, Lespedeza, millet, and/or Bermudagrass that provide quick protection shall be used to temporarily stabilize disturbed areas that will not be brought to final grade for 30 days or more.

G. Temporary mulches shall consist of straw or hay, composted materials, wood chips or cellulose fiber, asphalt, and/or rolled erosion control products.

H. Erosion Control Blanket/Matting: Blanket and matting materials shall be non-toxic to vegetation. Netting shall be photodegradable and intertwined with mulch/fiber material. Mulch and fiber material shall consist of straw, excelsior (curled wood), coconut, or jute (woven root fiber).

PART 38 - EXECUTION

38.1 PROTECTION

A. Conduct construction so as to provide the site with maximum protection from erosion at all times.

B. Conduct excavation activities to provide erosion and sediment control as follows:

1. Clearing and excavation shall not commence until such work is approved and permitted by local authorities having jurisdiction. Coordinate with authorities having jurisdiction for permitting requirements.
2. Stockpile excavated material so as not to block any drainage area. Replace this excavated material in the trench immediately after repairs or installations have been completed and are approved by the Engineer or local authority.
3. Retain natural vegetation whenever feasible.
4. Stabilize exposed areas as quickly as possible by means of seeding and mulching. Use diversion ditches, or other methods, to prevent storm water from running over the exposed area until seeding is established as specified.
5. Take particular care along streams and drainage ditches so that fallen trees, debris, and excavated material will not adversely affect the streamflow. Exercise care to minimize disturbance of streambanks. Wherever the streambanks are affected by construction, reduce the slope of the streambanks to provide a suitable condition for establishment of vegetative protection.
6. Retard the velocity of runoff water by use of barriers, traps and basins.
7. Trap the sediment contained in runoff water.
8. Take care during the hauling of materials, etc., to keep vehicles from creating a severe erosion problem.
9. Control dust by application of water or other means, as necessary.
10. Stabilize roadways and driveways as soon as feasible.

C. Regrade and stabilize surfaces eroded or otherwise damaged during any and all construction operations.

38.2 STABILIZED CONSTRUCTION ENTRANCE / EXIT

A. Length: As effective, but not less than 150 feet.

B. Thickness: Not less than eight (8) inches. A layer of medium grade filter fabric shall be placed on the subgrade before placement of stone.

C. Width: The full width of all points of ingress and egress, but not less than 20 feet.

D. Radii: Radii shall be appropriate for type of traffic, but not less than 20 feet.

E. Washing: When necessary, vehicles shall be cleaned of sediment prior to exiting the site onto public right-of-way. When washing is required, it shall be done in an area stabilized with crushed stone and draining into an approved sediment trap or basin. All sediment shall be prevented from entering any storm drain, ditch, or watercourse through use of approved methods.

F. Maintenance: The entrance shall be maintained in a condition, which prevents transport of sediment off of the site or onto public rights-of-way. This may require periodic top dressing with additional stone and

maintenance of measures used to trap sediment. All sediment transported onto public rights-of-way shall be removed immediately.

38.3 SILT FENCING

A. Silt fencing shall be placed on proposed line, parallel to contours, and within an excavated trench of minimum 6 inch depth and width. Excavated soil shall be backfilled against the uphill side of the barrier. The bottom edge of silt fence must be entrenched and backfilled to be effective.

B. Silt fencing shall be purchased in continuous rolls and cut to length of the barrier. When joints are unavoidable, filter material shall be spliced together only at support posts and overlapped a minimum of 6 inches.

C. Install the silt fence in accordance with the manufacturer's recommendations and the details shown on the plans.

38.4 STRAW BALE BARRIERS

A. Bales shall be installed in a trench excavated to the width of the bale, the length of the proposed barrier, and to a minimum depth of 4 inches. Excavated soil shall be backfilled against the uphill side of the barrier.

B. Bales shall be placed in a single row, lengthwise on proposed line, with ends of adjacent bales tightly abutting one another, such that no gaps are evident. In swales and ditches the barrier shall extend up each side slope such that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale.

C. Bales shall be anchored with at least two stakes or rebars through each bale and a minimum of 8 inches into the ground. Provide safety caps if rebar is used to anchor straw bales.

38.5 TEMPORARY VEGETATIVE COVER

A. Soil shall be tested to determined nutrient levels. If soil does not contain sufficient nutrient levels, work 12-12-12 analysis fertilizer 2 to 4 inches deep into soil at a rate of 400-600 pounds per acre.

B. Seed shall be certified by the local State Department of Transportation or Soil Conservation office.

C. To promote temporary vegetation establishment; provide lime, fertilizer (as determined by soil testing) and above-ground irrigation as necessary.

D. Provide mulch consisting of straw or hay, composted materials, wood chips or cellulose fiber, asphalt, or erosion control blanket to cover a minimum of 75% of the area receiving temporary vegetative cover.

E. Temporary vegetation shall be made non-viable, with herbicide or other means, prior to seeding and planting of permanent species.

38.6 EROSION CONTROL BLANKET/MATTING

A. Seed and fertilizer (if required) shall be applied before installation of a blanket or mat.

B. Follow manufacturer's directions for orienting, overlapping, entrenching and securing blankets and mats. Generally orient blanket and mat rolls vertically along a slope, from top to bottom. Horizontal orientation is allowable only for slopes with steepness less than 2:1 and a height of less than twice the roll width.

C. Always entrench the blanket or mat a minimum of 6 inches at any joint, any structure, and at the top and bottom of a slope.

38.7 ROCK CHECK DAMS

A. Provide rock check dams in locations shown on the plans. Maximum spacing shall be such that the toe of the upstream dam is at the same elevation as the top of the downstream dam.

B. The center of each check dam should be at least 9 inches lower than its outer edges. Height of the dam shall not exceed 2 feet at its centerline.

38.8 INLET PROTECTION

A. Excavation around the drop inlet (non-paved areas) shall be performed to accommodate the barrier type implemented (e.g. silt fence, straw bales, gravel filled bags). Backfilled material shall be placed on the upstream side of the barrier.

38.9 DUST CONTROL

A. Dust generated during performance of the work shall be controlled by applying water and/or polyacrylamide (PAM). Provide PAM when timely establishment of vegetative cover is not possible.

B. Water and/or shall be provided in the amounts and locations in accordance with general local practice. Do not apply PAM within 25 feet of a natural stream or storm water conveyance.

END OF SECTION

PART 39 - GENERAL

39.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

39.2 SUMMARY

A. This Section includes the following administrative and procedural requirements: selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

B. Related Sections include the following:
1. Division 01 Section "References" for applicable industry standards for products specified.
2. Division 01 Section "Closeout Procedures" for submitting warranties for contract closeout.
3. Divisions 02 through 44 Sections for specific requirements for warranties on products and installations.

39.3 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics

for purposes of evaluating comparable products of other named manufacturers.

D. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

E. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

39.4 SUBMITTALS

A. Product List: Submit a list, in tabular from, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.
1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
2. Completed List: Within 30 days after date of commencement of the Work, submit 3 copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
3. Engineer's Action: Engineer will respond in writing to Contractor within 15 days of receipt of completed product list. Engineer's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Engineer's response, or lack of response, does not constitute a waiver of requirement that products comply with the Specifications.

B. Substitution Requests: This form is to be used by the awarded vendor. Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Substitution Request Form: Use form provided at end of Section. Other forms are not acceptable.
2. Substitutions will not be considered when indicated on shop drawings or product data submittals.
3. Substitutions will not be considered unless submitted through the General Contractor.
4. Additional studies, investigations, submittals, redesign and/or analysis by the Engineer caused by requested substitution shall be paid by the Contractor at no expense to the Owner.
5. Only one request for substitution for each product will be considered. When substitution is not acceptable to Engineer, provide specified product.
6. Engineer will determine the acceptability of all substitutions.
7. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
   a. Statement indicating reason for substitution.
   b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.

c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
h. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
i. Cost information, indicating the difference in cost between specified product(s) and proposed substitution.
j. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
k. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

8. Engineer's Action: If necessary, Engineer will request additional information or documentation for evaluation upon receipt of a request for substitution.
   a. Use product specified if Engineer is unable to make a decision on use of a proposed substitution within time allocated.

C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.

39.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

B.

39.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store products to allow for inspection and measurement of quantity or counting of units.
6. Store materials in a manner that will not endanger Project structure.
7. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
8. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
9. Protect stored products from damage.
10. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.
11. Provide additional protection during handling as necessary to prevent scraping, marring, or otherwise damaging products or surrounding spaces.
12. Handle products by using methods that will prevent bending or over stressing.
13. Lift heavy components only at designated lifting points.

B. Storage: Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

39.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

B. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 40 - PRODUCTS

40.1 PRODUCT OPTIONS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that are new at time of installation.
   1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
   2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
   3. Engineer reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
   4. Where products are accompanied by the term "as selected," Owner will make selection.
   5. Where products are accompanied by the term "match sample," sample to be matched is Owner's.
   6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
   7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures: Procedures for product selection include the following:
   1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer, provide the product named.
   2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product by the manufacturer or from the source named that complies with requirements.
   3. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
   4. Manufacturers: Where Specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
   5. Product Options: Where Specification paragraphs titled "Product Options" indicate that size, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide either the specific product or system indicated or a comparable product or system by another manufacturer. Comply with provisions in "Product Substitutions" Article.
   6. Basis-of-Design Products: Where Specification paragraphs or subparagraphs titled "Basis-of-Design Products" are included and also introduce or refer to a list of manufacturers' names, provide either the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in

"Comparable Products" Article to obtain approval for use of an unnamed product.

40.2 PRODUCT SUBSTITUTIONS

A. Conditions: Engineer will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Engineer will return requests without action, except to record noncompliance with these requirements.
   1. Requested substitution does not require extensive revisions to the Contract Documents.
   2. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   3. Substitution request is fully documented and properly submitted.
   4. Requested substitution will not adversely affect Contractor's Construction Schedule.
   5. Requested substitution has received necessary approvals of authorities having jurisdiction.
   6. Requested substitution is compatible with other portions of the Work.
   7. Requested substitution has been coordinated with other portions of the Work.
   8. Requested substitution provides specified warranty.
   9. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

40.3 COMPARABLE PRODUCTS

A. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:
   1. Evidence that the proposed product does not require extensive revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and is compatible with other portions of the Work.
   2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
   3. Evidence that proposed product provides specified warranty.
   4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
   5. Samples, if requested.

PART 41 - EXECUTION (Not Used)

END OF SECTION

GENERAL: Form shall be submitted via General Contractor to Owner.

PROJECT TITLE AND NO._____

TO:
Telephone:

ATTN:_____

DATE OF REQUEST: _____

SPECIFIED ITEM_____

Section_____Paragraph _____

REASON FOR SUBSTITUTION:_____

PROPOSED SUBSTITUTE: (indicate manufacturer and model) _____

Attach complete description, catalog, spec data, and laboratory tests.

1.Describe change to Contract Documents proposed substitute will require for its proper installation.

2.Will substitution affect electrical requirements, wiring, piping, equipment, systems, ductwork, etc. indicated in Contract Documents?

___ No ___ Yes; Explain: _____

3.Proposed substitution affects other trades. ___ No ___ Yes; Explain: _____

4.List <u>all</u> differences between proposed substitute and specified product/material: (noise, weight, power, size, gage, finishes, dimensions, etc.) _____

5.List (on separate sheet) the availability of maintenance services and replacement materials for proposed substitution.

6.List (on separate sheet) company names, addresses, phone numbers and contact persons of fabricators and suppliers for proposed substitution.

7.Will substitution affect the construction schedule?
___ No ___ Yes; Explain _____

8.If the substitution request is accepted, it will result in: No cost impact _____

Lower cost (How much) _____ Added cost (How much) _

9.Are there any additional license fees and/or royalties pending on the proposed substitute.
No ___ Yes; Explain: _____

10.The undersigned certifies/agrees:
Same warranty/guarantee will be furnished for proposed substitute as for specified product.
Same maintenance service and source of replacement parts, as applicable, is available.
Payment will be made for changes to building design, including Owner design, detailing and construction costs caused by the substitution.

SUBMITTED BY: (Supplier or Subcontractor)

Firm: _____

Address: _____

Name and Title of Person Signing: _____

Signature: _____

Telephone No.: _____ Date: _____

REVIEWED AND APPROVED for Subcontractor or Supplier by (General Contractor):

Firm: _____

Address: _____

Name and Title of Person Signing: _____

Signature: _____

Telephone No.: _____Date: _____

ENGINEER'S REVIEW AND ACTION:

_____Accepted - Make submittals in accordance with Specification Section 01 3300.

_____Accepted as Noted - Make submittals in accordance with Specification Section 01 3300.

_____ Rejected - Use specified materials.

_____ Received too late - Use specified materials.

Signature: _____ Date: _____

Remarks: _____

END OF SECTION

PART 42 - GENERAL

42.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

42.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
   1. Construction layout.
   2. Field engineering and surveying.
   3. Installation of the Work.
   4. Cutting and patching.
   5. Progress cleaning.
   6. Starting and adjusting.
   7. Protection of installed construction.
   8. Correction of the Work.

B. Related Requirements:
   1. Division 01 Section "Summary" for limits on use of Project site.
   2. Division 01 Section "Submittal Procedures"
   3. Division 01 Section "Closeout Procedures"

42.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

42.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For land surveyor and professional engineer, as applicable.

B. Certificates: Submit certificate signed by land surveyor or professional engineer certifying that location and elevation of improvements comply with requirements, as applicable.

C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
   1. Extent: Describe reason for and extent of each occurrence of cutting and patching.

2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
   a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

D. Certified Surveys: Submit two copies signed by land surveyor, as applicable

E. Final Property Survey: Submit 10 copies showing the Work performed and record survey data, as applicable.

42.5 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
1. Structural Elements: When cutting and patching structural elements, notify Engineer of locations and details of cutting and await directions from Engineer before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Engineer or Owner’s opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 43 - PRODUCTS

43.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Engineer for the visual and functional performance of in-place materials.

PART 44 - EXECUTION

44.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
1. Description of the Work.

2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

44.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility or Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Engineer.

44.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Engineer promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices, as applicable
1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Engineer when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Engineer.

44.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
1. Do not change or relocate existing benchmarks or control points without prior written approval of Engineer. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Engineer before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

44.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches in occupied spaces and **90 inches** in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
   1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Engineer.
   2. Allow for building movement, including thermal expansion and contraction.
   3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

44.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
   1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Division 01 Section "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
   1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
   3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
   5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
   6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
   1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
   2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
      a. Clean piping, conduit, and similar features before applying paint or other finishing materials.

b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
   a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

44.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
   1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
   2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
   3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
      a. Use containers intended for holding waste materials of type to be stored.
   4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
   1. Remove liquid spills promptly.
   2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials

that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

K.

44.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Requirements."

44.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION

PART 45 - GENERAL

45.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

45.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Substantial Completion procedures.
   2. Final completion procedures.
   3. Warranties.
   4. Final cleaning.
   5. Repair of the Work.

B. Related Requirements:
   1. Division 01 Section "Photographic Documentation" for submitting final completion construction photographic documentation.
   2. Division 01 Section "Execution" for progress cleaning of Project site.
   3. Division 01 Section "Project Record Documents" for submitting record Drawings and record Product Data.
   4. Divisions 02 through 44 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

45.3 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

45.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

45.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

45.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 working/14 calendar days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
   1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
   2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
   3. Submit closeout submittals specified in individual Divisions 02 through 44 Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
   4. Submit maintenance material submittals specified in individual Divisions 02 through 44 Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Engineer. Label with manufacturer's name and model number where applicable.
   5. Submit test/adjust/balance records.
   6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 working/14 calendar days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
   1. Advise Owner of pending insurance changeover requirements.
   2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
   3. Complete startup and testing of systems and equipment.
   4. Perform preventive maintenance on equipment used prior to Substantial Completion.
   5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
   6. Advise Owner of changeover in heat and other utilities.
   7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
   8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
   9. Complete final cleaning requirements, including touchup painting.
   10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 working/14 calendar days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Owner will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Engineer, that must be completed or corrected before certificate will be issued.
   1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
   2. Results of completed inspection will form the basis of requirements for final completion.

45.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
   1. Certified List of Incomplete Items: Submit certified copy of Engineer's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Engineer. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
   2. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 working/14 calendar days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
   1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

45.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
   1. Organize list of spaces in sequential order.
   2. Organize items applying to each space by major element.
   3. Include the following information at the top of each page:
      a. Project name.
      b. Date.
      c. Name of Engineer.
      d. Name of Contractor.
      e. Page number.
   4. Submit list of incomplete items in the following format:
      a. PDF electronic file.

45.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Engineer for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 working/21 calendar days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
   1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
   2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
   3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

D. Provide digital copies of each warranty to Engineer to include in operation and maintenance manuals.

PART 46 - PRODUCTS

46.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 47 - EXECUTION

47.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
   a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   d. Remove tools, construction equipment, machinery, and surplus material from Project site.
   e. Remove snow and ice to provide safe access to building.
   f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
   h. Sweep concrete floors broom clean in unoccupied spaces.
   i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
   j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
   k. Remove labels that are not permanent.
   l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
   m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
   n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
   o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
   p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
   q. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."

47.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
   a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION

PART 48 - GENERAL

48.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

48.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Operation and maintenance documentation directory.
   2. Emergency manuals.
   3. Operation manuals for systems, subsystems, and equipment.
   4. Product maintenance manuals.
   5. Systems and equipment maintenance manuals.

48.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

48.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
   1. Engineer will comment on whether content of operations and maintenance submittals are acceptable.
   2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:
   1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Engineer.
      a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
      b. Enable inserted reviewer comments on draft submittals.
   2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Engineer, through Construction Manager, will return two copies.

C. Initial Manual Submittal: Submit draft copy of each manual at least 10 days before commencing demonstration and training. Engineer will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Engineer will return copy with comments.
   1. Correct or revise each manual to comply with Engineer's comments. Submit copies of each corrected manual within 15 days of receipt of Engineer's comments and prior to commencing demonstration and training.

PART 49 - PRODUCTS

49.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing item`s and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
   1. List of documents.
   2. List of systems.
   3. List of equipment.
   4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

49.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
   1. Title page.
   2. Table of contents.

3. Manual contents.

B. Title Page: Include the following information:
1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Engineer.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Engineer that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold **8-1/2-by-11-inch (215-by-280-mm)** paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other

binders if necessary to provide essential information for proper operation or maintenance of equipment or system.

b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents[, and indicate Specification Section number on bottom of spine]. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

49.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:
   1. Type of emergency.
   2. Emergency instructions.
   3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
   1. Fire.
   2. Flood.
   3. Gas leak.
   4. Water leak.
   5. Power failure.
   6. Water outage.
   7. System, subsystem, or equipment failure.
   8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:
   1. Instructions on stopping.

2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

49.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
   1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
   2. Performance and design criteria if Contractor has delegated design responsibility.
   3. Operating standards.
   4. Operating procedures.
   5. Operating logs.
   6. Wiring diagrams.
   7. Control diagrams.
   8. Piped system diagrams.
   9. Precautions against improper use.
   10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:
   1. Product name and model number. Use designations for products indicated on Contract Documents.
   2. Manufacturer's name.
   3. Equipment identification with serial number of each component.
   4. Equipment function.
   5. Operating characteristics.
   6. Limiting conditions.
   7. Performance curves.
   8. Engineering data and tests.
   9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:
   1. Startup procedures.
   2. Equipment or system break-in procedures.
   3. Routine and normal operating instructions.
   4. Regulation and control procedures.
   5. Instructions on stopping.
   6. Normal shutdown instructions.
   7. Seasonal and weekend operating instructions.
   8. Required sequences for electric or electronic systems.
   9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

49.5 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:
   1. Product name and model number.
   2. Manufacturer's name.
   3. Color, pattern, and texture.
   4. Material and chemical composition.
   5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
   1. Inspection procedures.
   2. Types of cleaning agents to be used and methods of cleaning.
   3. List of cleaning agents and methods of cleaning detrimental to product.
   4. Schedule for routine cleaning and maintenance.
   5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

49.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title

in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
   1. Standard maintenance instructions and bulletins.
   2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
   3. Identification and nomenclature of parts and components.
   4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
   1. Test and inspection instructions.
   2. Troubleshooting guide.
   3. Precautions against improper maintenance.
   4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   5. Aligning, adjusting, and checking instructions.
   6. Demonstration and training video recording, if available.
   7. List of cleaning agents and methods of cleaning detrimental to equipment.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
   1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
   2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

PART 50 - EXECUTION

50.1 MANUAL PREPARATION

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
   1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
   2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
   1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
   1. Do not use original project record documents as part of operation and maintenance manuals.
   2. Comply with requirements of newly prepared record Drawings in Division 01 Section "Project Record Documents."

F. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION

PART 51 - GENERAL

51.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

51.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:
   1. Record Drawings.
   2. Operation and Maintenance Manuals.
   3. Miscellaneous record submittals.

B. Related Requirements:
   1. Division 01 Section "Closeout Procedures" for general closeout procedures.
   2. Divisions 02 through 44 Sections for specific requirements for project record documents of the Work in those Sections.

51.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:
   1. Number of Copies: Submit one set(s) of marked-up record prints.
   2. Number of Copies: Submit copies of record Drawings as follows:
      a. Initial Submittal:
         1) Submit one paper-copy set(s) of marked-up record prints.
         2) Engineer will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
      b. Final Submittal:
         1) Submit three paper-copy set(s) of marked-up record prints.
         2) Print each drawing, whether or not changes and additional information were recorded.

B. Operation and Maintenance Manuals:
   1. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing initial testing. Engineer will comment on whether general scope and content of manual are acceptable.
   2. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing initial testing. Engineer will return copy with comments.
      a. Correct or revise each manual to comply with Engineer's comments. Submit copies of each corrected manual within

15 days of receipt of Engineers comments and prior to commencing initial testing.

3. Furnish, prior to substantial completion, five copies of final maintenance manuals. All corrections shall have been made necessary to comply with Engineer's comments in the final manuals. Final manuals shall be indexed and composed of suppliers' maintenance manuals on all equipment and suppliers' brochures on all specialty equipment, including performance curves with size, model, figure number, etc., indicated to identify unit furnished.
4. Contractor is responsible for providing any additional operation and maintenance data specific to certain equipment as specified in Divisions 02 through 44 Sections of these specifications.

C. Miscellaneous Record Submittals: See other Specification Sections for additional miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy of each submittal.

PART 52 - PRODUCTS

52.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
   a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
   b. Accurately record information in an acceptable drawing technique.
   c. Record data as soon as possible after obtaining it.
   d. Record and check the markup before enclosing concealed installations.
   e. Cross-reference record prints to corresponding archive photographic documentation.
2. Content: Types of items requiring marking include, but are not limited to, the following:
   a. Dimensional changes to Drawings.
   b. Revisions to details shown on Drawings.
   c. Depths of foundations below first floor.
   d. Locations and depths of underground utilities.
   e. Revisions to routing of piping and conduits.
   f. Revisions to electrical circuitry.
   g. Actual equipment locations.
   h. Duct size and routing.

i. Locations of concealed internal utilities.
j. Changes made by Change Order.
k. Changes made following Engineer's written orders.
l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Identification: As follows:
a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Engineer.
e. Name of Contractor.

52.2 OPERATION AND MAINTENANCE MANUALS

A. Maintenance manuals are to be of a hardback, loose-leaf type and of a durable quality. In addition, a complete electronic copy shall be provided in MS-Word or searchable Adobe PDF format.

B. Manuals are to be for the specific equipment provided. Manuals describing general equipment lines will not be accepted. Where non-relevant information is present in the manual, it shall be neatly marked out with a single “X” through non-relevant portions.

C. Include in each set of manuals the following:
1. Manufacturer's parts list identified with the make, model and serial number of the equipment furnished.
2. Control and wiring diagrams.
3. Installation, operation (including start up and shut down procedures), lubrication and maintenance instructions.
4. Manufacturers recommended spare parts list.

D. If an Owner's representative is assigned to the project either through the Owner or the Engineer, the Contractor shall make a copy of all instruction manuals available to the Representative. Manuals on specific items shall

be available prior to installation of the item. This requirement in no way relieves the Contractor of his other responsibilities.

52.3 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as paper copy.
1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 53 - EXECUTION

53.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Engineer and Owner reference during normal working hours.

END OF SECTION

PART 54 - GENERAL

54.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

54.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
   1. Demonstration of operation of systems, subsystems, and equipment.
   2. Training in operation and maintenance of systems, subsystems, and equipment.
   3. Demonstration and training video recordings.

B. Related Requirements:
   1. Divisions 02 through 33 Sections for specific requirements for demonstration and training for products in those Sections.

54.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
   1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Attendance Record: For each training module, submit list of participants and length of instruction time.

C. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

54.4 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
   1. Identification: On each copy, provide an applied label with the following information:
      a. Name of Project.
      b. Name and address of videographer.
      c. Name of Architect.
      d. Name of Construction Manager.

e. Name of Contractor.
f. Date of video recording.

2. At completion of training, submit complete training manual(s) for Owner's use in PDF electronic file format on compact disc.

54.5 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.

54.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 55 - PRODUCTS

55.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

a. System, subsystem, and equipment descriptions.
b. Performance and design criteria if Contractor is delegated design responsibility.
c. Operating standards.
d. Regulatory requirements.
e. Equipment function.
f. Operating characteristics.
g. Limiting conditions.
h. Performance curves.

2. Documentation: Review the following items in detail:
   a. Emergency manuals.
   b. Operations manuals.
   c. Maintenance manuals.
   d. Project record documents.
   e. Identification systems.
   f. Warranties and bonds.
   g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.
   h. Normal shutdown instructions.
   i. Operating procedures for emergencies.
   j. Operating procedures for system, subsystem, or equipment failure.
   k. Seasonal and weekend operating instructions.
   l. Required sequences for electric or electronic systems.
   m. Special operating instructions and procedures.
5. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.
7. Maintenance: Include the following:
8. Inspection procedures.

a. Types of cleaning agents to be used and methods of cleaning.
b. List of cleaning agents and methods of cleaning detrimental to product.
c. Procedures for routine cleaning
d. Procedures for preventive maintenance.
e. Procedures for routine maintenance.
f. Instruction on use of special tools.

9. Repairs: Include the following:
a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

PART 56 - EXECUTION

56.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Division 01 Section "Operations and Maintenance Data."

B. Set up instructional equipment at instruction location.

56.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
2. Owner will furnish an instructor to describe Owner's operational philosophy.
3. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
1. Schedule training with Owner, through Construction Manager, with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

56.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
   1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Video: Provide minimum 640 x 480 video resolution converted to format file type acceptable to Owner, on electronic media.
   1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
   2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
   3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
   4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:
      a. Name of Contractor/Installer.
      b. Business address.
      c. Business phone number.
      d. Point of contact.
      e. E-mail address.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
   1. Film training session(s) in segments not to exceed 15 minutes.
      a. Produce segments to present a single significant piece of equipment per segment.
      b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
      c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.

D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.

E. Furnish additional portable lighting as required.

F. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.

G. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

H. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION

PART 57 - GENERAL

57.1 RELATED DOCUMENTS

A. Contractor's Drawings, Standard Specification Sections, Details, and Owner/ Contractor agreed terms apply to this Section.

57.2 SUMMARY

A. This Section specifies cast-in-place concrete, including reinforcement, concrete materials, mix design, placement procedures, and finishes for equipment slabs, concrete pier, footings, and access ramp.

57.3 SUBMITTALS

A. General: In addition to the following, comply with submittal requirements in ACI 301.

B. Product Data: For each type of manufactured material and product indicated.

C. Design Mixes: For each concrete mix.

57.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed concrete work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

C. Source Limitations: Obtain each type of cement of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.

D. Comply with ACI 301, "Specification for Structural Concrete," including the following, unless modified by the requirements of the Contract Documents.
   1. General requirements, including submittals, quality assurance, acceptance of structure, and protection of in-place concrete.
   2. Formwork and form accessories.
   3. Steel reinforcement and supports.
   4. Concrete mixtures.
   5. Handling, placing, and constructing concrete.
   6. Lightweight concrete.

PART 58 - PRODUCTS

58.1 FORMWORK

A. Furnish formwork and form accessories according to ACI 301.

58.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60(Grade 420), deformed.

B. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

58.3 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I.

B. Normal-Weight Aggregate: ASTM C 33, uniformly graded, not exceeding 1-1/2-inch nominal size.

C. Lightweight Aggregate: ASTM C 330.

D. Water: Potable and complying with ASTM C 94.

58.4 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures. Do not use admixtures containing calcium chloride.

B. Air-Entraining Admixture: ASTM C 260.

58.5 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz. /sq. yd.dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

58.6 CONCRETE MIXES

A. Comply with ACI 301 requirements for concrete mixtures.

B. Prepare design mixes, proportioned according to ACI 301, for normal-weight concrete determined by either laboratory trial mix or field test data bases, as follows:
   1. Compressive Strength (28 Days): 3500 psi concrete equipment slabs and access ramp.

2. Compressive Strength (28 Days): 4000 psi concrete pier and footings.
3. Slump: 3 - 5 inches.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 2.5 to 4.5 percent.

58.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with ASTM C 94.
1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 59 - EXECUTION

59.1 FORMWORK

A. Design, construct, erect, shore, brace, and maintain formwork according to ACI 301.

59.2 STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

59.3 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Locate and install so as not to impair strength or appearance of concrete, at locations indicated or as approved by Owner.

C. Isolation Joints: Install joint-filler strips at junctions with slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint fillers full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

D. Contraction (Control) Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.

59.4 CONCRETE PLACEMENT

A. Comply with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.

B. Do not add water to concrete during delivery, at Project site, or during placement.

C. Consolidate concrete with mechanical vibrating equipment.

59.5 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.
   1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Completely remove fins and other projections.
   1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, damp proofing, veneer plaster, or painting.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

59.6 FINISHING UNFORMED SURFACES

A. General: Comply with ACI 302.1R for screening, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or derbies to form a uniform and open-textured surface plane before excess moisture or bleed water appears on the surface.
   1. Do not further disturb surfaces before starting finishing operations.

C. Float Finish: Apply float finish to surfaces of slabs that are to be beneath prefabricated pumping stations.

59.7 TOLERANCES

A. Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

59.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-

weather protection, and follow recommendations in ACI 305R for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screening, and bull floating or darbying concrete, but before float finishing.

C. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure formed and unformed concrete for at least seven days by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
   1. Moisture Curing: Keep surfaces continuously moist for no less than seven days.
   2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
   3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

59.9 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Section. Perform tests according to ACI 301.
   1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.
   2. Testing not required on concrete for utility line anchors or encasement.

59.10 REPAIRS

A. Remove and replace concrete that does not comply with requirements in this Section.

PART 60 - GENERAL

60.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

60.2 SUMMARY

A. Products furnished, but not installed, under this Section:
   1. Loose steel lintels.
   2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

60.3 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.

60.4 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

D. Coordinate layout and fit up of medical support systems with engineering disciplines and equipment manufacturer requirements.

PART 61 - PRODUCTS

61.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

61.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 316L.

C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 316L.

D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

E. Rolled-Stainless-Steel Floor Plate: ASTM A 793.

F. Steel Tubing: ASTM A 500, cold-formed steel tubing.

G. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.

H. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

61.3 NONFERROUS METALS

A. Aluminum Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.

B. Aluminum Extrusions: ASTM B 221(ASTM B 221M), Alloy 6063-T6.

C. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.

61.4 FASTENERS

A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or **ASTM F 1941 (ASTM F 1941M)**, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
1. Provide stainless-steel fasteners for fastening aluminum.
2. Provide stainless-steel fasteners for fastening stainless steel.
3. Provide stainless-steel fasteners for fastening nickel silver.
4. Provide bronze fasteners for fastening bronze.

B. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group **2 (A4)**] stainless-steel bolts, **ASTM F 593 (ASTM F 738M)**, and nuts, **ASTM F 594 (ASTM F 836M)**.

2.

61.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Shop Primers: Provide primers that comply with Division 09 painting Sections.

C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer compatible with topcoat.
1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

D. Epoxy Zinc-Rich Primer: Complying with and compatible with topcoat.
1. Products: Subject to compliance with requirements, provide one of the following:
a. Benjamin Moore & Co.; Epoxy Zinc-Rich Primer CM18/19.
b. Carboline Company; Carbozinc 621.
c. ICI Devoe Coatings; Catha-Coat 313.
d. International Coatings Limited; Interzinc 315 Epoxy Zinc-Rich Primer.
e. PPG Architectural Finishes, Inc.; Aquapon Zinc-Rich Primer 97-670.
f. Sherwin-Williams Company (The); Corothane I GalvaPac Zinc Primer.
g. Tnemec Company, Inc.; Tneme-Zinc 90-97.

E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

G. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.

H. Concrete: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of **3000 psi (20 MPa)**.

61.6 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, **1/8 by 1-1/2 inches (3.2 by 38 mm)**, with a minimum **6-inch (150-mm)** embedment and **2-inch (50-mm)** hook, not less than **8 inches (200 mm)** from ends and corners of units and **24 inches (600 mm)** o.c., unless otherwise indicated.

61.7 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
1. Fabricate units from slotted channel framing where indicated.
2. Furnish inserts for units installed after concrete is placed.

C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.

D. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.
   1. Provide bearing plates welded to beams where indicated.
   2. Drill or punch girders and plates for field-bolted connections where indicated.
   3. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at **24 inches (600 mm)** o.c.

E. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness, unless otherwise indicated.
   1. Unless otherwise indicated, fabricate from Schedule 40 steel pipe.
   2. Unless otherwise indicated, provide 1/2-inch (12.7-mm) baseplates with four **5/8-inch (16-mm)** anchor bolts and **1/4-inch (6.4-mm)** top plates.

F. Galvanize miscellaneous framing and supports where indicated.

G. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

H. Fabricate connections to comply with details shown or as needed to suit type of structure indicated.

61.8 SHELF ANGLES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive **3/4-inch (19-mm)** bolts, spaced not more than **6 inches (150 mm)** from ends and **24 inches (600 mm)** o.c., unless otherwise indicated.
   1. Provide mitered and welded units at corners.
   2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches (50 mm) larger than expansion or control joint.

B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.

C. Galvanize shelf angles located in exterior walls.

D. Prime shelf angles located in exterior walls with zinc-rich primer.

E. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete

61.9 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 40 steel pipe.

B. Fabricate bollards with 3/8-inch (9.5-mm) thick steel baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4-inch **(19-mm)** anchor bolts.
   1. Where bollards are to be anchored to sloping concrete slabs, angle baseplates for plumb alignment of bollards.

C. Fabricate sleeves for bollard anchorage from steel pipe with 1/4inch (6.4-mm) thick steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches (200 mm) deep and 3/4 inch (19 mm) larger than OD of bollard.

D. Match drill sleeve and bollard for 3/4 inch (19 mm) steel machine bolt.

E. Prime bollards with zinc-rich primer.

61.10 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

61.11 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

61.12 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
   1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
   1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
3. Items Indicated to Receive Primers Specified in Division 09 Section "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
4. Other Items: SSPC-SP 3, "Power Tool Cleaning."

D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2.

61.13 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. As-Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).

C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 62 - EXECUTION

62.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
1. Cast Aluminum: Heavy coat of bituminous paint.
2. Extruded Aluminum: Two coats of clear lacquer.
3.

62.2 INSTALLING METAL BOLLARDS

A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.
1. Do not fill removable bollards with concrete.

B. Anchor bollards to existing construction with expansion anchors. Provide four **3/4-inch (19-mm)** bolts at each bollard, unless otherwise indicated.
1. Embed anchor bolts at least **4 inches (100 mm)** in concrete.

C. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete. Fill annular space around bollard solidly with nonshrink, nonmetallic grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch (3 mm) toward bollard.

D. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches (75 mm) above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

E. Anchor internal sleeves for removable bollards in concrete by inserting into pipe sleeves preset into concrete. Fill annular space around internal sleeves solidly with nonshrink, nonmetallic grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch (3 mm) toward internal sleeve.

F. Anchor internal sleeves for removable bollards in place with concrete footings. Center and align sleeves in holes 3 inches (75 mm) above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace sleeves in position until concrete has cured.

G. Place removable bollards over internal sleeves and secure with 3/4-inch (19-mm) machine bolts and nuts. After tightening nuts, drill holes in bolts for inserting padlocks. Owner will furnish padlocks.

H. Fill bollards solidly with concrete, mounding top surface to shed water.
   1. Do not fill removable bollards with concrete.

62.3 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
   1. Apply by brush or spray to provide a minimum **2.0-mil (0.05-mm)** dry film thickness.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

PART 63 - GENERAL

63.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Contractor shall coordinate the installation of all natural gas piping and appurtenance directly with Atlanta Gas Light Company. Contractor is responsible for meeting all requirements set forth by Atlanta Gas Light Company regardless of whether said requirements are provided in these Specifications.

63.2 SUMMARY

A. Section **Includes**:
1. Pipes, tubes, and fittings.
2. Piping specialties.
3. Piping and tubing joining materials.
4. Valves.
5. Pressure regulators.
6. Service meters.

63.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

63.4 PERFORMANCE REQUIREMENTS

A. Minimum Operating-Pressure Ratings:
1. Piping and Valves: 100 psig minimum unless otherwise indicated.
2. Service Regulators: 65 psig minimum unless otherwise indicated.

63.5 SUBMITTALS

A. Product Data: For each type of the following:
1. Piping specialties.
2. Corrugated, stainless-steel tubing with associated components.
3. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
4. Pressure regulators. Indicate pressure ratings and capacities.

5. Dielectric fittings.
6. Mechanical sleeve seals.
7. Escutcheons.

B. Coordination Drawings: Plans and details, drawn to scale, on which natural-gas piping is shown and coordinated with other installations, using input from installers of the items involved.

C. Site Survey: Plans, drawn to scale, on which natural-gas piping is shown and coordinated with other services and utilities.

D. Field quality-control reports.

E. Operation and Maintenance Data: For motorized gas valves and pressure regulators to include in emergency, operation, and maintenance manuals.

63.6 QUALITY ASSURANCE

A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

63.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.

63.8 PROJECT CONDITIONS

A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located. Coordinate installation with Atlanta Gas Light Company.

B. Interruption of Existing Natural-Gas Service: Do not interrupt natural-gas service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide purging and startup of natural-gas supply according to requirements indicated:
1. Notify Engineer and Owner no fewer than three days in advance of proposed interruption of natural-gas service.
2. Do not proceed with interruption of natural-gas service without Owner's written permission.

63.9 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 64 - PRODUCTS

64.1 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
   1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
   2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
   3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
   4. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
      a. Material Group: 1.1.
      b. End Connections: Threaded or butt welding to match pipe.
      c. Lapped Face: Not permitted underground.
      d. Gasket Materials: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
      e. Bolts and Nuts: ASME B18.2.1, carbon steel aboveground and stainless steel underground.
   5. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.
      a. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.
   6. Mechanical Couplings:
      a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
         1) Dresser Piping Specialties; Division of Dresser, Inc.
         2) Smith-Blair, Inc.
      b. Stainless-steel flanges and tube with epoxy finish.
      c. Buna-nitrile seals.
      d. Stainless-steel bolts, washers, and nuts.
      e. Coupling shall be capable of joining PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
      f. Steel body couplings installed underground on plastic pipe shall be factory equipped with anode.
      g.
      h.

64.2 PIPING SPECIALTIES

A. Quick-Disconnect Devices: Comply with ANSI Z21.41.
   1. Copper-alloy convenience outlet and matching plug connector.
   2. Nitrile seals.
   3. Hand operated with automatic shutoff when disconnected.
   4. For indoor or outdoor applications.
   5. Adjustable, retractable restraining cable.

B. Y-Pattern Strainers:
   1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
   2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.

3. Strainer Screen: 60-mesh startup strainer and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig (862 kPa).

C. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

64.3 JOINING MATERIALS

A. Joint Compound and Tape: Suitable for natural gas.

64.4 MANUAL GAS SHUTOFF VALVES

A. General Requirements for Metallic Valves, NPS 2 (DN 50) and Smaller: Comply with ASME B16.33.
1. CWP Rating: 125 psig (862 kPa).
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch (25 mm) and smaller.
6. Service Mark: Valves 1-1/4 inches to NPS 2 (DN 50) shall have initials "WOG" permanently marked on valve body.

B. General Requirements for Metallic Valves, NPS 2-1/2 (DN 65) and Larger: Comply with ASME B16.38.
1. CWP Rating: 125 psig (862 kPa).
2. Flanged Ends: Comply with ASME B16.5 for steel flanges.
3. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
4. Service Mark: Initials "WOG" shall be permanently marked on valve body.

C. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. BrassCraft Manufacturing Company; a Masco company.
   b. Conbraco Industries, Inc.; Apollo Div.
   c. Lyall, R. W. & Company, Inc.
   d. McDonald, A. Y. Mfg. Co.
   e. Perfection Corporation; a subsidiary of American Meter Company.
2. Body: Bronze, complying with ASTM B 584.
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE; blowout proof.
6. Packing: Threaded-body packnut design with adjustable-stem packing.

7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
8. CWP Rating: 600 psig (4140 kPa).
9. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

D. Two-Piece, Regular-Port Bronze Ball Valves with Bronze Trim: MSS SP-110.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. BrassCraft Manufacturing Company; a Masco company.
   b. Conbraco Industries, Inc.; Apollo Div.
   c. Lyall, R. W. & Company, Inc.
   d. McDonald, A. Y. Mfg. Co.
   e. Perfection Corporation; a subsidiary of American Meter Company.
2. Body: Bronze, complying with ASTM B 584.
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE.
6. Packing: Threaded-body packnut design with adjustable-stem packing.
7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
8. CWP Rating: 600 psig (4140 kPa).
9. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

E. Bronze Plug Valves: MSS SP-78.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Lee Brass Company.
   b. McDonald, A. Y. Mfg. Co.
2. Body: Bronze, complying with ASTM B 584.
3. Plug: Bronze.
4. Ends: Threaded, socket, or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Operator: Square head or lug type with tamperproof feature where indicated.
6. Pressure Class: 125 psig (862 kPa).
7. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
8. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

F. Cast-Iron, Nonlubricated Plug Valves: MSS SP-78.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. McDonald, A. Y. Mfg. Co.
b. Mueller Co.; Gas Products Div.
c. Xomox Corporation; a Crane company.

2. Body: Cast iron, complying with ASTM A 126, Class B.
3. Plug: Bronze or nickel-plated cast iron.
4. Seat: Coated with thermoplastic.
5. Stem Seal: Compatible with natural gas.
6. Ends: Threaded or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
7. Operator: Square head or lug type with tamperproof feature where indicated.
8. Pressure Class: 125 psig (862 kPa).
9. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

G. Cast-Iron, Lubricated Plug Valves: MSS SP-78.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Flowserve.
   b. Homestead Valve; a division of Olson Technologies, Inc.
   c. McDonald, A. Y. Mfg. Co.
   d. Milliken Valve Company.
   e. Mueller Co.; Gas Products Div.
   f. R&M Energy Systems, A Unit of Robbins & Myers, Inc.
2. Body: Cast iron, complying with ASTM A 126, Class B.
3. Plug: Bronze or nickel-plated cast iron.
4. Seat: Coated with thermoplastic.
5. Stem Seal: Compatible with natural gas.
6. Ends: Threaded or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
7. Operator: Square head or lug type with tamperproof feature where indicated.
8. Pressure Class: 125 psig (862 kPa).
9. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

H. Valve Boxes:

1. Cast-iron, two-section box.
2. Top section with cover with "GAS" lettering.
3. Bottom section with base to fit over valve and barrel a minimum of 5 inches in diameter.
4. Adjustable cast-iron extensions of length required for depth of bury.
5. Include tee-handle, steel operating wrench with socket end fitting valve nut or flat head, and with stem of length required to operate valve

64.5 PRESSURE REGULATORS

A. General Requirements:
   1. Single stage and suitable for natural gas.
   2. Steel jacket and corrosion-resistant components.
   3. Elevation compensator.
   4. End Connections: Threaded for regulators NPS 2 (DN 50) and smaller; flanged for regulators NPS 2-1/2 (DN 65) and larger.

B. Service Pressure Regulators: Comply with ANSI Z21.80.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Actaris.
      b. American Meter Company.
      c. Fisher Control Valves and Regulators; Division of Emerson Process Management.
      d. Invensys.
      e. Richards Industries; Jordan Valve Div.
   2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
   3. Springs: Zinc-plated steel; interchangeable.
   4. Diaphragm Plate: Zinc-plated steel.
   5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
   6. Orifice: Aluminum; interchangeable.
   7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
   8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
   9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
   10. Overpressure Protection Device: Factory mounted on pressure regulator.
   11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
   12. Maximum Inlet Pressure: 100 psig (690 kPa)

C. Line Pressure Regulators: Comply with ANSI Z21.80.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Actaris.
      b. American Meter Company.
      c. Eclipse Combustion, Inc.
      d. Fisher Control Valves and Regulators; Division of Emerson Process Management.
      e. Invensys.
      f. Maxitrol Company.
      g. Richards Industries; Jordan Valve Div.
   2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
   3. Springs: Zinc-plated steel; interchangeable.
   4. Diaphragm Plate: Zinc-plated steel.
   5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
   6. Orifice: Aluminum; interchangeable.
   7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.

8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.

64.6 SERVICE METERS

A. Diaphragm-Type Service Meters: Comply with ANSI B109.2.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Actaris.
   b. American Meter Company.
   c. Invensys.
2. Case: Die-cast aluminum.
3. Connections: Steel threads.
4. Diaphragm: Synthetic fabric.
5. Diaphragm Support Bearings: Self-lubricating.
6. Compensation: Continuous temperature and pressure.
7. Meter Index: Cubic feet
8. Meter Case and Index: Tamper resistant.
9. Remote meter reader compatible.
10. Maximum Inlet Pressure: 100 psig (690 kPa).
11. Pressure Loss: Maximum 2.0-inch wg (498 Pa).
12. Accuracy: Maximum plus or minus 1.0 percent.

B. Turbine Meters: Comply with ASME MFC-4M.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. American Meter Company.
   b. Invensys.
2. Housing: Cast iron or welded steel.
3. Connection Threads or Flanges: Steel.
4. Turbine: Aluminum or plastic.
5. Turbine Bearings: Self-lubricating.
6. Compensation: Continuous temperature and pressure.
7. Meter Index: Cubic feet.
8. Tamper resistant.
9. Maximum Inlet Pressure: 100 psig (690 kPa).
10. Accuracy: Maximum plus or minus 2.0 percent.

C. Service-Meter Bypass Fittings:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Lyall, R. W. & Company, Inc.
   b. Williamson, T. D., Inc.
2. Ferrous, tee, pipe fitting with capped side inlet for temporary natural-gas supply.
3. Integral ball-check bypass valve.

64.7 ESCUTCHEONS

A. General Requirements for Escutcheons: Manufactured wall and ceiling escutcheons and floor plates, with ID to fit around pipe or tube, and OD that completely covers opening.

B. One-Piece, Deep-Pattern Escutcheons: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Escutcheons: With set screw.
1. Finish: Polished chrome-plated.

D. Split-Casting, Cast-Brass Escutcheons: With concealed hinge and set screw.
1. Finish: Polished chrome-plated.

E. One-Piece, Stamped-Steel Escutcheons: With set screw or spring clips and chrome-plated finish.

F. Split-Plate, Stamped-Steel Escutcheons: With exposed-rivet hinge, set screw or spring clips, and chrome-plated finish.

G. One-Piece, Floor-Plate Escutcheons: Cast-iron floor plate.

H. Split-Casting, Floor-Plate Escutcheons: Cast brass with concealed hinge and set screw.

64.8 LABELING AND IDENTIFYING

A. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored yellow.

PART 65 - EXECUTION

65.1 EXAMINATION

A. Examine roughing-in for natural-gas piping system to verify actual locations of piping connections before equipment installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

65.2 PREPARATION

A. Close equipment shutoff valves before turning off natural gas to premises or piping section.

B. Inspect natural-gas piping according to Atlanta Gas Light Company requirements to determine that natural-gas utilization devices are turned off in piping section affected.

C. Comply with Atlanta Gas Light Company requirements for prevention of accidental ignition.

65.3 OUTDOOR PIPING INSTALLATION

A. Comply with Atlanta Gas Light Company requirements for installation and purging of natural-gas piping.

B. Install underground, natural-gas piping buried at least 36 inches or as required by Atlanta Gas Light Company below finished grade. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.
   1. If natural-gas piping is installed less than 36 inches below finished grade, install it in containment conduit.

C. Install underground, PE, natural-gas piping according to ASTM D 2774.

D. Steel Piping with Protective Coating:
   1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
   2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
   3. Replace pipe having damaged PE coating with new pipe.

E. Copper Tubing with Protective Coating:
   1. Apply joint cover kits over tubing to cover, seal, and protect joints.
   2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.

F. Install fittings for changes in direction and branch connections.

G. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
   1. Install steel pipe for sleeves smaller than 6 inches in diameter.
   2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.

H. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

I. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

J. Install pressure gauge(s) in location(s) required by Atlanta Gas Light Company. Pressure gages shall meet requirements set forth by Atlanta Gas Light Company.

65.4 SERVICE-METER ASSEMBLY INSTALLATION

A. Install service-meter assemblies as specified by Atlanta Gas Light Company.

B. Install metal shutoff valves upstream from service regulators. Shutoff valves are not required at second regulators if two regulators are installed in series.

C. Install strainer on inlet of service-pressure regulator and meter set.

D. Install service regulators mounted outside with vent outlet horizontal or facing down. Install screen in vent outlet if not integral with service regulator.

E. Install metal shutoff valves upstream from service meters. Install dielectric fittings downstream from service meters.

F. Install service meters downstream from pressure regulators.

G. Install metal bollards to protect meter assemblies.

65.5 VALVE INSTALLATION

A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing, aluminum, or copper connector.

B. Install underground valves with valve boxes.

C. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.

D. Install anode for metallic valves in underground PE piping.

65.6 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints:
1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
2. Cut threads full and clean using sharp dies.
3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.

5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Welded Joints:
1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
2. Bevel plain ends of steel pipe.
3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.

F. Flanged Joints: Install gasket material, size, type, and thickness appropriate for natural-gas service. Install gasket concentrically positioned.

G. Flared Joints: Cut tubing with roll cutting tool. Flare tube end with tool to result in flare dimensions complying with SAE J513. Tighten finger tight, then use wrench. Do not overtighten.

H. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
1. Plain-End Pipe and Fittings: Use butt fusion.
2. Plain-End Pipe and Socket Fittings: Use socket fusion.

65.7 HANGER AND SUPPORT INSTALLATION

A. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:
1. NPS 1 (DN 25) and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
2. NPS 1-1/4 (DN 32): Maximum span, 108 inches; minimum rod size, 3/8 inch.
3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): Maximum span, 108 inches; minimum rod size, 3/8 inch.
4. NPS 2-1/2 to NPS 3-1/2 (DN 65 to DN 90): Maximum span, 10 feet; minimum rod size, 1/2 inch.
5. NPS 4 (DN 100) and Larger: Maximum span, 10 feet; minimum rod size, 5/8 inch.

65.8 CONNECTIONS

A. Connect to Atlanta Gas Light Company's gas main according to Atlanta Gas Light Company's procedures and requirements.

B. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.

C. Install piping adjacent to appliances to allow service and maintenance of appliances.

D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.

E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

65.9 LABELING AND IDENTIFYING

A. Comply with Atlanta Gas Light Company requirements for piping and valve identification.

B. Install detectable warning tape directly above gas piping, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

65.10 PAINTING

A. Comply with Atlanta Gas Light Company requirements.

B. Paint exposed, exterior metal piping, valves, service regulators, service meters and meter bars, and piping specialties, except components, with factory-applied paint or protective coating.
1. Alkyd System: MPI EXT 5.1D.
   a. Prime Coat: Alkyd anticorrosive metal primer.
   b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
   c. Topcoat: Exterior alkyd enamel (gloss).
   d. Color: Gray.

C. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

65.11 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:
1. Test, inspect, and purge natural gas according to the International Fuel Gas Code and authorities having jurisdiction.

C. Natural-gas piping will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

65.12 OUTDOOR PIPING SCHEDULE

A. Underground natural-gas piping shall be one of the following:
1. PE pipe and fittings joined by heat fusion, or mechanical couplings; service-line risers with tracer wire terminated in an accessible location.
2. Steel pipe with wrought-steel fittings and welded joints, or mechanical couplings. Coat pipe and fittings with protective coating for steel piping.

B. Aboveground natural-gas piping shall be one of the following:
   1. Steel pipe with malleable-iron fittings and threaded joints.
   2. Steel pipe with wrought-steel fittings and welded joints.
   3. Drawn-temper copper tube with wrought-copper fittings and brazed joints.

C. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.

65.13 UNDERGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Connections to Existing Gas Piping: Use valve and fitting assemblies made for tapping utility's gas mains and listed by an NRTL.

B. Underground:
   1. PE valves.
   2. NPS 2 (DN 50) and Smaller: Bronze plug valves.
   3. NPS 2-1/2 (DN 65) and Larger: Cast-iron, lubricated plug valves.

65.14 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Valves for pipe sizes NPS 2 (DN 50) and smaller at service meter shall be one of the following:
   1. One-piece, bronze ball valve with bronze trim.
   2. Two-piece, full port, bronze ball valves with bronze trim.
   3. Bronze plug valve.

B. Valves for pipe sizes NPS 2-1/2 (DN 65) and larger at service meter shall be one of the following:
   1. Two-piece, full-port, bronze ball valves with bronze trim.
   2. Bronze plug valve.
   3. Cast-iron, nonlubricated plug valve.

C. Distribution piping valves for pipe sizes NPS 2 (DN 50) and smaller shall be one of the following:
   1. One-piece, bronze ball valve with bronze trim.
   2. Two-piece, full-port, bronze ball valves with bronze trim.
   3. Bronze plug valve.

D. Distribution piping valves for pipe sizes NPS 2-1/2 (DN 65) and larger shall be one of the following:
   1. Two-piece, full-port, bronze ball valves with bronze trim.
   2. Bronze plug valve.
   3. Cast-iron, lubricated plug valve.

E. Valves in branch piping for single appliance shall be one of the following:
   1. One-piece, bronze ball valve with bronze trim.
   2. Two-piece, full-port, bronze ball valves with bronze trim.
   3. Bronze plug valve.

END OF SECTION

PART 66 - GENERAL

66.1 DESCRIPTION

A. This section specifies electrical work including electrical material, equipment, installation, and testing requirements. The electrical drawings included in this project manual are functional in nature and do not specify exact locations of equipment or equipment terminations. In case of discrepancy between the specifications and electrical drawings, the contractor shall bid the higher cost of the two and request engineer clarification.

66.2 QUALITY ASSURANCE

A. REFERENCES:

B. Reference	C. Title
D. ANSI A58.1-82	E. Minimum Design Loads for Buildings and other Structures
F. IEEE 81-83	G. Measuring Earth Resistivity,
	H. Ground Impedance, and Earth
	I. Surface Potentials of a Ground System
K. IEEE C57.12.01-89	J. General Requirements for Dry-Type Distribution and Power Transformers
L. NEMA 250-85	M. Enclosures for Electrical Equipment (1000 volt Maximum)
N. NEMA ICS 1-88	O. General Standards for Industrial Controls and Systems
P. NEMA ICS 2-88	Q. Industrial Control Devices, Controllers, and

			Assemblies
R.	NEMA ICS 6-88	S.	Enclosures for Industrial Controls and Systems
T.	NEMA ST20-86	U.	Dry-Type Transformers for General Application
V.	NEMA WD 1-83	W.	General Requirements for Wiring Devices
X.	NEC 1996	National Electric Code (NEC)	
Y.	SBC 1991	Z.	Standard Building Code
AA.	UL 67-88	BB.	Panelboards
CC.	UL 489-86	Molded-Case Circuit Breakers and Circuit Breaker Enclosures	
DD.	UL 506-79	EE.	Specialty Transformers

FF. IDENTIFICATION OF LISTED PRODUCTS

1. Electrical equipment and materials shall be listed by an independent testing laboratory for the purpose for which they are to be used. Three such organizations are Underwriters Laboratories, Inc. (UL), Canadian Standards Association (CSA), and Electrical Testing Laboratories (ETL). The independent testing laboratory shall be acceptable to the inspection authority having jurisdiction.

66.3 SUBMITTALS

A. The following information shall be provided for all electrical equipment and materials:

1. Catalog-cuts including technical specifications, application information, ratings, and other information required to verify the equipment and/pr material meets the requirements of this specification.

66.4 PROJECT/SITE CONDITIONS

A. GENERAL

1. Unless otherwise specified, equipment and material shall be sized and rated for an ambient temperature of 40 degrees C at an elevation ranging from sea level to 3000 feet without exceeding the manufacturer's stated ratings.

PART 67 - PRODUCTS

67.1 GENERAL

A. Equipment and materials shall be new and free from defects. All equipment of the same or similar type shall be of the same manufacturer throughout the work. Standard production materials shall be used wherever possible.

67.2 RACEWAY, FITTINGS, AND SUPPORT

A. GENERAL:
1. Conduits shall be provided for power, control, grounding, lighting, and receptacles

B. RACEWAY:
1. Exposed and embedded conduit shall be threaded, galvanized, rigid steel conduit. Minimum size shall be ¾ inch. Bushings shall be galvanized, malleable iron with a feed through compression lug. Unions shall be galvanized, ferrous alloy type. Thread-less fittings are not acceptable. Running threads shall not be used in lieu of conduit nipples. Thread hubs shall be used to terminate conduits entering boxes.
2. Liquidtight, flexible steel conduit shall be formed from spirally wound, galvanized steel strip with successive convolutions securely interlocked and jacketed with liquidtight plastic cover. Minimum size shall be ¾ inch. Fittings for liquidtight conduit shall have cadmium-plated, malleable iron body and gland nut with cast-in lug, brass grounding ferrule threaded to engage conduit spiral and O-ring seals around the conduit and box connection and insulated throat. Forty five and 90 degree fittings shall be used where applicable.

C. BOXES:
1. Boxes for the use outdoors shall be hot-drip, galvanized cast ferrous alloy type FD with integrally cast threaded hubs for conduit entry. Boxes larger than FD boxes shall be welded steel and hot-dip galvanized after fabrication.
2. Boxes installed in areas where electrical metallic tubing is specified shall be standard UL approved electro-galvanized sheet steel, 4 inch square or octagon minimum trade size.
3. Conduit bodies shall be ferrous alloy type with screw taps for fastening covers. Gaskets shall be made of neoprene.

D. RACEWAY SUPPORT:
1. Hot-dip galvanized framing channel shall be used to support groups of conduit. Individual conduit supports shall be one-hole galvanized malleable iron pipe straps with galvanized iron clamp backs and nesting backs where required. Ceiling hangers shall be adjustable, galvanized carbon steel rod hangers. Straps or plumbers tape is not acceptable. Hanger rods shall be ½ inch all thread rod.

67.3 CONDUCTORS, WIRE, AND CABLE

A. GENERAL:
1. Conductors, wires, and cables shall be provided for power, control, lighting, receptacles, instrumentation, grounding and signal circuits. The quantity and size of conductors shall be as specified.

B. POWER AND CONTROL CONDUCTORS:
1. Power and control conductors shall be single conductor stranded, annealed cooper with 600 Volt THWN-2/THHN polyvinyl chloride (PVC) insulation, Okonite, Okoseal-N, CABLEC; or equal.

C. LIGHTING AND RECEPTACLE CIRCUIT CONDUCTORS:
1. Conductors for lighting and receptacle circuits shall be single conductor, annealed copper with 600 Volt THWN-2 PVC insulation. Conductor sizes No. 10 AWG and larger shall be stranded. Minimum conductor size shall be No. 12 AWG. Conductors shall be Okonite, Okoseal-N; CABLEC; or equal.

D. GROUNDING CONDUCTORS:
1. Grounding conductors shall be as specified in this section.

E. INSTRUMENTATION AND SIGNAL CABLE:
1. Cable for instrumentation and signal circuit shall be twisted shielded, No. 16 AWG 7-strand copper with 600 Volt PVC insulation, 100 percent aluminum-Mylar tape shield, No.18 AWG tinned copper drain wire and overall PVC jacket, Okonite, Okoseal-N type P-OS, or equal.

F. SPLICING AND TERMINATING MATERIALS:
1. CONNECTORS:
   a. Connectors for stranded conductors shall be tool applied, tin-plated copper, compression type of the correct size and UL approved for the application.
   b. Connectors for wire sizes No.10 AWG and smaller shall be nylon self-insulated, ring tongue or locking-space terminals. Connectors for wire sizes No. 8 AWG and larger shall be one-hole lugs up to size no.3/0 AWG and two-hole or four hole for size 4/0 AWG and larger. Mechanical clamp, dimple, or screw type connectors are not acceptable.
   c. 480 Volt motor terminations shall be made using bolt connected lugged connectors and factory engineered kits consisting of heat shrinkable, polymeric insulating material with high dielectric strength mastic sealant.
   d. Termination of solenoid valves, 120 Volt motors and other devices furnished with pigtail leads shall be made using self-insulating, tubular compression connectors.

G. TERMINAL BLOCKS:
1. Terminal blocks shall be provided for external control and power wires size No.10 AWG and smaller. Terminal blocks shall be 600 Volts, heavy-duty, rated 20 amperes for control and 30 amperes for power.

H. WIRE MARKERS:
1. Wire markers shall be yellow or white shrink tubing, Thermofit Marker System (TMS) by Raychem Co. , or equal for conductors

No. 10 AWG and smaller and locking tab cable markers, W.H. Brady Co., or equal, for conductors No.8 and larger. Letters and numbers identifying each conductor shall be machine printed in permanent black ink.

67.4 WIRING DEVICES

A. GENERAL:
1. Receptacles, plugs, switches, and appurtenances shall be provided as specified on the drawings. Wiring devices shall be UL approved for the current and voltage specified and shall comply with NEMA WD-1. Receptacles and switches shall be premium, specification grade.
2.
3.

B. RECEPTACLES:
1. Receptacles shall be grounding type. Receptacles for use outdoors and in process areas shall be corrosion resistant, marine duty with polycarbonate weatherproof lift covers, Hubbell 53CM62/53CM21, General Electric, or equal.

67.5 SURGE SUPPRESSOR

A. The surge suppressor shall be UL listed and labeled under UL 1449 and UL1283. Acceptable manufactures are:
1. Liebert
2. Current Technologies
3. United Power

B. The surge suppressor shall be in NEMA 4X enclosure and shall provide line-to-line, line-to-ground and neutral-to-ground protection modes as applicable for the power service.

C. The surge suppressor shall be provided with disconnect. Minimum surge current rating shall be 100KA per mode, 200KA per phase per NEMA LS-1. The surge suppression system shall be duty cycle tested to survive 20KV, 10KA, IEEE C62.41 category surge current with less than 5%degradation of clamping voltage. The surge suppressor shall have minimum repetitive surge capacity of 2500 impulses per mode and 5000 impulses per phase. Status indicating lights and form ‘C’ dry alarm contacts shall be provided.

67.6 MOTOR CONTROL CENTER

A. For motor control center see specification section 262419.

67.7 ELECTRICAL CONTROL DEVICES

A. Not included in this specification.

67.8 GROUNDING MATERIAL

A. CABLE

1. Grounding cable shall be concentric stranded, annealed bare copper. Cable size shall be as specified.

B. GROUND RODS
1. Ground rods shall be copper-covered steel, ¾ inch diameter, and 10 feet long. Rods shall have threaded type, removable caps so that extension rods of the same diameter and length may be added where necessary.
2. All ground conductor (grounding triangle, etc.) connections shall be Cadweld type.

C. BOLTED CONNECTORS
1. Bolted connectors shall be Burndy, O.Z. Gedney, or equal. All terminations done in the plant wiring trough shall be bolted type.

67.9 LIGHTING FIXTURES

A. Lighting fixture shall be as shown on the drawing.

67.10 DISTRIBUTION EQUIPMENT

A. MAIN CIRCUIT BREAKERS
1. Main circuit breaker in the MCC is existing & shall be reused.

67.11 NAMEPLATES

A. Nameplates shall be made from laminated phenolic plastic. The nominal size of the nameplates shall be ¾ inch high by 2 inches long. Nameplates shall have black backgrounds with 3/1 inch white letters. If abbreviations are required because of space limitations, abbreviations shall be submitted to the Construction Manager prior to manufacture. Nameplates shall be fastened using self-tapping stainless steel screws. The use of adhesives will not be permitted on the outside of enclosures.

B.

67.12 PRODUCT DATA

A. The following information shall be provided:
1. Applicable operating and maintenance instructions.
2. Lighting fixture information as follows.
3. Catalog information describing fixture make, materials, and dimensions.

PART 68 - EXECUTION

68.1 GENERAL

A. Unless otherwise detailed or dimensioned, electrical layout drawings are diagrammatic. The Contractor shall coordinate the location of electrical material and equipment with the work.

B. Electrical equipment shall be protected from dust, water, and damage.

68.2 RACEWAY, FITTINGS, AND SUPPORTS

A. GENERAL:
1. The Contractor shall limit the number of directional changes of conduit to a total of not more than 270 degrees in any run between pull boxes. Conduit runs shall be limited to 400 feet, less 100 feet for each 90 degree change in direction.

B. EXPOSED CONDUITS:
1. Metallic conduit shall be assembled to provide a continuous ground path. Joints shall be made with standard couplings or threaded unions. Bends and offsets shall be made with a hicky or conduit bending machine or shall be factory pre-formed bends.
2. Exposed conduit shall be run on supports spaced not more than 10 feet apart and shall be constructed with runs parallel and perpendicular to walls, structural members, or intersections of vertical planes and ceiling. No conduit shall approach closer than 6 inches to any object operating above 30 degrees C.
3. Conduit supports shall be secured to concrete walls and ceilings by means of cast-in-place anchors, die cast, rustproof alloy expansion shields, or cast-flush anchors. Wooden plugs, plastic inserts, or gunpowder driven inserts are not acceptable as a base for securing conduit supports.
4. Liquidtight, flexible steel conduit shall be used for the final connection to equipment, devices, and instruments where flexibility is required.
5. The length of liquidtight flexible steel conduit shall not exceed the lesser of 15 times the trade diameter of the conduit or 36 inches.

C. EMBEDDED OR ENCASED CONDUIT:
1. Conduits constructed in concrete which is in contact with earth shall be separated from earth by at least 3 inches of concrete. Clearances equal to the nominal conduit diameter but not less than 2 inches, shall be maintained between encased or embedded conduits except where conduits cross or terminate.

D. ELECTRICAL METALLIC TUBING
1. Electrical metallic tubing shall be used only within stud walls and above suspended ceilings.

68.3 CONDUCTORS, WIRE AND CABLE

A. GENERAL:
1. Raceway construction shall be complete, cleaned, and protected from the weather prior to wire and cable being installed. Pulling wire and cable into conduit shall be completed without damaging or putting undue stress on the cable insulation. Soapstone, talc, or UL listed pulling compounds are acceptable lubricants for pulling wire and cable. Grease is not acceptable. Nylon pull rope shall be pulled through the conduit immediately after concrete pour.
2. Each power, control, signal, and instrumentation conductor shall be identified at each terminal to which it is connected utilizing the wire markers specified above.

B. 600 VOLT CONDUCTOR AND CABLE

1. Slack shall be provided in junction and pull boxes. Slack shall be sufficient to allow cable or conductors to be routed along the walls of the box.
2. Conductors crossing hinges shall be bundled in groups not exceeding 12 and shall be so arranged that they will be protected from chaffing when the hinged member is moved.
3. Raceway fill limitations shall be as defined by NEC and the following:
   a. Lighting and receptacle circuits may be together in the same conduit in accordance with derating requirements of the NEC. However, lighting and receptacle circuits shall not be in conduit with other circuits.
   b. Solid wire shall not be lugged nor shall electrical spring connectors be used on any except for solid wires in lighting and receptacle circuits. Lugs and connectors shall be installed with a compression tool.

68.4 WIRING DEVICES

A. Switches and receptacles for use outdoors and in process areas shall be mounted in “FD” type boxes. Unless otherwise specified, switches shall be mounted 48 inches above the floor. Receptacles shall be mounted 18 inches above the floor in finished areas and 48 inches above the floor in process areas and outdoors unless otherwise specified.

68.5 SURGE SUPPRESSOR:

A. Surge suppressor shall be mounted as per manufacturer recommendations.

B.

68.6 MOTOR CONTROL CENTER

A. Not included in this specification.

68.7 MISCELLANEOUS CONTROL DEVICES:

A. Control stations shall be mounted 48 inches above the floor unless otherwise specified.

68.8 GROUNDING

A. Electrical equipment and enclosures, metal surfaces of equipment, and metal structural members shall be grounded. Grounding system shall be provided in compliance with the NEC and as specified on the drawings.

B. Exposed ground connections shall be made by bolted connectors. Exposed grounding conductors shall be supported by non-corrosive metallic hardware at 4-foot intervals or less.

C. Grounding conductors entering enclosures shall be bonded together to the enclosure if it is metallic and to metallic raceway within terminating at

the enclosure. Metal surfaces shall be cleaned prior to making grounding connections and bonds.

68.9 LIGHTING FIXTURES:

A. Not included in specification.

68.10 PANELBOARDS:

A. The Contractor shall type in the circuit descriptions on the circuit directory as shown on the final drawings or panel schedule.

68.11 TESTING:

A. GENERAL:
1. Prior to energizing the electrical circuits, the following tests shall be performed. Unless otherwise noted, a 1000-Volt megohmmeter shall be used for resistance measurements. All test results shall be submitted to the engineer and County.

B. INSULATION RESISTANCE MEASUREMENTS:
1. GENERAL:
a. General insulation resistance measurements shall be made on conductors and energized parts of electrical equipment. Minimum acceptable values of insulation resistance shall be in accordance with the applicable ICEA, NEMA, or ANSI standards for the equipment or material being tested, unless otherwise specified. The ambient temperature at which insulation resistance is measured shall be recorded on the test form.

C. CONDUCTOR AND CABLE TESTS:
1. The phase-to-ground insulation resistance shall be measured for all circuits 120 Volts and above. Measurements shall be made with motors and other equipment connected.

68.12 RECORD DRAWINGS:

A. Record drawings refer to those documents maintained and annotated by the Contractor during construction include record drawings.

END OF SECTION

PART 69 - GENERAL

69.1 SECTION INCLUDES

A. Low voltage motor control centers.

69.2 SUBMITTALS

A. Submit shop drawings in accordance with NEMA classification as noted above and additional information as noted in the following paragraphs.

B. Elementary Diagrams: Provide a separate elementary diagram for each starter unit following the format shown on the Drawings and showing numbered terminal points and interconnections to the first level of remote devices.

C. Reference Data: Submit one set of full size (11 x 14-inch) time current curves on log-log transparency paper for all overcurrent protective devices. Exception: A tabulation of heater sizes or elements versus motor current rating may be submitted in lieu of time current curves for overload relays.

69.3 QUALITY ASSURANCE

A. Provide motor control centers manufactured and tested in accordance with NEMA ICS-2 and UL 845.

B. Provide a UL label where applicable, on each unit and each vertical section. If a unit or section cannot be UL labeled so note on submittals along with reasons for same.

C. NEMA Classification: Class I type B.

D. Record Drawings:
1. Shop drawings; as listed in Article 1.03 corrected to reflect the equipment as-built.
2. Operation and maintenance data including recommended maintenance procedures and intervals, spare parts listing, and instruction books for the equipment and components.

69.4 DELIVERY, STORAGE, AND HANDLING

A. Arrange shipping splits as required for installation. Individually wrap each section and mount on shipping skids.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris and traffic.

C. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to motor control center components, enclosure and finish.

PART 70 - PRODUCTS

70.1 MANUFACTURERS

A. Motor control centers shall be Cutler-Hammer, General Electric, Square D.

70.2 EQUIPMENT

A. Spare Parts:
1. Starter Contacts: One set for each NEMA size furnished.
2. Starter Coils: One for each NEMA size furnished.
3. Control Circuit Fuses: Three for each rating famished. Provide one fuse puller.
4. Pilot Light Lamps: Standard lot cartons equal to 10 percent of the number of lights furnished, one carton minimum.
5. Touch-Up Paint: One can.

70.3 SOURCE QUALITY CONTROL

A. Ratings:
1. Service: 240 Volt, 3 Phase, 4wire, 60 Hz.
2. Short Circuit: Unless otherwise indicated device interrupting rating and bus bracing is 42,000 amperes rms symmetrical. Provide fully rated devices; series ratings are not acceptable.
3. Ampacity: 300 amps minimum, unless otherwise indicated, for the vertical bus; as indicated for the horizontal bus. Rating to be in accordance with UL standards for temperature rise.

PART 71 - EXECUTION

71.1 INSTALLATION

A. Install in accordance with the manufacturer’s instructions.

B. Install control centers on a 4-inch concrete pad and secure to sills imbedded in the concrete with ½-inch threaded bolts and nuts.

C. Touch up paint scratches and vacuum to remove construction debris and dirt. Install all doors, wireway covers etc., and plug any unused device holes.

71.2 CONSTRUCTION

A. Equipment consists of the required number of vertical sections to accommodate all devices indicated and specified herein, each nominally

90-inches high and 20-inches deep. Sections are bolted together to form a rigid free standing, front accessible, dead front assembly.

B. Provide each section with isolated horizontal wireways at the top and bottom and isolated vertical wireways with hinged door and cable tie supports. Unused spaces are to have bussing for future units and blank door covers.

C. Indoor enclosures are NEMA 1A gasketed painted in the manufacturer's standard grey over a rust inhibitor treatment.

D. Surge Protection: UL listed in accordance with UL1449, Edition 2, suitable for high exposure level per ANSI C62.41, Surge Current: 120 kA per phase, 60 kA per mode. Provide with status indicating lights, equal to Advanced Protection Technologies TE Thousand Series. Connect to main bus per arrester manufacturer's recommendations. Surge Protector shall have an integral disconnect.

E. Incoming Mains:
1. Provide 400amp incoming main circuit breaker as indicated. Main breaker is molded case type meeting UL 489 and NEMA AB-1. Provide ground fault protection for breakers 1000 amp and longer.
2. Arrange main breaker for top or bottom cable entry as indicated without requiring 90 degree bends in the incoming conductors.
3. Where motor control centers serve as service entrance equipment provide a UL service entrance label on the incoming section.
4. Provide a 400amp generator breaker. This breaker along with the main breaker shall operate as a transfer switch. Both breakers shall have 300amp trip settings. See single line diagram.

F. Starter Units:
1. Starters: Circuit breaker combination type rated in accordance with NEMA size designations. Fractional sizes and ratings per IEC recommendations are not acceptable.
2. Breakers: Adjustable magnetic trip only. Equip with current limiters as required for the interrupting rating noted.
3. Contactors: NEMA ICS-2; NEMA Size 1 minimum; magnetically held; field replaceable coil and contacts; auxiliary contacts field installable and removable. Terminal temperature rise is not to exceed 50 degrees C per NEMA standards.
4. Overload Relays: Class 20 solid state, heaterless design, self-powered, front dial adjustable, ± two percent repeat trip accuracy with pressure type terminals normally open, isolated auxiliary contact; manually reset by means of an external reset button.
5. Units: Constructed to fully compartmentalize the starter and arranged to permit access to starter, control power transformer, fuses and other components without requiring disassembly. NEMA size 1 thru 4 are plug in, size 5 and larger are bolt on. Equip unit door with a defeatable interlock to prevent opening unless the disconnect is open. Use red color to clearly indicate on position; either uncovered when disconnect handle is moved to the on

position or disconnect handle itself colored red on the side showing in on position.

6. Terminal Blocks: Pull apart type for power and control to allow unit withdrawal without disconnecting wiring. Use screw type terminals suitable for ring and tongue lugs for control wiring and box lug type for power wiring.
7. Reduced Voltage Starters: Solid state type with adjustable acceleration ramp. Equip with isolation and bypass contactors.

G. Feeder Units:
1. Breakers: Molded case type, thermal-magnetic trips meeting UL 489 and NEMA AB-1. Ampere rating and interrupting ratings as noted.
2. Units: Individually compartmentalized with not more than one breaker per unit unless otherwise indicated. Use red color to indicate on position as described above for starter units.

H. Bus:
1. Material: Copper, silver plated at all joints.
2. Isolation: Locate main bus at the top, completely compartmentalized with sliding or removable barriers for access to joints. Provide phase isolation for vertical bus by polyester barriers enclosing each phase bar or providing adequate creepage to restrict fault propagation. Plug all holes not used to stab in units.
3. Provide ground bus rated 300 amps minimum extending the full length of the lineup. Where three phase, four wire control centers are indicated provide full length neutral bus rated at 100 percent of the main bus. Where three phase three wire control centers are used as service entrance equipment provide neutral bus in incoming main section only.

I. Metering Relaying and Control Devices:
1. Current Transformers: ANSI C57.13; 5 ampere secondary; bar or window type; with single secondary winding and secondary shorting device; ratio as required; burden and accuracy consistent with connected metering and relay devices; 60 Hertz.
2. Circuit Monitor: Microprocessor-based unit for measuring multiphase variables including amps, volts, VARS, volt-amperes, power factor, demand values and harmonic distortion. Equal to General Electric Power Leader Meter.
3. Indicating Lights and Selectors: Heavy duty, oiltight, industrial grade with octagonal ring. Pilot lights are transformer type; LED for amber, red, and green and incandescent for other colors. Equal to Allen-Bradley bulletin 800T.
4. Control Relays: heavy duty, 600 volt, industrial grade, 10 amp contact rating. Equal to Allen- Bradley bulletin 700 type P.

J. Solid State Type Starter:
1. Starter units shall be horsepower rated or amp rated for the horsepower of the motor. Provide circuit breaker ahead of the starter. Starter shall be NEMA rated. Soft starter shall be Cutler-Hammer model S811 or equivalent from Square D or GE.

71.3 FIELD QUALITY CONTROL

A. TESTS

1. Install overload relay thermal elements based on motor nameplate rating. If capacitors are installed between the relay and motor, select thermal elements based on the measured motor current. Adjust other -overcurrent protective devices to settings per the coordination study.
2. Meggar each bus, phase-to-phase and phase-to-ground.

END OF SECTION

PART 72 - GENERAL

72.1 REFERENCES

A. The equipment covered by these specifications shall be designed, tested, rated, assembled and installed in strict accordance with all applicable standards of ANSI, NEC, ISO, U.L., IEEE and NEMA.

72.2 RELATED SECTIONS

A. Division 3 - Concrete

B. Division 23 – Mechanical

C. Division 26 - Electrical

72.3 WORK INCLUDED

A. The work includes supplying a complete integrated emergency generator system. The system consists of a natural gas fueled generator set and automatic transfer switch with related component accessories as specified herein.

B. The CONTRACTOR shall be responsible for connecting all fuel piping and any necessary auxiliary equipment (gas regulators, etc.) for a fully operational fuel system.

C. A complete system load test shall be performed after all equipment is installed.

D. The equipment supplied and installed shall meet the requirements of the NEC and all applicable local codes and regulations. All equipment shall be of new and current production by a MANUFACTURER who has 25 years of experience building this type of equipment. Manufacturer shall be ISO9001 certified.

72.4 ACCEPTABLE MANUFATURERS

A. There shall be one source responsibility for warranty, parts and service through a local representative with factory trained service personnel.

B. Generator Set
   1. Caterpillar / Olympian
   2. Cummins / Onan
   3. Kohler
   4. Genrac
   5. or approved equal.

C. Automatic Transfer Switch
   1. ASCO
   2. Cummins / Onan

72.5 SUBSTITUTION

A. Proposed deviations from the specifications shall be treated as follows:
1. Requests for substitutions shall be made a minimum of ten (10) days prior to bid date. Manufacturers catalog data shall accompany each request and authorized acceptance shall be by addenda only.
2. The emergency power system has been designed to the specified manufacturer's electrical and physical characteristics. The equipment sizing, spacing, amounts, electrical wiring, ventilation equipment, fuel and exhaust components have all been sized and designed around CATERPILLAR / OLYMPIAN equipment. Should any substitutions be made, the CONTRACTOR shall bear responsibility for the installation, coordination and operation of the system as well as any engineering and redesign costs, which may result from such substitutions.

72.6 SUBMITTALS

A. Engine-generator submittals shall include the following information
1. Factory published specification sheet indicating standard and optional accessories, ratings, etc.
2. Manufacturer's catalog cut sheets of all auxiliary components such as Automatic Transfer Switches, battery charger, control panel, enclosure, main circuit breaker, etc.
3. Dimensional elevation and layout drawings of the generator set, enclosure and transfer switchgear and related accessories.
4. Weights of all equipment.
5. Concrete pad recommendation, layout and stub-up locations of electrical and fuel systems.
6. Interconnect wiring diagram of complete emergency system, including generator, switchgear, day tank, remote pumps, battery charger, jacket water heater, remote alarm indications.
7. Engine mechanical data including heat rejection, exhaust gas flows, combustion air and ventilation air flows, noise data, fuel consumption, etc.
8. Generator electrical data including temperature and insulation data, cooling requirements, excitation ratings, voltage regulation, voltage regulator, efficiencies, waveform distortion and telephone influence factor.
9. Generator resistances, reactances, and time constants.
10. Generator motor starting capability.
11. Control panel schematics.
12. Oil sampling analysis, laboratory location, and information.
13. Manufacturer's and dealer's written warranty.
14.
15.
16.

72.7 WARRANTY

A. The manufacturer's standard warranty shall in no event be for a period of less than five (5) year from date of initial start-up of the system and shall

include repair parts, labor, reasonable travel expense necessary for repairs at the job site, and expendables (lubricating oil, filters, antifreeze, and other service items made unusable by the defect) used during the course of repair. Submittals received without written warranties as specified will be rejected in their entirety.

72.8 PARTS AND SERVICE QUALIFICATIONS

A. The engine-generator supplier shall have service facilities within 75 miles of the project site and maintain 24-hour parts and service capability. The distributor shall stock parts as needed to support the generator set package for this specific project.

B. The dealer shall maintain qualified, factory trained service personnel that can respond to an emergency call within 1 hour of notification, 24 hours per day.

PART 73 - PRODUCTS

73.1 GENERAL REQUIREMENTS

A. The generator set shall be Standby rated at 100 ekW, 125 kVA, 1800 RPM, 0.8 power factor, 240 V, 3 phase, 4 wire, 60 hertz, including radiator fan and all parasitic loads.

B. All materials and parts comprising the unit shall be new and unused.

73.2 ENGINE

A. The engine shall be spark ignition type natural gas fueled, four (4) cycle, water-cooled, vertical in-line or vee-type, operating with nominal speed not exceeding 1800 RPM.

B. The engine shall have a battery charging DC, alternator with a transistorized voltage regulator. Starting shall be a solenoid shaft, electric starter.

C. Engine speed shall be governed by an isochronous electronic governor to maintain 0% droop from no load to full load and +/- 0.25% steady state frequency variation.

73.3 GENERATOR

A. The synchronous generator shall be a single bearing, self-ventilated, drip-proof design in accordance with NEMA MG 1 and directly connected to the engine flywheel housing with a flex coupling.

B. The insulation material shall meet NEMA standards for Class H insulation and be vacuum impregnated with epoxy varnish to be fungus resistant. The excitation system shall be of brushless construction.

C. The brushless exciter shall be independent of main stator windings (either permanent magnet or auxiliary windings) and shall consist of a three-phase armature and a three-phase full wave bridge rectifier mounted on the rotor shaft. Surge suppressors shall be included to protect the diodes from voltage spikes. Generator shall have the ability to sustain short circuit current of 300% of rated current to allow protective devices to operate.

D. The automatic voltage regulator (AVR) shall maintain generator output voltage within +/- 0.5% for any constant load between no load and full load. The regulator shall be a totally solid state design which includes electronic voltage buildup, volts per Hertz regulation, over-excitation protection, shall limit voltage overshoot on startup, and shall be environmentally sealed.

73.4 CIRCUIT BREAKER

A. Provide a generator mounted circuit breaker, molded case or insulated case construction, 400 Amp Trip, 3 pole. Breaker shall be Cutler-Hammer or equal and utilize a thermal magnetic trip. steel NEMA 1 enclosure mounted on a separate support stand vibration isolated from the engine / generator arrangement. Bus bars, sized for the cable type shown on drawing, shall be supplied on the load side of breaker. Circuit breaker shall be mounted inside the generator enclosure.

73.5 CONTROLS

A. Generator Mounted Control Panel
   1. Provide a generator set mounted control panel for complete control and monitoring of the engine and generator set functions. Panel shall include automatic start/stop operation, cycle cranking, AC metering with phase selector switch, shutdown sensors and alarms with horn and reset, adjustable cooldown timer and emergency stop push-button.
   2. Critical components shall be environmentally sealed to protect against failure from moisture and dirt. Components shall be housed in a NEMA 1/IP22 enclosure with hinged door. The panel itself shall be mounted on a separate support stand isolated from the engine / generator arrangement. Panel / breaker arrangements mounted on the generator set in such a way that access to the AC Generator terminal box is restricted in any way whatsoever are not acceptable.
   3. Provide the following readouts:
      a. Engine oil pressure
      b. Coolant temperature
      c. Engine RPM
      d. System DC Volts
      e. Engine running hours
      f. Generator AC volts
      g. Generator AC amps
      h. Generator frequency

i. Control Panel Annunciation - Provide the following indications for protection and diagnostics according to NFPA 110 level 1:
j. Low oil pressure
k. High water temperature
l. Low coolant level
m. Overspeed
n. Overcrank
o. Emergency stop depressed
p. Approaching high coolant temperature
q. Approaching low oil pressure
r. Low coolant temperature
s. Low voltage in battery
t. Control switch not in auto. position
u. Low gas pressure
v. Battery charger ac failure
w. High battery voltage
x. Two (2) Spare

B. Provision for remote indication for generator status.

73.6 COOLING SYSTEM

A. The generator set shall be equipped with a rail-mounted, engine-driven radiator with blower fan and all accessories. The cooling system shall be sized to operate at full load conditions and 110°F (43°C) ambient air entering the room or enclosure (If an enclosure is specified). The generator set supplier is responsible for providing a properly sized cooling system based on the enclosure static pressure restriction.

73.7 FUEL SYSTEM

A. All fuel piping shall be black iron or flexible fuel hose rated for this service. No galvanized piping will be permitted.

B. Flexible fuel lines shall be rated for 300 degrees F and 100 PSI.

73.8 EXHAUST SYSTEM

A. A critical grade exhaust muffler (minimum), companion flanges, and flexible stainless steel exhaust fitting properly sized shall be furnished and installed according to the manufacturer's recommendation.

B. The silencer shall be mounted so that its weight is not supported by the engine.

C. Exhaust pipe size shall be sufficient to ensure that exhaust back pressure does not exceed the maximum limitations specified by the engine manufacturer.

73.9 STARTING SYSTEM

A. A DC electric starting system with positive engagement shall be furnished. The motor voltage shall be as recommended by the engine manufacturer.

B. The heater Watt rating shall be sized by the manufacturer to maintain jacket water temperature at 90 °F minimum, and shall be a (120/208/240) Volt, single phase, 60 hertz.

C. Batteries: A lead-acid storage battery set of the heavy duty diesel starting type shall be provided. Battery voltage shall be compatible with the starting system. The battery set shall be rated no less than 75 ampere hours. Necessary cables and clamps shall be provided.

D. A battery tray shall be provided for the batteries and shall conform to NEC 480-7(b). It shall treated to be resistant to deterioration by battery electrolyte. Further, construction shall be such that any spillage or boil-over battery electrolyte shall be contained within the tray to prevent a direct path to ground.

E. Battery Charger: A current limiting battery charger shall be furnish to automatically recharge batteries. The charger shall be dual charge rate with automatic switching to the boost rate when required. It shall include overload protection, silicon diode full wave rectifiers, voltage surge suppressor, DC ammeter, DC voltmeter, and fused AC input. Ac input voltage shall be 120 volts, single phase. Amperage output shall be no less than ten (10) amperes. On outdoor units the battery charger shall be mounted inside the genset enclosure.

73.10 GENERATOR SET ENCLOSURE- SOUND ATTENUATED AND WEATHER PROTECTIVE

A. The complete engine generator set, including generator control panel, and engine starting batteries, shall be enclosed in a factory assembled, sound attenuated enclosure mounted on the fuel tank base.

B. The enclosure shall be constructed of galvatite (corrosion resistant) steel with electrostatically applied powder coated baked polyester paint. The enclosure shall have a resulting sound level of 78 dBA at 23 feet with the genset running under full load. It shall consist of a roof, side walls, and end walls. Fasteners shall be either zinc plated or stainless steel.

C. Number of doors on enclosure shall be as required so that all normal maintenance operations, such as lube oil change, filter change, belt adjustment and replacements, hose replacements, access to the control panels, etc., may be accomplished without disassembly of any enclosure components. Access doors shall be fabricated of the same material as the enclosure walls and shall be reinforced for rigidity.

D. Handles shall be key lockable, all doors keyed alike, and hinges shall be zinc die cast or stainless steel. Fasteners shall be zinc plated or stainless steel. Doors shall be of a lift off design allowing one person to remove door if necessary.

E. Air handling will be sized and designed by the manufacturer for 0.5” static pressure drop through enclosure. Intake openings shall be screened to prevent the entrance of rodents.

F. Lube oil and coolant drains shall be extended to the exterior of the enclosure and terminated with drain valves. Radiator access shall be through a hinged, lockable cover on enclosure. Cooling fan and charging alternator shall be fully guarded to prevent injury.

G. Enclosure manufacturer shall internally mount the exhaust silencer(s) and maintain the weather resistant integrity and aesthetic appearance of the system. Externally mounted silencers will not be permitted for safety and aesthetic reasons.

H. Lifting points shall be provided on base frame suitable for lifting combined weight of base tank, generator set and enclosure

73.11 AUTOMATIC TRANSFER SWITCH

A. Please see MCC specification. ATS is part of the MCC.

PART 74 - EXECUTION

74.1 INSTALLATION

A. Install equipment in accordance with manufacturer's recommendations, the project drawings and specifications, and all applicable codes. Installation of the system includes but is not limited to pouring a concrete pad for the generator set and automatic transfer switch, receiving and offloading the equipment, providing all labor, permits and material to install the total system.

74.2 START-UP AND TESTING

A. Coordinate all start-up and testing activities with the Engineer and Owner.

B. After installation is complete and normal power is available, the manufacturer's local dealer shall perform the following:
   1. Verify that the equipment is installed properly.
   2. Check all auxiliary devices for proper operation, including battery charger, jacket water heater(s), generator space heater, remote annunciator, etc.
   3. Test all alarms and safety shutdown devices for proper operation and annunciation.
   4. Check all fluid levels.
   5. Start engine and check for exhaust, oil, fuel leaks, vibrations, etc.
   6. Verify proper voltage and phase rotation at the transfer switch before connecting to the load.
   7. Connect the generator to building load and verify that the generator will start and run all designated loads in the plant.
   8. Document all tests and results, signed by manufacturer, contractor, and Construction Manager.

C. Perform a 4-hour load bank test at full nameplate load using a load bank and cables supplied by the local generator dealer. Notify the County inspector prior to test and provide a certification letter from the manufacturer upon test completion. Observe and record the following data at 15 minute intervals:
   1. Service meter hours
   2. Volts AC - All phases
   3. Amps AC - All phases
   4. Frequency
   5. Power factor or Vars
   6. Jacket water temperature
   7. Oil Pressure
   8. Ambient temperature
   9. Document all tests and results, signed by manufacturer, contractor, and Construction Manager.

D. Operation and Maintenance Manuals
   1. Provide three (3) sets of operation and maintenance manuals covering the generator, automatic transfer switch, and auxiliary components. Include parts manuals, final as-built wiring interconnect diagrams and recommended preventative maintenance schedules.
   2.

E. Training
   1. Provide one day of on-site training to instruct the owner's personnel in the proper operation and maintenance of the equipment. Review operation and maintenance manuals, parts manuals, and emergency service procedures.

END OF SECTION

PART 75 - GENERAL

75.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

75.2 SUMMARY

A. This Section includes the following:
1. Base course for asphalt paving.
2. Excavating and backfilling trenches for buried utilities and pits for buried utility structures.

B. Related Sections include the following:
1. Division 01 Section "Temporary Facilities and Controls."
2. Division 02 Section "Excavation Support and Protection."
3. Division 32 Section "Plants" for finish grading, including placing and preparing topsoil for plantings.

75.3 DEFINITIONS

A. Backfill: Soil materials used to fill an excavation.
1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Layer placed between the subbase course and asphalt paving.

C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

E. Excavation: Removal of material encountered above subgrade elevations.
1. Additional Excavation: Excavation below subgrade elevations as directed by Engineer or Owner. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Bulk Excavation: Excavations more than 10 feet in width and pits more than 30 feet in either length or width.
3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Engineer or Owner. Unauthorized excavation, as well as remedial work directed by Engineer or Owner, shall be without additional compensation.

F. Fill: Soil materials used to raise existing grades.

G. Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material ¾ cu. yd. or more in volume that cannot be removed by a trackhoe.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Layer placed between the subgrade and base course for asphalt paving, or layer placed between the subgrade and a concrete pavement or walk.

J. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

K. Utilities include underground pipes, conduits, ducts, and cables.

75.4 SUBMITTALS

A. Blasting plan approved by authorities having jurisdiction, for record purposes.

75.5 QUALITY ASSURANCE

A. Comply with applicable requirements of NFPA 495, "Explosive Materials Code."

75.6 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Owner and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify the Engineer and Owner not less than two days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Owner's written permission.
   3. Contact utility-locator service for area where Project is located before excavating.

PART 76 - PRODUCTS

76.1 SOIL MATERIALS

A. Satisfactory Soils: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

B. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols.
   1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

C. Backfill and Fill: Satisfactory soil materials.

D. Subbase: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2- inch(38-mm) sieve and not more than 12 percent passing a No. 200(0.075-mm) sieve.

E. Base: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch(38-mm) sieve and not more than 8 percent passing a No. 200(0.075-mm) sieve.

F. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, ASTM D 2940, except with 100 percent passing a 1-inch (25-mm) sieve and not more than 5 percent passing a No. 8 (0.075-mm) sieve.

PART 77 - EXECUTION

77.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

C. 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.

77.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
   1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.
3. Meet the requirements of Georgia Environmental Protection Division for stormwater discharge from construction-related activities.

77.3 EXPLOSIVES

A. Explosives: Obtain written permission from authorities having jurisdiction before bringing explosives to Project site or using explosives on Project site.
   1. Do not damage adjacent structures, property, or site improvements or weaken the bearing capacity of rock subgrade when using explosives.

77.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.
   1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

77.5 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

77.6 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
   1. Clearance: 6 **inches** on each side of pipe or conduit.

C. Trench Bottoms: In soil excavate trenches to required elevation. Hand excavate for bell of pipe.
   1. Excavate trenches **6 inches** deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
   2.
   3.

77.7 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

77.8 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:
   1. Surveying locations of underground utilities for record documents.
   2. Inspecting underground utilities.
   3. Removing concrete formwork.
   4. Removing trash and debris.
   5. Removing temporary shoring and bracing, and sheeting.

77.9 UTILITY TRENCH BACKFILL

A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

B. Provide a complete stone backfill for piping within driveways, roadways, and parking areas.

C. Place and compact initial backfill of material, free of particles larger than 2 inches to a height of 12 **inches** over the utility pipe.
   1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping to avoid damage or displacement of utility system.

D. Coordinate backfilling with utilities testing.

E. If in roadway or paved area backfill entire trench with No. 67 stone to a height 12 inches below road surface. Final 12 inches shall be filled with compacted road base stone.

F. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed. Maximum dimension of individual rock in backfill from 12 inches above pipe to top of ground shall not exceed 6 inches.

G. Place and compact final backfill of satisfactory soil material to final subgrade.

H. Whenever excavation has been made within easements on private property, the top 1 inch of backfill material shall consist of fine, loose earth, free from large clods, vegetable matter, debris, stone, or other objectionable material.

I. Whenever trenches cut across or along paved areas, temporarily pave the top 12 inches of trenches with Class A, Grade D crushed stone.

77.10 MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.
   1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
   2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

77.11 COMPACTION OF BACKFILLS AND FILLS

A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Compact soil to not less than the following percentages of 95 percent density according to ASTM D 698:
   1. Under pavements, compact each layer of backfill or fill material at 95 percent.
   2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 92 percent.
   3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 85 percent.

77.12 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

77.13 SUBBASE AND BASE COURSES

A. Under pavements and walks, place subbase course on prepared subgrade and as follows:
   1. Place base course material over subbase.
   2. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
   3. Shape subbase and base to required crown elevations and cross-slope grades.
   4. When thickness of compacted subbase or base course is 6 inches or less, place materials in a single layer.

5. When thickness of compacted subbase or base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

77.14 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing. Contractor to pay for testing services.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
1. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each **150 feet** or less of trench length, but no fewer than two tests.

D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

77.15 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
1. Scarify or remove and replace soil material to depth as directed by Owner; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

77.16 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION

PART 78 - GENERAL

78.1 SUMMARY

A. This Section includes temporary excavation support and protection systems.

78.2 PERFORMANCE REQUIREMENTS

A. Design, furnish, install, monitor, and maintain excavation support and protection system capable of: supporting excavation sidewalls, resisting soil and hydrostatic pressure, and supporting superimposed and construction loads.
   1. Provide professional engineering services to assume engineering responsibility, including preparation of Shop Drawings and a comprehensive engineering analysis by a qualified professional engineer, as directed by the Engineer.

78.3 SUBMITTALS

A. Shop Drawings for Information: Prepared by or under the supervision of a qualified professional engineer for excavation support and protection systems.

78.4 PROJECT CONDITIONS

A. Survey adjacent structures and improvements, employing a qualified professional engineer or land surveyor; establish exact elevations at fixed points to act as benchmarks, as applicable. Clearly identify benchmarks and record existing elevations.
   1. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Owner if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 79 - PRODUCTS – NOT USED

PART 80 - EXECUTION

80.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.

B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

C. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.

D. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

80.2 REMOVAL AND REPAIRS

A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.

END OF SECTION

PART 81 - GENERAL

81.1 SECTION INCLUDES

A. Refer to the drawings to determine the extent of the work specified under this heading.

B. Coordinate this work with equipment installation schedules for pad completion.

PART 82 - PRODUCTS

82.1 SIGN MATERIALS

A. Concrete: As specified elsewhere.

B. Granular Fill: As specified elsewhere.

C. Joint Fillers: Fiberboard of the lengths necessary to accomplish the work.

82.2 FINISH

A. Broom finish perpendicular to direction of traffic.

PART 83 - EXECUTION

83.1 INSTALLATION

A. Place granular fill, compact and level, under walks and equipment pads.

83.2 INSTALLATION

A. Where walks run along parking areas, turn concrete down to form curb.

B. Place joint fillers every 30' in straight runs of walks, at right angle turns, and wherever the concrete butts vertical surfaces.

C. Tool transverse joints at 5' intervals unless otherwise detailed on the drawings. Joints shall be 1/4 the depth of the slab and 1/8" to 1/4" wide. Tool a 3/4" radius on edges of joints and on the sides of all walks.

D. When the concrete has hardened enough to bear a man's weight without imprint, float the concrete until its surface is porous and open. Broom lightly from side to side, keeping scoring lines straight and approximately 1/16" deep.

83.3 PROTECTION

A. Caution truck drivers and equipment operators to prevent damage. Replace any damaged walks or pads.

END OF SECTION

PART 84 - GENERAL

84.1 GENERAL

A. This Section includes, but is not limited to providing asphalt and concrete paving and surfacing, and concrete curbs and gutters.

B. The work includes furnishing and installing paving subbase, base and final subgrade preparation and fine grading normally incidental to paving operations.

C. The work includes patching and/or repairing road affected by construction activities.

84.2 QUALITY ASSURANCE

A. Testing of pavements shall be done by a soil testing laboratory as required by the specifications. The Contractor shall correct any deficiencies in material makeup, strength or quantities revealed by testing.

B. Paving and curb construction and materials shall conform to the requirements of the GDOT Standard Specifications for Construction of Roads and Bridges, current edition.

PART 85 - PRODUCTS

85.1 MATERIALS

A. All materials used shall meet the appropriate physical test requirements of the latest edition and/or revision of State of Georgia Department of Transportation Standard Specifications for Construction of Roads and Bridges.

B. Bituminous surfacing materials for replacement of Streets and Secondary State Highways of bituminous construction shall be hot mixed bituminous concrete, as specified in Section 424 of the GDOT Standard Specifications.

C. Paving base material shall be crushed stone meeting the requirements for granular fill described in Section 815 of GDOT Standard Specifications.

D. Drainage stone shall conform to requirements for drainage fill described in Section 806 of GDOT Standard Specifications.

E. Bituminous concrete materials.
   1. Prime Coat: Bituminous Material for prime coat shall be as specified in Section 412 of GDOT Standard Specifications. Prime coat shall be Type MC-30 or MC-70 and applied at a rate of not

less than 0.15 gallons or more than 0.30 gallons per square yard over the dense aggregate base.

2. Bituminous Concrete Binder Layer or leveling course: Binder layer of bituminous concrete conforming to Section 400 and Section 828 of the GDOT Standard Specifications. Apply over prime coat to a total compacted thickness of not less than 2½ inches.
3. Tack Coat: Bituminous tack coat shall be as specified in Section 413 of the GDOT Standard Specifications. Apply over binder layer at a rate of not less than 0.08 gallons and not more than 0.15 gallons per square yard of base course immediately preceding placement of the wearing surface.
4. Bituminous Concrete Wearing Surface: Wearing Surface of bituminous concrete shall conform to Section 424 of the GDOT Standard Specifications. Apply over binder layer after application of Tack Coat to a minimum compacted thickness of 1 inch. The total minimum combined total compacted thickness of the binder layer and wearing surface shall be not less than four inches.

F. Reinforced Concrete Pavement and Concrete Sidewalk

1. Reinforced Concrete pavement shall be in accordance with Section 430 of the GDOT Standard Specifications.
2. Class A structural requirements meeting requirements of Division 03 of these Specifications.
3. Welded wire reinforcing and reinforcing steel meeting requirements of Section on reinforcing steel.
4. Reinforced concrete pavement shall consist of Class A structural concrete with the thickness and reinforcing steel as shown on the Drawings. The concrete pavement shall be placed over a compacted dense graded aggregate crushed stone base with the thickness as shown on the Drawings.
5. The sidewalks shall consist of Class A structural concrete, 4 inches thick, reinforced with wire mesh placed over the previously prepared 3-inch thick compacted stone base. The shapes and sizes of the sidewalks shall be as indicated on the Drawings. The materials and methods of construction shall conform in all respects to the applicable sections of the Specifications, the Drawings or as directed by the Engineer.

G. Curb and Gutter

1. Asphaltic Concrete Curb shall be in accordance with Section 436 of the GDOT Standard Specification.
2. Precast Concrete Header Curb shall be in accordance with Section 438 of the GDOT Standard Specification.
3. Curb and gutter dimensions shall be as shown on the drawings.

PART 86 - EXECUTION

86.1 TRENCH REPAIR

A. Trench Surface Repaving on City and County Streets and Roads:

1. Bituminous paving Replacement: The cut edges of the existing paving surface shall be saw cut to a depth of at least 2-inch to

straight lines for uniform appearance and clean surface at joints. The area between the cut edges of the paving shall be removed to a depth of 1 inch (minimum) below the bottom of the existing paving. All unstable material in the trench shall be removed and replaced with compacted dense graded aggregate added as needed to bring the subgrade surface to 1 inch below bottom of existing paving. No extra payment will be allowed for removal and replacement of unstable backfill.

2. The paving subgrade shall be compacted under the wheel of a loaded dual wheel vehicle until there is no observed settlement of the subgrade.
3. Prior to placing the paving material, the bottom and sides of surface to be paved shall be covered with a prime coat to insure adhesion.
4. Next, the bituminous paving shall be hot applied and rolled in accordance with the provisions of the State of Georgia Highway Department Standard Specifications for Highway Construction. Surface shall then be graded to one-quarter inch above existing paving surface at edges and crowned to one-half inch above such surface at the center.

86.2 SUBGRADE PREPARATION

A. Before paving, the entire surface of the subgrade shall be plowed, harrowed, and mixed to a depth of 6 inches minimum. If stabilization stone is required by the Engineer, it shall be mixed into the subgrade at this time at the specified rate. After the material has been thoroughly mixed, the subgrade shall be brought to line and grade and compacted to 100 percent of the maximum laboratory dry density as determined by the Standard Proctor test. Surface of the finished subgrade shall be balded to a smooth and uniform texture.

B. The contractor shall protect subgrade from damage and maintain it in a smooth, compact, and rut-free condition until the base course has been placed.

86.3 PAVING SUBBASE COURSE

A. Paving subbase course shall be constructed of select surface soils previously stripped and stockpiled. Paving subbase shall be placed on prepared subgrade. Subbase shall be thoroughly mixed and blended and all materials removed that will interfere with fine grading. Subbase shall then be compacted to 100 percent of Standard Proctor for its full depth. The subbase surface shall conform to the established elevations with an acceptable tolerance of ½ inch above or below. All paving areas shall be free-draining without local depressions.

86.4 PAVING BASE COURSE

A. Paving base course shall be constructed of crushed stone and construction shall be done in accordance with Section 815 of the Georgia Department of Transportation Specifications.

86.5 BITUMINOUS PAVING

A. Bituminous paving shall be hot mix asphaltic concrete construction conforming to Sections 400 of the GDOT.

B. The job mix formula shall be submitted by the Contractor to the Engineer for his approval, and such approval does not relieve the Contractor of his responsibilities for adequacy and warranty of the paving.

C. Bituminous concrete pavement shall be applied with suitable mechanical spreaders so that the whole roadway or paved area shall have a true and uniform surface, and the pavement shall conform to the proper grade and cross section. Finish pavement shall have no depressions that detain runoff (birdbaths).

D. Set frames of drainage structures and miscellaneous castings to final grade in an approved manner.

E. All joints between new and existing asphalt or new asphalt and new or existing concrete surfaces shall be sealed with a bituminous joint sealer.

86.6 MISCELLANEOUS CONCRETE

A. Concrete paving and curbs shall be in accordance with Sections 430 of GDOT.

B. Curbing shall be constructed according to the details provided and at the locations shown on the drawings.

C. Concrete sidewalks shall be as located on the plans. All sidewalks damaged by construction activities shall be replaced from construction joint to construction joint.

86.7 REINFORCED CONCRETE SITE PAVEMENT

A. Reinforced concrete site pavement shall be placed over a granular structural fill subbase. The minimum compacted thickness of the subbase shall be 12 inches and it shall be granular structural fill as described elsewhere in the specifications.

B. Reinforced concrete site pavement shall be Class A structural concrete with a minimum thickness of 8 inches and reinforced with epoxy coated welded wire fabric conforming to Article 853 of the GDOT Standard Specifications. Welded wire fabric shall be a 4 inch by 4 inch grid (4 x 4 - (w4/w4)) weighing no less than 85 lbs. per square foot. As an alternate, (#4@12-inch epoxy coated reinforcing steel each way at center of slab is acceptable.

C. Control joints in the pavement shall be spaced at approximately 20 feet center to center maximum each way.

D. Expansion joints in the pavement shall be spaced at approximately 40 feet center to center maximum each way.

E. Concrete site pavement shall slope no less than 1/8 inch per foot to drain to grass areas and slope away from the site unless otherwise shown on the Drawings or directed by the Engineer.

F. Shop drawings showing the concrete pavement plan for the site with the location of control joints, expansion joints and isolation joints shall be submitted by the Contractor and approved by the Engineer prior to placing the pavement. The shop drawings shall also show the high point of elevations for the pavement and slopes for drainage.

86.8 STREET REPAVING

A. The tack coat shall be applied to the existing surface to insure adhesion between the underlying surface and the superimposed bituminous course.

B. A leveling course of bituminous surfacing shall be applied to fill the streets in low spots, correct ponding, and to fill in the area damaged by construction to the level of existing bituminous surface.

C. Finally, a one and one-half inch course of bituminous material shall be applied to the entire width of the street. The surface course shall be feathered out to a thickness of one-half inch at the front of the gutter. The point where feathering shall begin and the amount of feathering shall be controlled by the Engineer.

86.9 TEMPORARY PAVEMENT

A. The Contractor, upon completing the backfilling of the trenches in streets and the placing of the gravel base, may be required to construct a temporary pavement. Any trench not permanently paved within 36 hours shall require temporary pavement.

B. The temporary pavement shall be placed in one course and shall consist of 2 inch compacted thickness of bituminous concrete as directed by the Engineer. The pavement shall be maintained in good repair, flush with the existing pavement at all times, at the Contractor's expense.

C. The materials and methods of construction for temporary bituminous concrete pavement shall conform in all respects to the applicable subsections of Division 400 of the GDOT Standard Specifications.

86.10 PROTECTION

A. Immediately after placement, protect pavement from damage until surface is sufficiently hardened for traffic.

86.11 SURFACE MAINTENANCE

A. Until the expiration of the guarantee period, the Contractor shall maintain surfacing placed under this Contract and shall promptly correct all defects such as cracks, depressions, and holes that occur. At all times, the surfacing shall be kept in a safe and satisfactory condition for traffic. If defects occur in surfacing constructed by the contractor, the Contractor

shall remove all bituminous concrete and base course as is necessary to properly correct the defect. The Contractor shall replace the base course and bituminous concrete in accordance with the requirements of these specifications..

END OF SECTION

PART 87 - GENERAL

87.1 SCOPE

A. Work described in this Section includes furnishing all labor, materials, equipment, tools and incidentals required for a complete and operable installation of wastewater flow control; plugging and blocking; pumping and bypassing; flow control precautions; and any other similar, incidental, or appurtenant flow control operation which may be necessary to properly complete the Work as shown on the Drawings and Specified herein.

B. The Contractor shall provide all services, labor, materials, and equipment required for all flow control and related operations necessary or convenient to the Contractor for furnishing a complete Work as shown on the Plans or specified in these Specifications.

87.2 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. The design, installation, and operation of the wastewater flow control system shall be the Contractor's responsibility. The Contractor shall employ the services of a vendor that can demonstrate to the Engineer that the vendor specializes in the design and operation of wastewater flow control systems. The vendor shall provide at least three (3) references of projects of a similar size and complexity as this Project, which were successfully performed by the vendor's firm within the past three (3) years. The references shall include the name of the agency, the name of the project, the date of the project, and the agency contact (telephone, fax, and e-mail). The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction.
2. A general description of the proposed Wastewater Flow Control to include the make and model of temporary bypass pumps, the certified noise levels of the pumps and generator, the means used to maintain and operate the bypass pumps, and a written statement that all bypass pumping shall comply with the requirements of these Specifications.
3. During the course of the project, the detailed, work-specific Wastewater Control Plan utilizing multiple pumps, or a single pump greater than four (4) inches discharge, shall be submitted to the Engineer at least ten (10) days before required. This plan shall outline all provisions and precautions to be taken by the Contractor regarding the handling of existing wastewater flows. This plan shall be specific and complete, including such items as schedules, locations, elevations, capacities of equipment, materials, and all other incidental items necessary and/or required to insure adequate wastewater control. The plan shall also include details of protection of the access and bypass pumping locations from damage due to the discharge flows, and compliance with the requirements and permit conditions specified in these

Specifications. No construction shall begin until all provisions and requirements have been reviewed and accepted by the Engineer.

4. The Contractor shall submit two (2) copies of the wastewater control plan for each sewer bypass set-up with sufficient detail including the following:
   a. Staging areas for pumps.
   b. Sewer plugging method and types of plugs.
   c. Number, size, material, location, and method of installation of suction piping.
   d. Bypass pump sizes, capacity, number of each size to be on the site of the Work and power requirements.
   e. Calculations of static lift, friction losses, and flow velocity (pump curves) showing pump-operating range.
   f. Standby power generator size and location.
   g. Downstream piping and discharge plan.
   h. Method of protecting discharge manholes or structures from erosion and damage.
   i. Thrust and restraint block sizes and locations.
   j. Sections showing suction and discharge pipe depth, embedment, select fill, and special backfill where required.
   k. Certified decibel levels of individual pumps, the combined decibel level if multiple pumps will be operated simultaneously, and the method of noise control for each pump and/or generator.
   l. Any temporary pipe supports, including rollers and elevated rollers, as well as anchoring required.
   m. Design plans and computations for access to bypass pumping locations.
   n. Calculations for selection of bypass pumping pipe size.
   o. Schedule for installation of and maintenance of bypass pumping lines.
   p. Plan indicating selection location of bypass pumping line locations.
   q. The Plan shall indicate the means by which flows from laterals are provided for either by plugging, containing, or subsidiary pumping. Building laterals shall not be disconnected or plugged overnight. Plugging of laterals is only allowed from 9 a.m. until 5 p.m. of the same day.
5. All proposed wastewater flow control arrangements, including flow bypass and/or diversion plans, shall indicate or show the location and position, in detail if necessary, any special features where pipes or hoses cross roadways, including intersections, such as temporary trenches, support bridges, ramp-overs, etc.
6. All proposed wastewater flow control arrangements, including wastewater flow bypass and/or diversion pumping plans for sewers, shall also include an emergency response plan to be followed in the event of a failure of the wastewater flow control system. The Contractor shall provide names and phone numbers for twenty-four (24) hour emergency contact.
7. The Contractor shall notify the Engineer twenty-four (24) hours prior to commencing actual wastewater flow control operations. The Contractor's Wastewater Flow Control Plan shall be approved by the Engineer before the Contractor shall be allowed to commence wastewater flow control work.

87.3 GENERAL

A. The objective of wastewater flow control is to:
   1. Maintain an efficient and uninterupted level of service to wastewater collection system users while maintenance or construction operations (including rehabilitation, repair, replacement, or connection of newly constructed facilities) are facilitated on the segment or segments being bypassed and/or from which flow is being diverted, within the wastewater collection system.
   2. Ensure that all levels of wastewater flow are continuously and effectively handled around the segment or segments of sewer being bypassed and/or from which flow is being diverted by:
   3. Ensuring that bypass and diversion pumps are adequately fueled, lubricated, and maintained.
   4. Ensuring backup spare parts are expeditiously applied to the flow bypass and/or diversion pumping system in the event of component breakdown.
   5. Ensuring that an emergency backup plan is smoothly implemented in the event of system failure.
   6. Preventing backup, spillage, flooding, or overflow onto streets, yards, and unpaved areas or into buildings; adjacent ditches; storm sewers; and waterways; while flow bypass or diversion pumping takes place and ensuring that installation, startup, and subsequent disassemby of the flow bypass and diversion pumping system is smoothly transitioned

PART 88 - PRODUCTS

88.1 PIPE FOR FLOW DIVERSION

A. Ductile Iron Pipe: Ductile iron pipe as specified in Section 33 3120 Ductile Iron Pipe and Fittings is acceptable for use for flow diversion during construction.

B. Polyethylene Pipe: Polyethylene material shall comply with the requirements for Type III polyethylene, C-5 and P-34 as tabulated in ASTM D1248 and have the Plastic Pipe Institute recommended designation PE3406. The material shall also have an average specific base resin density of between 0.94 g/cc and 0.955 g/cc (ASTM D1505). Pipe made from these resins must have a long term strength (50 years) rating of 1,250 psi or more per hydrostatic design basis categories of ASTM D2837. The polyethylene resin shall contain antioxidants and be stabilized against ultraviolet degradation to provide protection during processing and subsequent weather exposure. The polyethylene resin shall have an environmental stress crack resistance, condition C as shown in ASTM D1693, to be greater that five-hundred (500) hours, twenty (20) percent failure. All pipe shall be made from virgin quality material. No rework compound, except that obtained from the manufacturer's own production of the same formulation shall be used. The polyethylene resin shall have an average melt flow index, condition E as shown in ASTM D1238, not in excess of 0.25 g/10 min. Pipe shall be homogeneous throughout, and free of visible cracks, holes, foreign material, blisters, or other deleterious faults. Diameters and wall

thickness shall be measured in accordance with the requirements of ASTM D2122. Pipe joining will be done by thermal butt fusion method in accordance with the requirements of ASTM D657.

88.2 PUMPING EQUIPMENT

A. All pumps used shall be fully automatic self-priming units that do not require the use of foot-valves or vacuum pumps in the priming system. The pumps may be electric or diesel powered, provided they meet all specified sound level requirements. If electric pumps are used, the combined generator/pump system shall meet the specified sound level requirements. All pumps used shall be constructed to allow dry running for long periods of time to accommodate the cyclical nature of effluent flows.

B. Unless specified otherwise in these Specifications or approved by the Engineer, all pumps (and generators if used) shall be fully sound attenuated and shall produce a noise level of sixty-five (65) dBA or less at a distance of twenty-three (23) feet.

C. The Contractor shall provide the necessary stop/start controls for each pump.

D. The Contractor shall include one stand-by pump of each size to be maintained on site of the Work. Back-up pumps shall be on-line, isolated from the primary system by a valve.

E. The Contractor shall design all piping, joints, and accessories to withstand twice the maximum system pressure or fifty (50) psi, whichever is greater. The back-up pump, appropriate piping, fuel, lubrication, and spare parts shall be incorporated into the bypass arrangement at the site of the Work, ready for use in case of breakdown. A bypass “drill” shall be carried out by the Engineer before the bypass arrangement is accepted on all sewers greater than twelve (12) inches in diameter, at no cost to the County. The drill shall demonstrate the incorporation of all standby equipment to handle flows when the main pump set is switched off. The Engineer’s instructions following the drill shall be adhered to in full at no cost to the County.

F. No more than two (2) pump discharge hoses shall be used for wastewater flow control over a length of the line segment(s). If the flow exceeds the capacity of (2) “hoses” then rigid piping shall be used. The rigid piping shall consist of Ductile Iron Pipe, HDPE, or steel pipes with suitable pressure rated couplings to withstand twice the maximum system pressure or fifty (50) psi, whichever is greater.

G. Under no circumstances will aluminum “irrigation” type piping or glued PVC pipe be allowed. Discharge hose will only be allowed in short sections and by specific permission from the Engineer.

88.3 SYSTEM DESCRIPTION

A. Design Requirements:
1. Bypass pumping systems shall have sufficient capacity to pump peak flows in the pipes being bypassed (flows in the existing

sewers can increase dramatically during periods of wet weather). The Contractor shall provide all pipeline plugs, pumps of adequate size to handle wet weather peak flows, and temporary discharge piping to ensure that the total flow of the mainline is safely diverted around the section to be repaired. Wastewater flow control system will be required to be operated twenty-four (24) hours per day.

2. Capacity of the bypass pumps shall match the capacity of the dry pit submersible pumps to be installed in the drywell. The water level in the wetwell shall not affect flow depth of the influent sewer.
3. The Contractor shall have adequate standby equipment available and ready for immediate operation and use in the event of an emergency or breakdown. One (1) standby pump for each size pump utilized shall be installed at the mainline flow bypassing locations, ready for use in the event of primary pump failure.
4. The Contractor shall have adequate standby equipment available and ready for immediate operation and use in the event of an emergency or breakdown. One (1) standby pump for each size pump utilized shall be installed at the mainline flow bypassing locations, ready for use in the event of primary pump failure.
5. The wastewater flow control system shall be capable of bypassing the flow around the work area and of releasing any amount of flow, up to full available flow, into the work area as necessary for satisfactory performance of the Work.
6. The Contractor shall make all arrangements for bypass pumping during the time when the mainline is shut down for any reason. The wastewater flow control system shall overcome any existing force main pressure on discharge.

B. Performance Requirements:

1. It is essential to the operation of the existing wastewater system that there is no interruption in the flow of wastewater throughout the duration of the project. To this end, the Contractor shall provide, maintain, and operate all temporary facilities such as dams, plugs, pumping equipment (both primary and back-up units as required), conduits, all necessary power, and all other labor and equipment necessary to intercept the wastewater flow before it reaches the point where it would interfere with the Work, carry it past the Work, and return it to the existing sewer downstream of the work.
2. The design, installation, and operation of the wastewater flow control system shall be the Contractor's responsibility. The wastewater flow control system shall be the Contractor's responsibility.
3. The Contractor shall provide all necessary means to safely convey the wastewater past the work area. The contractor will not be permitted to stop or impede the mainline flows under any circumstances.
4. The Contractor shall maintain wastewater flow around the work area in a manner that will not cause surcharging of sewers, damage to sewers, and that will protect public and private property from damage and flooding.
5. The Contractor shall protect water resources, wetlands, and other natural resources.

PART 89 - EXECUTION

89.1 PLANNING

A. The Contractor shall be solely responsible for planning and executing all wastewater flow control operations. The Contractor shall be entirely liable for damages to private or public property that may result from its operations and for all cleanup, disinfection, damages, and resultant fines in the event of a spillage, flooding, or overflow.

89.2 GENERAL

A. All materials used for wastewater flow control shall be pre-approved by the Engineer prior to commencing wastewater flow control activities.

B. The Contractor is responsible for locating any existing utilities in the area the Contractor selects to locate the bypass pipelines. The Contractor shall locate its bypass pipelines to minimize any disturbances to existing utilities and shall obtain approval of the pipeline locations from the Engineer. All costs associated with relocating utilities and obtaining all approvals shall be paid by the Contractor.

C. During all wastewater flow control operations, the Contractor shall protect mainlines, manholes, and all local sewer lines from damage inflicted by any equipment. The Contractor shall be responsible for all physical damage to mainlines, manholes, and all local sewer lines caused by human or mechanical failure.

D. All pipe materials utilized in wastewater flow diversion during construction shall be in good condition, and free of defects, and leaks. Any defective material shall be replaced by the Contractor at no cost to the County. Upon completion of the job, pipe materials shall be removed from the site.

E. The Contractor shall complete all wastewater flow control activities with the minimum sound level compatible with accepted industry standards for sound attenuated temporary pumping systems.

F. When pumps are operating, an experienced bypass/diversion pump maintenance operator, mechanic, and/or assistant shall continuously be on site to monitor the operation of the entire bypass/diversion system. The operator, mechanic, and/or assistant shall comprehensively, methodically, and continuously:
   1. Adjust pump speed as appropriate so as not to adversely impact upstream or downstream flow condition levels.
   2. Check that the effectiveness and security of bulkheads, dams, diaphragms, plugs, valves, weirs, and all other flow control devices are working effectively and according to plan.
   3. Check the integrity of hoses and couplings along the entire bypass/diversion system.
   4. Monitor fuel tanks and top up as appropriate.
   5. Monitor lubrication levels and top up as necessary.
   6. Facilitate minor repairs as required.
   7. Report on potential problems arising.

8. Inspect bypass-pumping system at least hourly to ensure that the system is working correctly.
9. Maintain adequate supply of spare parts on site as required.

89.3 PUMPING AND BYPASSING

A. Wastewater shall be pumped directly into the existing pump station force main, downstream of the construction. The Contractor shall be responsible for keeping the pumps running continuously twenty four (24) hours a day if required, until the bypass operation is no longer required. The Contractor shall have standby pumps at all times.

B. Pumps and equipment shall be continuously monitored by a maintenance person capable of starting, stopping, refueling, and maintaining these pumps during the bypassing operations. If pumping is required on a twenty four (24) hour basis, engines shall be equipped in a manner to keep noise to a minimum.

89.4 FLOW CONTROL PRECAUTIONS

A. The Contractor shall take appropriate steps to ensure that all pumps, piping, and hoses that carry raw wastewater are protected from traffic.

B. In the event, during any form of "Wastewater Flow Control," that raw wastewater is spilled, discharged, leaked, or otherwise deposited in the open environment, due to the Contractor's work, the Contractor shall be responsible for any cleanup of solids and stabilization of the area affected. This work shall be performed at the Contractor's expense with no additional cost to the County. The Contractor shall also be responsible for notifying the sewer system maintenance personnel and complying with any and all regulatory requirements for cleaning up the spill at no additional cost to the County.

C. During wastewater flow control operations, the Contractor shall take proper precautions to prevent damage to existing sanitary sewer facilities, flooding, or damage to public or private property.

D. The Contractor shall make repairs or replacements or rebuild such damaged section or sections of existing sewers, as directed by the Engineer. All such repairs, replacements, and rebuilding shall be paid for by the Contractor.

E. The Contractor shall make such provisions as are necessary for handling all flows in existing sewers, connections, and manholes by pipes, flumes, or by other approved methods at all times, when its operations would, in any way, interfere with normal functioning of those facilities.

F. All operations shall be performed by the Contractor in strict accordance with OSHA and any applicable local safety requirements. Particular attention is directed to safety regulations for excavations and entering confined spaces.

END OF SECTION

PART 90 - GENERAL

90.1 RELATED DOCUMENTS

A. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

90.2 SUMMARY

A. This Section includes requirements for precast concrete utility vaults.

B. Related Sections include the following:

C. Division 31 Earthwork Sections for excavation requirements..

90.3 DEFINITIONS / STANDARDS

A. The following are industry abbreviations for metal materials:

B. DIP: Ductile iron pipe.

C. Buried piping shall be of the bell and spigot or mechanical joint type as required by material and application.

D. Non-buried piping shall have flanged ends, unless otherwise noted on the Drawings.

E. Use Mechanical Joint Fitting Restraining Device for plain end piping connections to fittings, valves, etc.

90.4 SUBMITTALS

A. Product Data:

B. Concrete vaults and accessories.

C. Shop Drawings:

D. Concrete vaults including hatches, frames and covers, ladders, and drains.

E. Design calculations by a structural engineer registered in the State of Georgia (for information only).

F. Operation and Maintenance Data: For specialties to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section “Operation and Maintenance Data,” include the following:

G. Hatches for concrete vaults.

90.5 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of piping and specialties and are based on the specific system indicated.

B. Comply with regulatory requirements of local, state and federal agencies having jurisdiction.

C. Coordinate this work with that required by other sections for timely execution.

D. It shall be the Contractor's responsibility to ensure that all necessary materials are furnished to them and that those found to be defective in manufacture are replaced at no extra cost to the Owner. Materials damaged in handling after being delivered by the manufacturer shall be replaced at the Contractor's own expense. If installed material is found to be defective before the final acceptance of the work, the cost of both the material and labor needed to replace it shall not be passed on to the Owner.

E. Furnish all material, equipment, tools, and labor in connection with the precast concrete utility vault, complete and in accordance with the drawings and these specifications.

PART 91 - GENERAL

91.1 CONCRETE VAULTS

A. Concrete vaults shall be rectangular precast concrete, of the dimensions and specifications noted on the Drawings and Division 03 of these specifications.

B. Precast vaults shall be designed for AASHTO H-20 traffic loading. Design calculations stamped and signed by a structural engineer registered in the State of Georgia affirming the H-20 traffic loading shall accompany the submittal.

C. Precast section joints shall be mortared or grouted; joined with AASHTO M-198-75 preformed flexible butyl type joint sealant. Joints should be water tight

D. Manufacturer / Model:

E. Hamilton-Kent “Kent-Seal No. 2”,

F. K.T. Snyder Company “rub ‘r-Nek”,

G. Press Seal Gasket “E-Z Stik”, or

H. Approved equal.

I. Manufacturer:

J. Foley Concrete Products

K. Tindall

L. Approved equal.

91.2 ACCESSORIES

A. Hatches

B. Channel frame shall be ¼-inch thick extruded aluminum with a mill finish, incorporating a continuous concrete anchor. A 1-1/2 inch drainage coupling shall be located in the front left corner of the channel frame. A bituminous coating shall be applied to the frame exterior where it will come into contact with concrete. The entire frame must be supported by a full bed of Class A concrete.

C. The door panel(s) shall be 1/4 inch aluminum diamond plate, reinforced to withstand an H-20 live load with a maximum allowable deflection of 1/150 of the span and shall not protrude into the channel frame when in the open position.

D. Doors shall open to 90 degrees and automatically lock with a Type 316 stainless steel hold open arm with an aluminum release handle. For ease of operation, the door hold open arm shall incorporate an enclosed stainless steel compression spring assist.

E. Doors shall close flush with the frame.

F. Hinges and all fastening hardware shall be Type 316 stainless steel.

G. Unit shall lock with a Type 316 stainless steel slam lock with removable key and have a non-corrosive handle.

H. Unit shall carry a lifetime guarantee against defects in material and/or workmanship.

I. Manufacturer:

J. Bilco

K. Halliday

L. USF Fabrications

M. Approved equal.

N. Ladder/Steps:

O. Ladder/steps shall be steel encased in copolymer polypropylene plastic (or equal), “Press Fit” type, have an overall width of 12 inches, and spaced at 12 inches.

P. Manufacturer:

Q. M.A. Industries, or

R. Approved equal.

S. Pipe Penetrations shall be water tight and sealed in the vault wall opening with flexible and/or rigid connections. At least one pipe penetration shall be a rigid connection.

T. Flexible connections shall be provided using resilient connectors meeting the requirements of ASTM C-923. Resilient connectors shall be compression type cast integrally into the vault wall.

U. Manufacturer:

V. A-Lok Products, Inc., Tullytown, PA, or

W. Approved equal.

X. Rigid Connections shall be provided using a thrust collar wall pipe. Thrust collar wall pipes shall be cast integrally into the vault wall. Thrust collar wall pipes shall meet the requirements of ductile iron flanged piping, as specified herein, unless otherwise specified.

Y. Manufacturer:

Z. U.S. Pipe,

AA. American Ductile Iron Pipe, or

BB. Approved equal.

CC. Vault Drainage:

DD. Vault drainage shall be as noted on the Drawings and according to the following.

EE. Drain pipe shall be schedule 80 PVC and penetrate the wall at floor level. Slope of drain line shall be in accordance with local plumbing codes. A varmint screen shall be installed on the drain line inside the vault for ease of maintenance. A flap valve shall be installed on the drain line discharge.

FF. Vault electrical, if any, shall be in accordance with the requirements of Division 26 and the Drawings.

GG. Vault Piping:

HH. Piping shall be supported with column type pipe saddle supports, concrete block, or other Engineer approved method.

II. Column type pipe saddle supports shall be stanchion type with vertical adjustability and U-bolt attachment to pipe. The stanchion shall be properly sized to carry the pipe load. The saddle assembly and base shall be cast iron or carbon steel.

JJ. Manufacturer:

KK. Grinnell Corporation, Providence, RI, or

LL. Approved equal.

MM. Concrete pipe supports shall be full or half-size, solid CMU placed under pipe, valves, meters, etc. flanges or under flanged base bends. Flanged base bends shall be bolted to the concrete pipe support.

PART 92 - EXECUTION

92.1 EARTHWORK

A. Refer to Division 31 for excavating, trenching, and backfilling.

92.2 CONCRETE VAULT INSTALLATION

A. Dewater sufficiently to maintain the ground water level at or below the bottom of the vault foundation prior to and during placement of the foundation.

B. Obtain an adequate foundation for the structure by removing and replacing unsuitable material with well graded granular material, by tightening with coarse rock, or by such other means as provided for foundation preparation of the connected lines or as directed by the Engineer. Wherever water is encountered at the site, place all cast-in-place bases or monolithic structures on a one-piece waterproof membrane to prevent any movement of water into the fresh concrete.

C. When the foundation subgrade has been prepared and is approved by the Engineer, carefully construct the foundation for precast and monolithic structures to the line and grade required by the Drawings. The foundation shall be well graded granular material. In no case shall the vault be supported directly on rock.

D. Vault foundation shall be constructed such that the vault is fully and uniformly supported in true alignment according to the Drawings and as site conditions allow. Make sure that all entering pipe can be installed at proper grade.

E. Thoroughly wet and the completely fill all lift holes and all interior joints between precast elements with non-shrink grout. Smooth them inside to ensure water tightness.

F. Carefully set the vault top at the required elevation, and properly bond it to the vault with cement grout or rubber sealant. Wherever vaults are constructed in paved areas, tilt the vault top so as to conform to the exact slope and grade of the existing adjacent pavement.

G. Place backfill by hand around the vault and to a distance of at least one pipe length into each trench, and tamp with selected material up to an elevation of 12 inches above the crown of all entering pipes. Continue backfilling in accordance with the requirements for trench backfilling.

H. Install pipe supports in accordance with the manufacturer's recommendations. Supports shall be installed in the locations shown on the Drawings. In cases where supports are not shown, supports shall be furnished and installed at appropriate locations to ensure adequate support of piping, valves, etc. Supports shall be installed in locations that ease removal and re-alignment of valves, meters, etc.

I. After the vault had been adjusted to the proper grade, it shall be visually inspected by the Contractor in the presence of the Engineer. Any defects noted shall be corrected by the Contractor until the work is found satisfactory to the Engineer. In addition, at the Owner's or Engineer's request, the Contractor may be required within one year to visually inspect any vault(s) that were adjusted. Any work that has become defective shall be redone by the Contractor at no additional expense to the Owner.

J. Vault shall have positive drainage when site conditions allow. When positive drainage is not available, a sump pump shall be installed.

92.3 HATCH DRAINAGE

A. Precast concrete vault manufacturer shall extend hatch frame drains through the concrete to the exterior face of the vault, a minimum of 6” below finished grade.

B. Contractor shall place 5 cubic feet of #57 stone against edge of concrete vault, with the top of the drywell flush with the top of the hatch frame drain. Drywells shall be constructed for each hatch drain.

END OF SECTION

PART 93 - GENERAL

93.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

93.2 SUMMARY

A. This Section includes the following general-duty valves:
   1. Gray-iron swing check valves.
   2. Cast-iron gate valves.
   3. Cast-iron plug valves.
   4. Resilient-seated, cast-iron, eccentric plug valves.

93.3 DEFINITIONS

A. The following are standard abbreviations for valves:
   1. CWP: Cold working pressure.
   2. EPDM: Ethylene-propylene-diene terpolymer rubber.
   3. NBR: Acrylonitrile-butadiene rubber.
   4. PTFE: Polytetrafluoroethylene plastic.
   5. SWP: Steam working pressure.
   6. TFE: Tetrafluoroethylene plastic.

93.4 SUBMITTALS

A. Product Data: For each type of valve indicated, include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.

93.5 QUALITY ASSURANCE

A. ASME Compliance: ASME B31.9 for building services piping valves.
   1. Exceptions: Domestic hot- and cold-water and sanitary waste piping valves unless referenced.

B. ASME Compliance for Ferrous Valves: ASME B16.10 and ASME B16.34 for dimension and design criteria.

C. NSF Compliance: NSF 61 for valve materials for potable-water service.

93.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
   1. Protect internal parts against rust and corrosion.
   2. Protect threads, flange faces, grooves, and weld ends.
   3. Set angle, gate, and globe valves closed to prevent rattling.
   4. Set ball and plug valves open to minimize exposure of functional surfaces.
   5. Set butterfly valves closed or slightly open.
   6. Block check valves in either closed or open position.

B. Use the following precautions during storage:
   1. Maintain valve end protection.
   2. Store valves indoors and maintain at higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 94 - PRODUCTS

94.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
   1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

94.2 VALVES, GENERAL

A. Refer to Part 3 "Valve Applications" Article for applications of valves.

B. Bronze Valves: NPS 2(DN 50) and smaller with threaded ends, unless otherwise indicated.

C. Ferrous Valves: NPS 2-1/2(DN 65) and larger with flanged ends, unless otherwise indicated.

D. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

E. Valve Sizes: Same as upstream pipe, unless otherwise indicated.

F. Valve Actuators:
   1. Chainwheel: For attachment to valves, of size and mounting height, as indicated in the "Valve Installation" Article in Part 3.
   2. Gear Drive: For quarter-turn valves **NPS 8(DN 200)** and larger.
   3. Handwheel: For valves other than quarter-turn types.
   4. Lever Handle: For quarter-turn valves NPS 6(DN 150) and smaller, except plug valves.
   5. Wrench: For plug valves with square heads. Furnish Owner with 1 wrench for every 10 plug valves, for each size square plug head.

G. Extended Valve Stems: On insulated valves.

H. Valve Flanges: ASME B16.1 for cast-iron valves, ASME B16.5 for steel valves, and ASME B16.24 for bronze valves.

I. Valve Grooved Ends: AWWA C606.

J. Solder Joint: With sockets according to ASME B16.18.
   1. Caution: Use solder with melting point below **840 deg F** for angle, check, gate, and globe valves; below **421 deg F** for ball valves.

K. Threaded: With threads according to ASME B1.20.1.

L. Valve Bypass and Drain Connections: MSS SP-45.

94.3 GRAY-IRON SWING CHECK VALVES

A. Manufacturers:
1. Type II, Gray-Iron Swing Check Valves with Composition to Metal Seats:
2. Crane Co.; Crane Valve Group; Crane Valves.
3. Crane Co.; Crane Valve Group; Stockham Div.
4. Mueller Co.
5. Watts Industries, Inc.; Water Products Div.
6. Approved equal.
7. Grooved-End, Ductile-Iron Swing Check Valves:
8. Grinnell Corporation.
9. Mueller Co.
10. Victaulic Co. of America.
11. Approved equal.

B. Gray-Iron Swing Check Valves, General: MSS SP-71.

C. Type II, Class 125, gray-iron, swing check valves with composition to metal seats.

D. Type II, Class 250, gray-iron, swing check valves with composition to metal seats.

E. 175-psig CWP Rating, Grooved-End, Swing Check Valves: Ductile-iron body with grooved or shouldered ends.

94.4 CAST-IRON GATE VALVES

A. Manufacturers:
1. Type I, Cast-Iron, Rising-Stem Gate Valves:
2. Crane Co.; Crane Valve Group; Crane Valves.
3. Crane Co.; Crane Valve Group; Jenkins Valves.
4. Crane Co.; Crane Valve Group; Stockham Div.
5. Grinnell Corporation.
6. Hammond Valve.
7. Kitz Corporation of America.
8. Milwaukee Valve Company.
9. NIBCO INC.
10. Powell, Wm. Co.
11. Walworth Co.
12. Watts Industries, Inc.; Water Products Div.
13. Approved equal.

B. Cast-Iron Gate Valves, General: MSS SP-70, Type I.

C. Class 250, OS&Y, Bronze-Mounted, Cast-Iron Gate Valves: Cast-iron body with bronze trim, rising stem, and solid-wedge disc.

94.5 CAST-IRON PLUG VALVES

A. Manufacturers:
1. Non-lubricated-Type, Cast-Iron Plug Valves:
2. General Signal; DeZurik Unit.
3. Grinnell Corporation.
4. Mueller Flow Technologies.

5. Tyco International, Ltd.; Tyco Valves & Controls.
6. Wheatley Gaso, Inc.
7. Xomox Corporation.
8. Approved equal.

B. Cast-Iron Plug Valves, General: MSS SP-78.

C. Class 125 or 150, non-lubricated-type, cast-iron plug valves.

D. Class 250, non-lubricated-type, cast-iron plug valves.

94.6 RESILIENT-SEATED, CAST-IRON, ECCENTRIC PLUG VALVES

A. Manufacturers:
1. General Signal; DeZurik Unit.
2. Milliken Valve Company.
3. Olson Technologies; Homestead Div.
4. Pratt, Henry Company.
5. Val-Matic Valve & Mfg. Corp.
6. Approved equal.

B. Resilient-Seated, Cast-Iron, Eccentric Plug Valves, **NPS 2-1/2(DN 65)** and Smaller: Design similar to MSS SP-108, and rated for **175-psig** minimum CWP.
1. Resilient Seating Material: Suitable for potable-water service, unless otherwise indicated.

C. Resilient-Seated, Cast-Iron, Eccentric Plug Valves, **NPS 3(DN 80)** and Larger: MSS SP-108, and rated for **175-psig** minimum CWP.
1. Resilient Seating Material: Suitable for potable-water service, unless otherwise indicated.

PART 95 - EXECUTION

95.1 EXAMINATION

A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

C. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

D. Examine threads on valve and mating pipe for form and cleanliness.

E. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

F. Do not attempt to repair defective valves; replace with new valves.

95.2 VALVE APPLICATIONS

A. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.

B. Sanitary Waste Piping: Use the following types of valves:
1. Swing Check Valves, NPS 2-1/2(DN 65) and Larger: Type II, Class 125, gray iron.
2. Grooved-End, Ductile-Iron, Swing Check Valves, NPS 2-1/2(DN 65) and Larger: 175-psig minimum CWP rating.
3. Gate Valves, NPS 2(DN 50) and Smaller: Type 1, Class 150, bronze.
4. Gate Valves, NPS 2-1/2(DN 65) and Larger: Type 1, Class 250, OS&Y, bronze-mounted cast iron.

95.3 VALVE INSTALLATION

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

C. Locate valves for easy access and provide separate support where necessary.

D. Install valves in horizontal piping with stem at or above center of pipe.

E. Install valves in position to allow full stem movement.

F. Install chainwheel operators on valves NPS 4(DN 100) and larger and more than 84 inches above floor. Extend chains to 60 inches above finished floor elevation.

G. Install check valves for proper direction of flow and as follows:
1. Swing Check Valves: In horizontal position with hinge pin level.
2. Single-Plate Check Valves: In horizontal or vertical position, between flanges.
3. Lift Check Valves: With stem upright and plumb.

95.4 JOINT CONSTRUCTION

A. Grooved Joints: Assemble joints with keyed coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

95.5 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

END OF SECTION

PART 96 - GENERAL

96.1 SCOPE OF WORK

A. The Contractor shall furnish all materials for and shall properly install, adjust and test, and place in continuous operation at the locations indicated or as directed, all push-on ductile iron pipe, all mechanical joint ductile iron pipe, all restrained joint ductile iron pipe, and all ductile iron fittings for the construction of the sewer lines as necessary for the proper completion of the work.

B. Wherever the work disturbs existing conditions or work already completed, the same shall be restored to its original condition in every detail. All such replacement and repair shall meet with the approval of the Engineer.

C. It is the Contractor's responsibility to furnish all materials and pipe and fittings required, and in conformance with all applicable codes.

D. It is the intent of this Contract to require an installation under this Item which is complete in every detail, whether or not indicated on the Drawings, or specified herein. Consequently, the Contractor shall be responsible for all details, devices, accessories, and special construction which may be necessary to properly furnish, install, adjust, test, and place in continuous and satisfactory operation, a complete installation.

PART 97 - PRODUCTS

97.1 PIPE COATING AND LINING

A. All ductile iron pipe and fittings buried underground or submerged shall have a standard bituminous outside coating conforming to ANSI A21.6 or A21.51. All exposed ductile iron pipe and fittings shall have an outside coating of universal primer. Unless noted otherwise, all ductile iron pipe used for water or wastewater shall have cement mortar lining of standard thickness in accordance with ANSI A21.4. Cement mortar lining for ductile iron fittings shall be double the standard thickness under ANSI A21.4.

B. Paint all steel sleeves, tapping sleeves, rods, nuts and washers, and couplings with Roster Laboratories, Inc., -Roskote Mastic No. A-939, or Koppers Company, Inc. Bitumastic Superservice Black or approved equivalent.

97.2 PUSH-ON PIPE AND FITTINGS

A. Provide all push-on ductile iron pipe manufactured in accordance with and meeting the latest requirements of AWWA C151/A21.51.

B. Provide all push-on fittings with body thickness and radii of curvature conforming to the latest AWWA C110 or AWWA C153/A21.53. Make

design of fittings, whether long or short pattern, as indicated, noted or directed on the drawings.

97.3 MECHANICAL JOINT PIPE AND FITTINGS

A. Provide all mechanical joint ductile iron pipe barrels manufactured in accordance with the latest requirements of AWWA Standard C151/A21.51.

B. Make the mechanical joint herein specified for mechanical joint ductile iron pipe and fittings meet the requirements of AWWA Standard C111/A21.11.

C. Provide all mechanical joint fittings with body thickness, laying length and radii of curvature conforming to the latest AWWA Standard C11O/A21.10 and joints in accordance with Section 11-2.3 of the latest AWWA Standard C111/A21.11, minimum Class 250 Ductile Iron in all sizes. Make design of fittings, whether long or short pattern, as indicated, noted or directed on the drawings. Make special fittings conform to dimensions and details as directed, indicated or noted on the drawings.

97.4 RESTRAINED JOINT PIPE AND FITTINGS

A. Provide all restrained joint push-on ductile iron pipe barrels manufactured in accordance with the latest requirements of the AWWA Standard C151/A21.51.

B. Provide restrained joint push-on pipe and fittings, American Cast Iron Pipe "Lock-Ring", U. S. Pipe TR-FLEX or equal.

C. Provide restrained joint fittings with body thickness, laying length and radii of curvature conforming to the latest AWWA Standard C11O/A21.1O and joints in accordance with Section 11-2.3 of the latest AWWA Standard C111/A21.11, minimum Class 250 Ductile Iron in all sizes. Make design of fittings, whether long or short pattern, as indicated, noted or directed on the drawings. Make special fittings conform to dimensions and details as directed, indicated or noted on the drawings.

97.5 WALL THICKNESS

A. Ductile iron pipe used as gravity sewer line shall have the following minimum wall thickness unless otherwise specified. Ductile iron pipe used as force mains shall have the minimum wall thickness or be of the minimum class as specified on the drawings.

Pipe Diameter (inches)	Bedding Class	Maximum Depth of Cover	Pressure Class	Thickness Class	Minimum Thicknes s
6	B	70	350	50	.25
6	C	50	350	50	.25

Pipe Diameter (inches)	Bedding Class	Maximum Depth of Cover	Pressure Class	Thickness Class	Minimum Thickness
8	B	60	350	50	.27
8	C	40	350	50	.27
10	B	45	350	50	.29
10	C	30	350	50	.29
12	B	40	350	50	.31
12	C	25	350	50	.31
12	B	50	350	51	.34
12	C	35	350	51	.34
16	B	35	350	50	.34
16	C	20	350	50	.34
16	B	40	350	51	.37
16	C	25	350	51	.37

PART 98 - EXECUTION

98.1 JOINING PIPES

A. Sufficient lubricant shall be furnished with each order of pipe to provide a thin coating on each spigot end. Lubricant shall have no deleterious effect on the rubber gasket. Lubricant shall be of such consistency that they can be easily applied to the pipe in either hot or cold weather and shall adhere to either wet or dry pipe. Only lubricant furnished with the pipe by the pipe manufacturer shall be used.

B. Transition joints between sewer pipes of different materials shall be accomplished by the use of adapters made especially for that purpose. Shop drawings must be submitted and approved by the Engineer prior to the use of any adapter for this purpose.

98.2 CUTTING PIPE

A. Wherever the pipe requires cutting to fit into the line, the work shall be done in a satisfactory manner so as to leave a smooth end at right angles to the axis of the pipe. When a piece of pipe is cut to fit into the line, no payment shall be made for the portion cut off and not used in the line. Joints on existing piping will be carefully cut and any breakage will be at the sole expense of the Contractor.

98.3 BUILT-IN PIPE AND FITTINGS

A. Where indicated on the Drawings, or directed, pipe and fittings shall be carefully built in, connected to, or supported on concrete or brick masonry.

98.4 ANCHORAGE

A. Where indicated on the drawings, or directed, plugs, caps, tees, and bends deflecting 22-1/2 degrees or more shall be provided with restrained joint fittings or two independent restraints, (i.e. megalug plus blocking or megalug plus rodding) as detailed on the drawings. 11-1/4 degree bends may be restrained with only one method. Payment for thrust locks shall be included in the unit price bid for Ductile Iron Pipe and Fittings. Payment for concrete thrust blocking shall be paid for under the item titled Concrete.

98.5 TESTING

A. Pipes, fittings, and appurtenances on ductile iron pipe shall be laid in such a manner as to leave joints water-tight. Ductile iron pipe used as a force main shall be tested to the pressure specified on the plans but to a minimum of 150 PSI, as measured at the lowest elevation on the test section.

B. Tests shall be performed in the presence of the Engineer for force main testing. The Contractor shall furnish a pressure gauge for measuring the pressure on the line, shall provide a corporation cock in the line to attach gauge or pump connection, and shall provide plugs to seal taps after use in testing, and shall also furnish a suitable pump, pipe, and appliances, labor, fuel, and other appurtenances necessary to make these tests.

C. Each section of pipe shall be filled slowly with water and the specified test pressure, measured at the point of lowest elevation shall be applied by means of a pump connected to the pipe in the satisfactory manner. The Contractor will furnish all test water at a hydrant.

D. Before applying the specified test pressure, all air shall be expelled from the pipe. To accomplish this, taps shall be made, as directed by the Engineer, if necessary, at points of highest elevation, and afterward tightly plugged, all, at the Contractor's expense.

E. The test pressure shall be maintained for a minimum of two (2) hours to allow for thorough examination of leakage where necessary. The pipe line shall be made watertight under the test pressure.

F. No separate payment will be made for testing, but the cost thereof shall be included in the Lump Sum bid.

98.6 MARKING

A. Mark all ductile iron and ductile iron fittings in accordance with AWWA Standard C11O/A21.10, Section 10-9, "Marking of Fittings". Mark all ductile iron pipes in accordance with requirements of Section 51-10, "Marking Pipe", of AWWA Standard C151/A21.51. Also include in marking the manufacturer's initials, year cast, and class letter or number. Paint mark number and weight conspicuously on each piece.

B. Furnish the Engineer with lists of all pieces of pipe and fittings in each shipment received. On lists indicate the serial or mark number, weight, class, size and description of each typical piece received.

98.7 INSPECTION

A. Furnish to the Engineer copies of the manufacturer's sworn certificate of inspection and testing of all ductile iron pipe and ductile iron fittings provided on the Work. All ductile iron pipe and cast iron fittings will be subject to inspection and approval by the Engineer after delivery of material to the site. Do not use broken, cracked, misshaped, imperfectly coated, unsatisfactory or otherwise damaged ductile iron pipe or cast iron fittings.

B. Such inspection by the Engineer does not relieve the Contractor of full responsibility for the material installed.

98.8 UNLOADING AND LAYING

A. Unload ductile iron pipe, fittings and accessories with hoists or by skidding. Under no circumstances are pipe to be dropped. Do not skid or roll pipe handled on skid ways against pipe already on the ground. Do not damage casting and linings; but, in the event should damage occur, make repairs or replacement to satisfaction of the Engineer.

B. Use proper, suitable tools and appliances for the safe and convenient handling and laying of the pipe and fittings. Take care to prevent the pipe coating from being damaged, particularly on the inside of the pipe and fittings.

C. Pipe may not be "strung" along the job within highway right-of- ways without the approval of the Engineer.

D. Carefully examine all pipe and fittings for defects just before laying and lay no pipe or fitting which is known to be defective. In the event that defective pipe is discovered after having been laid, remove and replace with a sound pipe or fitting in a satisfactory manner at Contractor's expense.

E. Thoroughly clean all pipe and fittings before being laid. Plug open ends of pipe with an approved plug during construction.

98.9 CLEAN-UP

A. A thorough clean-up shall be made before final acceptance and final payment for each project is made. All excess rock shall be removed, private and public property shall be restored to original condition and all excess pipe and fittings shall be removed.

98.10 GUARANTEE

A. The Contractor shall guarantee for a period of twelve (12) months from the date of Final Acceptance, all lines, appurtenances, trenches, and other disturbed surfaces.

B. The Contractor shall be responsible for repairs to any leaking pipe, fittings, etc. Should trenches settle, he shall promptly furnish and place fill to original grade. Should any leaks or trench settlement occur under

the new pavement, the Contractor will be held responsible for the cost of all repairs, including pavement replacement.

END OF SECTION

PART 99 - GENERAL

99.1 DESCRIPTION OF WORK

A. Contractor shall furnish, install, and test (where required), all process piping, fittings, accessories and supports as required in this specification.

99.2 REFERENCES

A. ANSI A.21.10 - Standard for Cast Iron Fittings 3 in. through 48 in., for water and other liquids.

B. ANSI A.21.50 - Standard for the Thickness Design of Ductile-Iron Pipe.

C. ANSI B.16.1 - Standard for Cast Iron Pipe Flanges and Flanged Fittings.

D. C115/A21.15 - Standard for Flanged Ductile Iron.

E. ANSI-C-606 - Standard for Joints, Grooved and shouldered Type Fittings.

F. AWWA C208 - Hydrostatic Testing of Steel Pipe.

G. ANSI B.31 - Pressure Piping.

99.3 SUBMITTALS

A. Submit product data under provisions of other Sections of this specification.

B. Include data on pipe materials, pipe fittings and accessories.

99.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of other Sections of the specifications.

B. Store and protect products under provisions of other Sections of the specifications.

PART 100 - PRODUCTS

100.1 DUCTILE IRON PIPE

A. Fittings shall be ductile iron or cast iron.

B. Wall penetrations connecting buried outside piping and inside piping, or tank penetrations below water level, shall consist of cast iron wall sleeves imbedded in the concrete with mechanical joint or flanged connections compatible with the piping system.

C. Wall penetrations above grade where there are no concerns of water infiltration shall be as specified in "Sleeves and Plates" in this division.

D. For all ductile iron pipe and cast iron fittings shall be furnished as shown in the piping schedule and on the plans.

E. Joints for ductile iron pipe and cast iron fittings shall be flanged, mechanical joint, push-on joint, or mechanically coupled grooved joint as indicated on the drawings and as specified in "Joining of Pipes" in this division.

F. Where required, pipe and fittings shall be furnished with approved lugs or hooks cast integrally for use with bolts or bridle rods and socket clamps to keep pipe from pulling apart under pressure.

G. All ductile iron pipe and fittings (except air systems) shall be lined and coated as follows:
1. The inside shall be cement-mortar lined (standard thickness) for water service in accordance with ANSI/AWWA C104/A21.4.
2. The outside of underground systems shall be coated with the standard bituminous coating specified under the appropriate ANSI specification for the pipe and fittings.
3. Machined surfaces shall be cleaned and coated with a rust-preventive coating at the shop immediately after being machined.

H. All pipe and fittings shall be inspected and tested at the foundry as required by the standard specifications to which the material is manufactured. The Contractor shall furnish duplicate to the Owner's Representative sworn certificates of such tests. All inspection and testing at the foundry shall be accomplished at no additional expense to the Owner.

I. Pipes and fittings shall be subjected to a careful inspection and hammer test just before being installed.

100.2 POLYVINYL CHLORIDE (PVC) PIPE

A. PVC pipe shall be rigid, Type I, Grade I, ANSI/ASTM D-1784, D-1785 polyvinyl chloride Schedule 80 pipe. CPVC pipe shall be Type IV, Grade I, Schedule 80 pipe in accordance with ANSI/ASTM D-1784 and ASTM F-441.
1. Pipe shall be manufactured by:
2. Eslon Thermoplastics, Charlotte, NC
3. Fluid Controls Inc., Huntsville, AL
4. ASAHI/America, Medford, MA
5. LCP Chemicals and Plastics, Colfax, NC
6. Bristol Corp., Bristol, TN

B. Pipe shall contain less than 10% inert fillers.

C. All pipe shall be joined utilizing socket couplings or fittings by first applying a primer such as that equal to IPS Weld-on P-70, then applying a solvent cement. Flanged fittings may be used. Where threaded pipe must be used, it shall be threaded with new threading dies which shall not be used for the threading of iron or other metal pipe.

D. All PVC pipe shall be leak tested by the manufacturer prior to shipment.

100.3 STEEL PIPE

A. All steel pressure pipe shall conform to the requirements of ANSI/AWWA C200 and shall be hydrostatically tested to the pressures indicated in that specification.

B. Pipe shall be shop fabricated. Field welding will not be permitted without written permission of the Owner's Representative.

C. Pipe sizes, joints, wall thicknesses, (or thickness schedule), shall be as indicated in the Pipe Schedule included with these specifications.

D. Pipe 6 inches and larger shall be electrically welded or seamless steel pipe, Grade B.

E. Pipe less than 6 inches shall be seamless steel pipe, Grade B.

F. Steel pipe shall be black or hot-dipped galvanized in accordance with ANSI/ASTM A120. Steel pipe up to 2 inches diameter shall be butt-welding type.

G. Fittings:
1. Fittings for steel pipe 6 inches and larger shall be fabricated from hydrostatically tested pipe in accordance with AWWA C208. Wall thickness shall conform to that specified for the pipe.
2. Fittings up to 2 inch diameter shall be malleable iron conforming to ANSI B16.19, 300 psig, black or galvanized.
3. Fittings up to 2-1/2 inch through 4 inch shall be forged steel, standard class, conforming to ANSI/ASTM A234 and ANSI B16.9 or, in the case of grooved ends, malleable iron.

H. Flanges:
1. For 4 inch and larger pipes, flanges shall conform to ANSI/AWWA C207, Table 1, 2, or 3, depending on pressure.
2. Flanges for piping 2-1/2 inch to 4 inch shall be weld neck type conforming to ANSI/ASTM A181.
3. Piping up to 2 inch shall be socket-weld type.

I. Couplings:
1. Pipe couplings shall be mechanical type, to mechanically engage and lock grooved or shouldered pipe ends in a positive couple and to allow for some degree of angular deflection and contraction and expansion. Each coupling shall consist of malleable iron housing clamps in 2 or more parts, a single C-shaped composition sealed gasket designed to utilize internal pipe pressure to increase the tightness of the seal when installed, and 2 or more track-head steel bolts as required to assemble housing-clamps. The couplings shall be as manufactured by Victaulic Co. of America, South Plainfield, NJ; by Gustin/Bacon Division of Aeroquip, Lawrence, KS, or approved equal.

J. Inspection:

1. All pipe and fittings shall be inspected and tested in accordance with the applicable AWWA Specifications by an independent commercial testing laboratory approved by the Owner prior to shipment of the pipe. Certified copies of the reports of inspection and testing as required by the AWWA Specification shall be submitted for all pipe and fittings furnished before final acceptance. All inspection and testing shall be accomplished at no additional expense to the Owner.

100.4 PIPING SCHEDULE

Service	Pipe Class Or Schedule	Fittings
Pressure Piping Inside Building	DIP flanged with pressure rating of 250 PSI and flanges faced and drilled ANSI B16.1, Class 250 as described in *American Ductile Iron Pipe*, 17th Edition, Table 8-11. Contractor to install couplings as required to transition between pipe and valves to form a compatible match.	Flanges faced and drilled ANSI B16.1, Class 250.
Pressure Piping (Buried)	DIP with MJ ends with Megalug restraint.	MJ Fittings with Megalug restraint.

PART 101 -

PART 102 - EXECUTION

102.1 GENERAL

A. Where piping connects to equipment, particular care shall be taken to see that pipe fittings are suitable for connection to the equipment fittings.

B. All piping shall be erected true to line and grade by skilled mechanics in strict accordance with the specifications and drawings.

C. Where walls and piping systems are parallel to one another, the piping shall be grouped or arranged to present a symmetrical appearance.

D. All piping connections to pumps and other equipment shall be made in such a manner as to avoid any strain being transmitted from the piping to the equipment. Flanged piping shall be carefully installed so that the pipe flanges exactly match and are perfectly parallel to the flanged equipment connections.

E. Connections of the piping to the equipment with bolts more than finger-tight will not be permitted until the equipment has been leveled, grouted in, and the installation inspected and approved by the manufacturer of the

equipment. In the event the piping does not exactly match the equipment connections, the piping installation shall be revised until it does match those connections. In the case of flanged connections, it must be possible to insert the bolts by hand without "springing" the piping. In no event during the erection of the piping shall it be permitted to support the weight of any fitting, valve, piping, etc., from the equipment connections.

F. All piping shall run parallel with the building walls unless otherwise indicated. Diagonal runs will not be permitted. In all walkways, stair and working platform areas, a minimum clearance of 6 feet 8 inches from the floor, stair, or platform to the lowest point of the piping or piping accessory shall be maintained.

G. The Contractor shall be cognizant of the service and design features such as support anchoring, expansion/contraction, and jointing of the piping and valves he proposes to utilize. He shall inform the Owner of any features which are not compatible with the drawings at the time such equipment is submitted for approval.

H. Piping from safety valves shall be the same as inlet piping.

I. All pipe nipples shall be of the same material as the line in which they are installed.

J. The placement of valves, instruments and other components shall be located such that they can be serviced and can be read (in the case of instruments).

K. Unless otherwise indicated on the drawings, maximum spacing of pipe supports for horizontal piping shall be as follows:

Pipe Material		Maximum Spacing Liquids	Air & Gases
1.	Steel (standard weight or heavier), Ductile Iron		
	1-1/2" and under	7'-0"	7'-0"
	2", 2-1/2", 3"	10'-0"	14'-0"
	4", 5", 6"	14'-0"	20'-0"
	8", 10"	20'-0"	20'-0"
	12" and above	As recommended by the piping manufacturer	
2.	PVC		
	2" and under	Continuous support	
	2-1/2" and above	As required by manufacturer for service temperature	

L. Provide additional supports, a) where pipe changes direction, b) adjacent to flanged valves and strainers, and c) at equipment connections and heavy fittings. Provide at least one hanger adjacent to each joint in cast-iron soil pipe and grooved-end steel pipe with mechanical couplings.

102.2 INSTALLATION

A. Pipe Erection and Laying:

1. Carefully inspect all pipe, fittings, valves, equipment, and accessories prior to installation. Any items which are unsuitable, cracked or otherwise defective shall be rejected and removed from the job immediately. All pipe, fittings, valves, equipment and accessories shall have factory applied markings, stampings or nameplates with sufficient data for identification to determine their conformance with specified requirements.
2. Exercise all necessary care at every stage of storage, handling, laying and erecting to prevent entry of foreign matter into piping, fittings, valves, equipment and accessories. Do not erect or install any item which is not clean. During construction, until system is fully operational, all openings in piping and equipment must be kept closed at all times except when actual work is being performed on that item or system. Closures shall be plugs, caps, blind flanges or other items specifically designed and intended for this purpose.
3. Run pipelines straight and true, parallel to building lines with a minimum use of offsets and couplings. Provide only such offsets as may be required to provide necessary headroom or clearance and to provide necessary flexibility in pipe lines.
4. Changes in direction of pipelines shall be made only with fittings or pipe bends. Changes in size shall be made only with fittings. Miter fittings, face or flush bushings, or street elbows shall not be used. All fittings shall be of the long radius type, unless otherwise shown on the drawing or specified.
5. Provide flanges or unions at all final connections to equipment, traps and valves to facilitate dismantling. Arrange piping and piping connections so that equipment being served may be serviced or totally removed without disturbing piping beyond final connections and associated shutoff valves.
6. Use full and double lengths of pipe wherever possible.
7. Unless otherwise indicated, install all supply piping, including shutoff valves and strainers, to coils, pumps and other equipment at line size with reduction in size being made only at inlet to control valve or pump. Install supply piping from outlet of control valve at full size to connection of equipment served.
8. All pipe shall be cut to exact measurement and installed without springing or forcing except in the case of expansion loops where cold springing is indicated on the drawings. Particular care shall be taken to avoid creating, even temporarily, undue loads, forces or strains on valves, equipment or building elements with piping connections or piping supports.

B. Hangers and Supports:

1. The requirements of the applicable sections of ANSI B31 "Pressure Piping" shall be considered as minimum requirements governing fabrication, installation and support of piping systems except where more specific or stringent requirements re stated herein or shown on the drawings.
2. In general, all pipe hangers larger than 10 inches diameter shall be supported from foundations, beams or roofs. Piping smaller than 10 inches may be supported from or on the building slabs.

Pipe hangers shall be in accordance with those manufactured by Fee & Mason, Manasquan, NJ; ITT Grinnell Corp., Providence, RI; Carpenter & Patterson, Inc., Woburn, MA, or equal.

3. All piping and piping connected equipment, including valves, strainers, traps and other specialties and accessories shall be supported in a manner that will not result in or product objectionable or excessive stress, deflection, swaying, sagging or vibration in the piping or in the building structure either during erection, cleaning, testing or normal operation of the systems. Piping shall not be so restrained, however, as to cause it to shake or buckle between supports or anchors or to prevent proper movement due to expansion and contraction. Piping shall be supported at equipment and valves such that they can be disconnected and removed without further supporting the piping. Piping shall not introduce any strains or distortion to the connected equipment.
4. All concrete inserts for support shall be set in place prior to pouring concrete.
5. All auxiliary structural steel required for the support of piping systems and not shown on the drawings as having been installed as a part of the building structure shall be furnished, installed and prime painted as part of the work under this section. Attach auxiliary steel to building structure as detailed on the drawings.
6. Hangers and supports shall be installed complete, including lock nuts, clamps, rods, bolts, couplings, swivels, inserts and required accessory items. Hangers for horizontal piping shall have adequate means of vertical adjustment for proper alignment of pipe and shall be provided with lock nuts. All hangers and supports in direct contact with copper tubing shall be copper plated or plastic coated.
7. Parallel runs or horizontal pipe 3 inches and under may be supported on trapeze type hangers made up of structural shapes and hanger rods. Otherwise, pipe lines shall be supported with individual pipe hangers.
8. Hanger rods for both single and double rod hangers shall conform to the following:

9. It shall be the responsibility of the Contractor to coordinate the location and method of support of the piping systems with that of all installations under other sections of the specifications. Piping shall be supported in such a manner as to impose no eccentric loading on building structural members. The loading of any hanger or support shall in no case exceed the manufacturer's recommended maximum load.
10. Hangers for insulated piping shall be sized for the OD of the pipe insulation or the insulation protection saddle.
11. Pipe hangers and supports are not shown on the plans. Contractor is responsible for coordination of the design, subject to Engineer’s approval of a suitable hanger and/or support system.

C. Draining and Venting:
1. Unless otherwise indicated on the drawings, all horizontal water, gas, including runouts and branches, shall pitch or slope to low points to provide for complete drainage, removal of condensate

and venting. Pitch, unless otherwise indicated, shall be 1 inch in 40 feet. All waste, vent, and roof leader piping shall pitch a minimum of 1/4 inch per foot.

2. Maintain accurate grade where lines are pitched or sloped for venting and drainage. No lines shall have pockets due to changes in elevation unless indicated on the drawings and only then with proper provisions for draining and venting.
3. Provide 3/4 inch globe type drain valves fitted with 3/4 inch hose thread adapter at all low points of water piping systems or where indicated on drawings to permit complete or sectionalized draining.
4. Provide drip legs at low points and at the base of all risers in steam, plant air and gas lines. Unless otherwise shown, drip legs shall be full line sizes on lines through 4 inches and a minimum of 4 inches, but not less than half line size over 4 inches. Drip legs shall be a 12 inch minimum length, capped with a reducer to a 3/4 inch globe type drain valve.
5. Use eccentric reducing fittings on horizontal runs when changing size of lines in order to provide proper drainage and venting. Install steam, plant air, gas and gravity condensate lines with bottom of pipe and eccentric reducers in a continuous line; all other liquid lines with top of pipe and eccentric reducers in a continuous line.
6. Provide automatic air release vents at high points and wherever else required for elimination of air in all water and waste water solution piping systems.
7. All vent and drain piping shall be of same materials and construction as specified for the service involved unless specified or indicated otherwise.

D. Sleeves and Plates:

1. Provide sleeves for all pipes passing through floors, walls, partitions, slabs, grade beams and foundations.
2. Lay out, size and locate all sleeves such that they be set and/or installed prior to pouring concrete or when masonry is being constructed. In the event sleeves must be placed after floor, wall, grade beam, etc., has been constructed, submit in writing to the obtain approval from the Owner, quantity and proposed method of core drilling and installing. Cored openings must be clean and neat without cracking or spalling.
3. Unless otherwise specified, sleeves shall be standard weight galvanized steel pipe having square cut ends with anchoring lugs welded on. Horizontal sleeves through walls, grade beams, foundations and partitions shall be flush with finished wall faces and have a water stop. Vertical Sleeves through floors shall extend 3 inches above finished floor and be flush on ceiling or under side.
4. Size sleeves such that internal diameter is a minimum of 2 inches larger than OD of bare pipe for un-insulated lines and 2 inches larger than OD of insulation and jacket for insulated lines. Center pipes in sleeves. Sleeves in pits or below grade shall be painted or coated with one coat of coal tar pitch paint and have an integral waterstop.
5. On lines passing through floors, slabs, walls, grade beams or foundations at or below grade and in pits, the annular space between outside of pipe or insulation and inside of sleeve shall be

packed with oakum to within one inch of both sides and the remaining space filled with asphaltic mastic. On lines passing through walls and floors above grade, and annular space between outside of pipe or insulation and inside of sleeve shall be packed tight with fiberglass insulation.

E. Expansion, Anchoring, Guiding and Thrusting:
1. Pipeline anchors and alignment guides shall be as required or as herein specified.
2. Pipe expansion loops and offsets shall be provided as required.
3. Alignment guides shall consist of a bolted semi-steel spider and a bolted guiding cylinder with supporting legs welded to the pipe support. Guides shall be as manufactured by Tube Turns Div., Allegheny Ludlum Industries, Louisville, Ky; Metraflex Co., Chicago, IL.

F. Underground Piping Protection:
1. Direct, buried, un-insulated steel pipe shall be covered with T-1 Denso Tape as manufactured by Denso, Inc., Houston, TX.
2. Approved alternate system suppliers are Pipe Line Service Co., Glenwillard, PA; Polyken Division of the Kendall Co., Boston, MA; Greenline Systems by Royston Laboratories, Pittsburgh, PA; or Tapecoat Co., Evanston, IL.
3. Flange bolts and nuts in pits and below ground shall be coated with Denso paste or as recommended by the alternate system manufacturer.

102.3 JOINING OF PIPES

A. General:
1. The joining of pipes shall be in accordance with the system acceptable and recommended by the manufacturer of the piping system. The joining methods herein described and described in the section "Piping and Tubing Materials" are a guide.
2. Threaded piping connections for plastic pipe are not to be used. In the connection of plastic pipe to a metal pipe, flanged connections shall be used.

B. Threaded Joints:
1. Pipe screw threads to conform to ANSI B2.1. Ream pipe ends and remove all burrs and chips after cutting and threading. Protect pipe thread during assembly. Apply thread lubricant to male threads as follows: John Crane Co., Morton Grove, IL, "Anti-Seize" for steam and condensate, boiler feed water and blow-down; read lead graphite for vent lines and roof conductor and Teflon tape for all other services.

C. Flanged Joints:
1. Steel pipe flanges shall conform to ANSI B16.5 "Steel Pipe Flanges and Flanged Fittings". Cast iron pipe flanges shall conform to ANSI B16.1 "Cast Iron Flanges and Flanged Fittings". Steel flanges shall be raised face except when bolted to flat face cast iron flange.
2. Flanged joints shall be made with bolts, bolt studs with nut on each end, or studs with nuts where the flange is tapped. The

number and size of bolts shall conform to the same ANSI Standard as the flanges.

3. Bolting for services up to 500 degrees F shall be ANSI/ASTM A307 Grade B with square head bolts and heavy hexagonal nuts conforming to ANSI B18.2.1 "Square and Hex Bolts" and B18.2.2 "Square and Hex Nuts". Bolt studs and studs shall be of the same quality as machine bolts.
4. Set flange bolts beyond finger tightness with an indicating torque wrench to insure equal tension in all bolts. Tighten bolts such that those 180 degrees apart or directly opposite are torqued in sequence.
5. Gaskets for flat face flanges shall be full face type. Gaskets for raised face flanges shall conform to requirements for "Group I Gaskets" in ANSI B16.5. Gaskets 12 inches in diameter and smaller shall be 1/16 inch thick minimum; larger than 12 inches in diameter shall be 3/32 inch thick minimum and of following types:
6. Water and Sludges (up to 175 degrees F): Red rubber, heavy duty type, by John Crane Co., Morton Grove, IL, - Style 555.
7. Plant Air: Neoprene type by John Crane - Style 999.
8. Chemical feed, Teflon coated type by John Crane - Style 11FF, free flow with neoprene insert.

D. Solder Joints:

1. Make up joints with 95% tin and 5% antimony (95-5) solder conforming to ANSI/ASTM B32 "Solder Metal" Grade 95TA. Cut copper tubing so ends are perfectly square and remove all burrs inside and outside. Thoroughly clean sockets of fittings and ends of tubing to remove all oxide, dirt and grease just prior to soldering. Apply flux evenly, but sparingly, over all surfaces to be joined. Heat joints uniformly to proper soldering temperature so solder will flow to all mated surfaces. Wipe excess solder, leaving a uniform fillet around cup of fitting. Flux shall be non-acid type. Remove composition discs from solder end valves during soldering.

E. Mechanically Coupled Grooved Joints:

1. Mechanical coupling connections shall mechanically engage, lock and seal the grooved pipe ends in a positive couple. Each coupling shall consist of malleable iron housing clamps in two or more C-shaped composition sealing gaskets, designed such that internal pressure tends to increase the tightness of the seal and two or more track-head steel bolts. The entire installation, including pipe grooving, shall be accomplished in accordance with the manufacturer's published instructions. Final tightening of bolts shall be with a torque wrench to insure equal tension in all bolts.
2. Approved manufacturers are Gustin Bacon Div. of Aeroquip Corp., Lawrence, KS, (Style 100 with Type 1 gaskets) and Victaulic Company of America, South Plainfield, NJ, (Style 77 with Grade T gaskets for steel pipe;, and Style 31 with flush seal gaskets for cast iron and ductile iron pipe).
3. Couplings used for the accommodation of drop nipples, branches, sprinkler heads, gauges or other male threaded connections shall be Style 96 FIT reducing tee, as manufactured by Victaulic Company of America, South Plainfield, NJ, or approved equal.

F. Mechanically Coupled Plain End Joints:

1. Mechanical coupling connections shall mechanically engage, lock and seal the steel pipe plain ends in a positive couple. The coupling housing shall be cast with oval shaped bolt holes. The assembly shall include a gasket which seals without pressure or vacuum when properly assembled. The couplings shall be Style 99 Roust-A-Bout with steel jaws which engage the pipe. Manufacturer is Victaulic Company of America, South Plainfield, NJ. Pipe preparation and assembly shall be in accordance with manufacturer's specifications. The assembly must be made with nuts tightened to the full torque requirements which depend on size.

G. Mechanical Joints:

1. Joints shall conform to ANSI A21.11 "Rubber Gasket Joints for Cast Iron Pressure Pipe and Fittings". Gasket material shall be Neoprene. The standard bolts and nuts of the pipe manufacturer shall be used and shall be coated at the factory with rust preventive lubricant after threading and tapping. Final tightening of bolts shall be with a torque wrench to insure equal tension in all bolts.

H. PVC Pipe:

1. The following procedures are recommended for the assembly of solvent cements welded PVC pipe and fittings:
2. Cut the pipe ends to be fitted square and smooth.
3. Where the pipe diameter is too large to fit in the socket of fittings, use emery cloth to remove excess material.
4. Wipe end of pipe and sockets of fitting lightly with a cloth moistened with methyl ethyl ketone to clean off dirt; grease and other foreign materials.
5. Apply primer.
6. Apply a coat of solvent cement to both ends of pipe and socket of fittings, by means of a paint brush made of natural (hog) bristle.
7. Insert pipe in socket and press to bottom of socket, then rotate the pipe in socket about one-quarter to one-half turn. A check that sufficient cement has been applied is indicated when a full fillet forms between the pipe and the edge of the socket.
8. Joints may be tested with water after four h ours under pressures not exceeding ten percent of the rating. Full working pressure may be applied after the joints have been allowed to stand for at least two days.
9. The use of solvent alone, such as methyl ethyl ketone, as differentiated from solvent cement discussed above, will not be allowed because of the uneven and relatively large clearance between the spigot and the socket, hence the inability to affect a proper and continuous adhesion between all the surfaces involved.
10. Where flanged PVC is used, gaskets shall be used in all cases. All fittings shall be of the molded type.

102.4 PROCESS PIPING CLEANING

A. All water lines shall be flushed out under full treated water pressure; potable water piping shall be flushed with potable water; air piping shall

be thoroughly blown out with air. All filters, control valves and gages shall be removed from lines or bypassed during the blowout period.

B. Following the blow-through, all dirt legs and other low points in lines shall be disassembled and all residual material thoroughly removed. All stop valves shall be removed and cleaned.

102.5 TESTING PREPARATION

A. The Contractor shall furnish all equipment and labor necessary to perform the field tests called for in this specification.

B. The Contractor shall give ample notice to the Owner that tests are to be conducted. The Owner or his Representative will witness the tests if he wishes.

C. No test shall be performed until all anchors, hangers, supports, test gages, plugs, bulkheads, blanks, etc., are installed. Tests shall be made against bulkheads or where permitted by the Owner.

D. Piping that connects to or is continuous with lines installed by others shall be isolated from such lines by valves or test blanks located at or near the junctions. When necessary to include parts of such lines in the test, the Owner's Representative shall be given prior notice so that test conditions may be mutually agreed upon.

E. When exposed piping is required to be painted or insulated, the paint or insulation shall not be applied to the pipe joints until the tests are completed.

F. Safety precautions shall be taken to prevent open ends of piping being in position to cause injury to personnel when blowing out or testing systems.

G. One or more calibrated indicating test gages shall be connected directly to the piping as necessary to coordinate the pressuring operation. The indicating gages shall be visible to the operator controlling the pressure. Pressure gages used shall have dials graduated over a range approximately 2 times the intended maximum test pressure.

102.6 TESTING METHODS

A. Pressure Pipelines - Liquid:
   1. All pressure pipelines conveying liquids and steam shall be tested by the Contractor in a manner satisfactory to and witnessed by the Owner's Representative.
   2. The section under test shall be filled with water; air expelled from the line and maintained full of water for a period of not less than 24 hours.
   3. The pressure and leakage test shall first consist of raising the water pressure (based on the elevation of the lowest point of the section under test and corrected to the gage elevation) to a pressure 1.5 times operating pressure and maintaining such pressure for a period of 30 minutes.
   4. The pressure and leakage test shall then consist of dropping the water pressure (based on the elevation of the lowest point of the

section under test and corrected to the gage elevation) to a pressure of 1.2 times operating pressure. Such test shall be maintained for an additional 1-1/2 hours.

5. For all pipelines not underground the section tested shall be considered as having failed to pass the test if the pressure test cannot be maintained without additional pumping.
6. For all underground piping at the end of the test period for both the pressure test and the leakage test, the section tested will be accepted if the total leakage is not greater than that determined by the following formula:

L = ND (square root of P)
3700

Where:
L = Allowable leakage in GPH
N = Number of joints in section tested
D = Nominal pipe diameter in inches
P = Average test pressure during test in psig

7. If the section fails to pass the pressure and leakage tests, the Contractor shall do everything necessary to locate, uncover and repair or replace the defective pipe, fitting, or joint, all at his own expense and without extension of time for completion of the work. Additional tests and repairs shall be made until the section passes the specified test.

B. Pressure Pipelines - Air:

1. All pressure pipelines conveying process air, flume air or primary air shall be tested by the Contractor in a manner satisfactory to and witnessed by the Owner.
2. The section under test shall be isolated by airtight plugs or valves from the air blowers and the diffuser headers which shall be tested separately.
3. The pressure and leakage test shall first consist of filling the test section with compressed air to a pressure of 12 psig. The air inlet point shall be sealed and with no further introduction of air, the pipeline shall maintain a pressure of 12 psig for one hour. A pressure gage supplied by the Contractor shall be used to indicate the pressure.
4. If the pipeline fails the above test, the Contractor shall locate and correct all leaks and retest the pipe section until it satisfactorily passes the test.

END OF SECTION

PART 103 - GENERAL

103.1 SCOPE OF WORK

A. The General Provisions of Section 13460 shall apply to this section.

B. The PLC Manufacturer shall furnish all labor, materials, equipment and incidentals required to provide, complete and ready for operation, the programmable logic controllers (PLCs) as specified.

C. All work in this Section shall be the product of the System Integrator (SI). Sub-suppliers and/or manufacturers may provide components, and/or services to the SI, but the final product shall conform to this specification and shall be the sole responsibility of the SI.

103.2 RELATED WORK

A. Refer to Section 13460.

103.3 SYSTEM DESCRIPTION

A. Refer to Section 13460.

B. Each PLC system shall have an initial installed capacity of I/O as shown on the drawings and as described in the I/O List plus a minimum of 20 percent installed spares. All installed action and spare I/O points shall be wired and terminated to terminal strips. Each PLC system provided shall be sized for an additional 20 percent minimum I/O expansion slots within the panel that it is installed.

C. The following new PLC system shall be furnished as specified under this Section.

PLC-CP - Northeast Pump Station

103.4 SPARE PARTS AND TEST EQUIPMENT

A. Provide spare parts and test equipment as specified below.
   1. One complete PLC systems including the following:
      a. 16-slot Chassis.
      b. Power Supply.
      c. Central Processing Unit (CPU).
      d. Communications Module.
      e. I/O Cards: One of each type used.
   2. I/O cards: 10 percent of each type used, but no less than one of each type.

B. All spare parts shall be packed in a manner suitable for long-term storage and shall be adequately protected against corrosion, humidity and temperature.

C. Program Development Software

1. Provide two (2) licenses of the PLC program development software. It shall be the latest version of Control Logic from Allen Bradley.

PART 104 - PRODUCTS

104.1 PROGRAMMABLE LOGIC CONTROLLER (PLC)

A. Hardware
1. Major hardware components of the PLC system shall include:
   a. Central Processing Unit (CPU)
   b. Communications Equipment
   c. Input / Output Modules (I/O)
   d. Power Supply and Chassis
   e. Panel-View Monitor door mounted
2. General
   a. The PLCs shall communicate between the operator workstations and field-mounted instrumentation, controllers and process actuators. Communications protocol shall be completely transparent to plant operators in the Control Room. The PLC shall be an intelligent microprocessor based device that can collect data and process control functions. Communications between PLCs and the operator workstations shall utilize an Ethernet 802.3 compliant data highway. The protocol shall be Modbus/Ethernet.
   b. All components of the PLC system shall be normally recognized industry standards and regularly sold for industrial applications. The PLC manufacturer shall assemble all components of the PLC system in structurally sound housings. All connecting cables, switches and other operator-controlled devices shall be constructed so as to withstand, without damage, all normal use and handling.
   c. Electrical supply voltage to the PLC shall be 115 VAC +/- 15%, 48 – 63 Hz. PLC system power supplies shall be fused for overload protection.
   d. The PLC shall be capable of stand-alone operation in the event of failure of the communications link to the operator workstations.
   e. The PLC shall be a digital solid-state logic system capable of performing the same functions as conventional relays, timers, counters, math functions, controllers, etc.
   f. The PLC system shall be of modular plug-in design and shall consist of a CPU, memory, I/O cards, racks, power supplies, interconnecting cables, communication lines and other items as necessary to meet the functional requirements of the specification. All components of the PLC system shall be marketed and supported by one PLC manufacturer. All necessary cable shall be provided.
   g. All products shall be designed, manufactured and tested in accordance with recognized industrial standards. All components shall have corrosion protection and shall have UL, CSA and FM approval. The PLC subsystems shall be approved for and adhere to the following agency and environmental specifications:

1) Vibration - 3.5 mm Peak-to-Peak, 5-9 Hz: 1.0G, 9-150 Hz. The methods of testing are to be based upon IEC 68-2-6 and JIS C 0911 standards for vibration. The system shall be operational during and after testing.
2) Shock – 15G, 11 msec. The method of testing is to be based upon IEC 68-2-27 and JIS C 0912 standards for shock. The system shall be operational during and after testing.
3) Temperature – All PLC hardware shall operate at an ambient temperature of 0 to 600 C, with an ambient temperature rating for storage of –40 to +850 C.
4) Relative Humidity – All PLC hardware shall function continuously in the relative humidity range of 5% to 95% with no condensation.
5) Noise Immunity – All PLC hardware shall be designed and tested to operate in a high electrical noise environment of an industrial plant as governed by the following regulations: EEE 472, IEC 801, MILSTD 461B, IEC 255-4, NEMA ICS 2-230.40 and ANSI/IEEE C-37.90A-1978.

h. The PLC manufacturer shall provide operating instruction manuals with adequate information pertaining to the following:
1) System specifications
2) Electrical power requirements
3) Application considerations
4) Assembly and installation procedures
5) Power up procedures
6) Troubleshooting procedures
7) Programming procedures
8) Internal fault diagnostics
9) Shut down procedures
10) Recommended spare parts list

i. The PLC manufacturer shall utilize a network of field sales and support personnel located in major cities throughout the United States. It shall also utilize a field service department with experienced representatives stationed in major cities with the capability to provide telephone consultation, prompt on-site service and field replacement stock.

j. The PLC manufacturer shall provide product application assistance by trained and experienced engineers to assist the Owner with program and system development through telephone consultation and on-site checkout, debug and start-up assistance.

k. The PLC manufacturer shall have the capacity to conduct on-site training programs. It shall also have the capacity to provide videotape-training courses for operation and maintenance of PLCs.

l. Modules are defined herein as devices, which plug into a chassis and are keyed to allow installation in only one direction. The design must prohibit upside down insertion of the modules as well as safeguard against the insertion of a module into a wrong slot.

m. In a single chassis system, all system and signal power to the CPU and support modules shall be distributed on a single motherboard or backplane. Interconnecting wiring between modules via plug-terminated jumpers shall not be acceptable.
n. All system modules on the main or expansion chassis shall be designed to provide for free air flow convection cooling. Heat sinks shall be used to dissipate component heat. Internal fans shall not be permitted.
o. The PLC manufacturer shall be regularly engaged in the manufacturing and servicing of PLCs and all corresponding components.
p. The PLC manufacturer shall have a fully operational quality assurance and control program in place and shall comply with ISO9001 standards for “Quality Systems – Model for Quality Assurance in Design, Development, Production, Installation and Servicing”.
q. The PLC manufacturer or it’s authorized representative shall provide complete technical support for all of its products including a “1-800” phone line.
r. All major assemblies and sub-assemblies, circuit boards, components and modules shall be identified using permanent labels or markers, each of which indicate the manufacturer’s catalog number and a product manufacturing date code.
s. The PLC system shall be Control Logic by Allen Bradley.

3. Central Processing Unit (CPU)
   a. General
      1) The CPU shall be as a minimum a 16-bit microprocessor that provides system timing and is responsible for scheduling I/O updates. It shall execute user-developed relay ladder logic programs, communicate with intelligent I/O modules and perform on-line diagnostics. The CPU shall consist of a single module, which solves application logic, stores the application program, stores numerical values related to the application processes and logic and interfaces to the I/O.
      2) The CPU shall sample all the discrete and analog inputs and outputs including internal coils and registers and service special function modules on every scan. The CPU shall process the I/O with user programs stored in memory, then control the outputs based on the results of the logic operation. The CPU shall execute the user program by rapidly scanning the program stored in user memory. Both logic and data word functions are executed in the order they appear in the user program. As each rung of logic is solved, the results shall be available to any following rungs. The CPU shall have an instruction to allow a decrease in scan time by skipping over parts of the program. The CPU shall allow the PLC program to be broken into ladder logic subroutines that execute only when called. The PLC shall allow analog and discrete points to be updated immediately within the

scan as the analog or discrete value is called in the ladder logic program.

3) The CPU shall be a single printed circuit board utilizing surface mount technology. The CPU shall plug directly into the backplane and shall not require additional wiring to the backplane, power supply or the I/O.
4) The CPU shall support floating point without the need of a Co-processor.
5) The CPU shall be supplied with a battery-backed time of day clock and calendar.
6) The CPU family shall allow for user program transportability from one CPU model to another.

b. Capacity
1) The CPU I/O capacity shall be 8192 bits in and 8192 bits out minimum.
2) The processing of a typical logic program consisting of a mix of analog and digital commands shall not exceed 1.4 milliseconds for 1,024 instructions.

c. Diagnostics
1) The CPU shall perform on-line diagnostics that monitor the internal operation of the PLC. If a failure is detected, the CPU shall initiate system shutdown and fail-over if a failure occurs. The following at a minimum shall be monitored:

a) Memory failure
b) Memory battery low
c) CPU over temperature and general fault
d) Communications port failure
e) Scan time over run
f) I/O failure
g) Analog or special function I/O module failure

2) All diagnostic information shall be accessible at the programming terminal, which attaches at the CPU. A diagnostic CRT page shall provide information, which identifies the nature of the fault, the absolute memory or I/O address of the fault, and the date and time of occurrence of the fault.
3) All diagnostic information shall be accessible to the host communications interface.
4) All diagnostic information shall be accessible to the ladder program or other executing software.
5) The CPU shall have LED indicators to show status such as PLC Ready, PROGRAM RUN and BATTERY GOOD. If any of the above mentioned failure conditions occur, provide an internal PLC diagnostic alarm contact output. The CPU within the system shall perform internal diagnostic checking and give visual indication to the user by illuminating a “green” indicator when no fault is detected and a “red” indicator when a fault is detected.

d. Programming Environment

1) The CPU shall be capable of being programmed by an external computer workstation via either a serial communication port on the CPU, or via optional Ethernet communications. Serial programming shall be possible without the use of a workstation interface board. The CPU shall be capable of programming from the PanelView window mounted on the door.
2) The programming device shall have access to the application program, the system configuration, all registers, I/O, system fault status, I/O override and system diagnostic relays.
3) Application programs may be loaded or stored while the CPU is running with minimal impact on the scan time.
4) If contacts or entire rungs are intentionally deleted from an existing logic program, the remaining program shall be automatically repositioned to fill this void. Whenever contacts or entire rungs are intentionally inserted into an existing program, the original program shall automatically be repositioned to accommodate the enlarged program.
5) The number of times a normally open (N.O.) and/or normally closed (N.C.) contact of an internal output can be programmed shall be limited only by the memory capacity to store these instructions.
6) The CPU shall support multiple industry standard IEC 1131-3 programming languages. As a minimum, ladder diagram, structured text and Sequential Function Chart (SFC) programming shall be provided. All hardware and software necessary to program the CPU in a mode other than standard ladder logic shall be supplied.

e. Memory

1) The CPU shall contain the CMOS RAM program memory. The memory shall a battery backup system capable of retaining all memory for a minimum of three months under load and shall require no external or special vents. The backup battery shall be capable of being replaced without interruption of memory integrity.
2) A visual indication of backup battery status shall be provided. In the event of low battery voltage, a visual indication and a low battery output alarm contact (for remote alarm) actuation shall be provided before battery failure.
3) The program memory shall be sized as required to implement the functions specified plus a minimum of 10 words (16 bit) for each I/O provided as spare, but not less than 48K bytes. The entire program memory shall be available for user program storage. Scratch pad or “housekeeping” programs shall not be counted in memory size rating.

4) The PLC CPU memory shall consist of the following functional types of memory:

a) Ladder logic program memory
b) Constant data memory
c) Variable data memory
d) Input / output memory
e) CPU status data memory
f) I/O word memory
g) User memory for compiled programs

5) Various memory combinations up to the maximum limits shall be software configurable between logic and data storage to more closely match the application requirements.

f. Instruction Set

1) The PLC CPU shall be capable of performing the same functions as a conventional relay logic system, including relays, timers, counters and shift registers. The CPU shall also be capable or performing high-level instructions including data word functions such as:

a) Four-Function Math: The CPU shall be capable of performing addition, subtraction, multiplication and division on integer numbers.
b) Compare Function: The CPU shall perform the compare function that compares two integers for less than, equal to, greater than and not equal to. The programming function shall energize when true and de-energize when false.
c) Square Root Function: The CPU shall be capable of taking the square root of a positive integer.
d) Move Function: The CPU shall be able to move an integer value from one memory location to another memory location.
e) Other data word capabilities shall include data file compare with pointer, file (block) move, word rotate, bit set, pick and clear.
f)

2) The PLC CPU shall perform all the functions of the conventional three-mode (PID) analog controller. The CPU shall be able to process up to 64 PID loops with the processing time of each controller selectable. Each PID loop shall incorporate an anti-windup algorithm on reset.

3) The system shall have the capability to address software timers and software counters in any combination and quantity up to the limit of available memory. The CPU shall handle all management of these instructions into memory. Instructions shall permit programming timers in the “ON” or “OFF” delay

modes. Timer programming shall also include the capability to interrupt timing without resetting the timers. Counters shall be programmable using up-increment and down-increment.

4) Timer instructions shall include selectable time bases in increments of 1.0 second and 10 milliseconds. The timing range of each timer shall be from 0 to 32,767 increments as a minimum. It shall be possible to program and display separately the timer's preset and accumulated values.
5) When using modules such as analog where multiple channels are terminated on one module, it shall be possible to transfer the current status of all channels to the CPU upon execution of one program instruction. This instruction shall be bi-directional to include data transfer from the CPU to the module or from the module to the CPU.
6) Instructions shall be provided for grouping contiguous 16 bit data words into a file. The system shall address up to 1,000 files with up to 1,000 words per file. File manipulation instructions such as high speed "file copy" and "file fill", "file to file" move, "element to file" move, "file to element" move and "first in-first out" shall be supported by the system. The four function math instructions and instructions for performing "logical OR", "logical AND", "exclusive OR" and comparison instructions such as "less than", "greater than" and "equal to" shall be included within the system. All instructions shall execute on either single word or files.
7) The system shall contain instructions, which will construct asynchronous and synchronous 16-bit word shift registers. Additional instructions shall be provided to construct synchronous bit shift registers.
8) The PLC shall have a jump instruction, which will allow the programmer to jump over portions of the user program to a portion marked by a matching label instruction.
9) It shall be a function of the CPU to automatically manage all data types.
10) In applications requiring repeatable logic runs it shall be possible to place such rungs in a subroutine section. Instructions, which call the subroutine and return to the main program, shall be included within the system. It shall be possible to program several subroutines and define each subroutine by a unique program file designator. The processor shall support nesting of subroutines up to seven levels deep. The program format as displayed on the CRT shall clearly define the main program and all subroutines. It shall be possible to pass selected values (parameters) to a subroutine before its execution.
11) The program format shall display all instructions on a CRT programming panel with appropriate mnemonics to define all data entered by the programmer. The system shall be capable of providing a "HELP"

instruction, which when called by the programmer will display on the CRT a list of instructions and all data and keystrokes required to enter an instruction into the system memory.

12) The system shall have the capability to enter rung comments above ladder logic rungs. These comments may be entered at the same time the ladder logic is entered.
13) The system shall have the capability to enter address comments and symbols. These entities may be entered at the same time the ladder logic is entered.
14) A means to program a fault recovery routine shall exist. When a major system fault occurs in the system, the fault recovery routine shall be executed and then the system shall determine if the fault has been eliminated. If the fault is eliminated, program execution resumes. If the fault still exists, the system will shut down. A user shall have the option to either resume operation or to shut down upon fault detection.
15) An interrupt routine shall be programmable such that the routine shall be executed regularly. The interval at which the routine is executed shall be user-specified in the range of 1 to 65,535 milliseconds.
16) The CPU shall support indexed and indirect addressing of inputs and outputs, along with all data table words (integer, binary, floating point, timers and counters) for the software instruction set.
17) Trigonometric instructions supported must include Sine, Cosine, Tangent, Inverse Sine, Inverse Cosine, and Inverse Tangent. These instructions must fully support floating-point math.
18) Additional floating point instructions supported must include Log 10, Natural Log and Exponential.
19) It shall be possible to complete complex, combined calculations in a single instruction, such as flow totalizing or equations of the format ((A+((B-C)*D))/E).
20) File function instructions supported shall also include Sort, Average, Square Root and Standard Deviation.
21) The processor instruction set shall provide support for a variety of ASCII string manipulation instructions such as search, concentration, extraction, compare and to/from integer conversion.
22) The processor shall support ladder functions providing ASCII port control such as read, write, handshake line control, buffer examination, etc.
23) An interrupt routine shall be programmable such that the routines shall be executed based upon the input condition of one of sixteen discrete hardware inputs in the processor chassis. The routine will be executed within two milliseconds of the detection of the input signal.
24) It shall be possible to divide user logic into multiple program blocks (structured programming).

g. Communication Ports and Remote I/O (RIO) Communications.

1) The CPU shall have at least three built-in communication ports for programming, operator interface and remote I/O operations.
2) The CPU shall be capable of communicating with up to 31 remote base locations at a combined distance of 15000 feet. The CPU shall automatically sample and update all local and remote I/O modules every scan cycle of the CPU.
3) The communication link between the CPU and any RIO chassis shall be via coaxial cable as recommended by the PLC manufacturer. RIO Communications speeds shall not be diminished with increased cable length.
4) Diagnostic and equipment status information shall be available from each RIO.
5) The remote I/O system shall have available a remote input/output arrangement capable of operation at locations physically separated from the PLC CPU by up to15,000 feet.

4. Input / Output Modules (I/O)

a. General

1) The I/O count and type has been determined by the Engineer in conjunction with the Owner and includes an allowance for active spares as noted below.
2) Each I/O system per location shall include 20 percent (minimum of 4 for each type) active input and output points (both DI, DO, AI and AO) for future use. The spares shall be the same type of I/O module as the active I/O modules and shall be wired down to the terminal strip.
3) Minimum isolation between input/output and logic voltage shall be 2,500v RMS per NEMA standards via opto-isolation.
4) All outputs shall have field replaceable fuse protection and blown fuse indicators.
5) I/O modules shall be plug-in mounted to the I/O mounting bases. I/O modules shall be designed to allow insertion at any point on the mounting base.
6) Field wiring terminal blocks shall be pull a part type if mounted on the I/O modules or mounted on the I/O mounting base to allow I/O module replacement without disconnecting of the field wiring. All field wiring terminal blocks shall be 300V minimum NEMA rated and accommodate no less than two (2) #14 gauge wires.
7) I/O modules shall comply with the following schedule unless noted otherwise:

a) Analog input modules shall be 4-20 mA and shall have a maximum of eight (8) isolated

differential channels per module. Common mode input protection of 30 volts DC minimum shall be provided. Input signal conversion shall be a minimum of 14-bit resolution.

b) Analog output modules shall be 4-20 mA and shall have a maximum of eight (8) isolated differential channels per module. Output load capability shall be 750 ohms minimum for each output. Accuracy shall be 0.1 percent of full-scale output span. Analog output modules shall be selectable on a point per point basis to either hold the last state or to return to zero upon reset or stop of the PLC.

c) Discrete input modules shall be 120 VAC and shall have a maximum of sixteen (16) circuits per module. Inputs shall be optically isolated (channel-to-channel) to protect bus circuits from transients and surges. Isolation resistance shall be 1000 ohms minimum at 300 VDC between any set of terminals and any other set or earth ground. Light emitting diodes shall be provided adjacent to each pair of output terminals for on status indication.

d) Discrete output modules shall be 120 VAC and shall have a maximum of sixteen (16) circuits per module. Outputs shall be optically isolated (channel-to-channel) to protect bus circuits from transients and surges. Light emitting diodes, one adjacent to each pair of input terminals shall be provided to indicate a closed contact, conducting transistor switch; a low positive logic level, AC line voltage on conditions.

8) I/O points shall be optically isolated and capable of withstanding low energy common mode transients of 1,500 volts peak.

5. I/O List

a. Please see schematic diagrams.

6. Communications Module

a. PLC system shall communicate with the Panel-View window and also through Ethernet communication.

b. The communications module shall provide real-time peer-to-peer communications as well as I/O scanning and a Modbus/TCP server.

c. The module shall include the following features:

d.

1) Communications to a data highway via an integrated 10/100BASE-TX, full duplex capable, shielded twisted pair port. The port shall be an RJ-45 receptacle for connection to a shielded, twisted pair Ethernet cable.

2) Communications to a data highway via an integrated 100BASE-FX multimode, full duplex capable, fiber-

optic port. The port shall be an MT-RJ receptacle for connection to a 100-megabit fiber-optic Ethernet cable.

3) The module shall include File Transfer Protocol (FTP) server and HyperText Transport Protocol (HTTP) server, which are available as soon as the module has received an IP address.
4)
5) The module shall include BOOTstrap protocol (BOOTP) software compliant with RFC 951 that is used to assign IP addresses to nodes or devices on an Ethernet network. The devices will use the assigned IP addresses for all communications occurring on the network.
6) The module shall be configured with Simple Network Management Protocol (SNMP), which is the standard protocol used to manage a local area network (LAN). It defines exactly how a manager communicates to an agent following the conventional client-server model.
7) The module shall be capable of peer-to-peer communication by transferring data to and from nodes on a TCP/IP network through the use of a special master instruction (MSTR) or by the addition of a Modbus I/O scanner, which can be configured by the development software.
8) The module shall be capable of accessing data from the controller using the standard Modbus/TCP protocol. The protocol shall allow any device such as a computer workstation, HMI package, another PLC or any Modbus/TCP compliant device to access data from the PLC.
9) The module shall be capable of supporting user configured Web Pages.
    a) The module shall include a multi-function diagnostic LED indicator panel on the front of the module.

7. Power Supply and Chassis

a. The I/O chassis shall provide for direct mounting of the CPU, power supplies, communication modules and I/O modules. The chassis shall be available for direct mounting in a 19-inch rack, flush or surface mounted. The I/O chassis shall have at least the number of I/O slots necessary to accommodate any mixture of CPUs, power supplies, communications modules or I/O modules. Modules shall be electrically isolated from each other (as a minimum 1,500VDC) allowing mixed voltages on the same I/O chassis. The chassis shall also allow for mounting both analog and digital I/O modules on the same I/O chassis. The chassis shall be capable of operating as either a CPU or expansion rack.

b. The power supply shall operate on 120 VAC, 60 Hz, single-phase to power the CPU, communication modules and I/O modules. Power supply shall include a fuse and fuse

holder, which is accessible without requiring the removal of the power supply from the chassis.

c. The CPU shall monitor the power supply status and voltage levels.

d. The power supply shall operate at the following:

1) 120 VAC rms +/- 15% continuously.
2) 120 VAC rms +/- 30% maximum for no more than 30 seconds.
3) 120 VAC rms +/- 100% maximum for no more than 17 milliseconds.
4) Line spikes at 100 VAC (5,000 microseconds duration), 0.5% maximum duty cycle.
5) A single main power supply shall power the CPU and local I/O modules. Auxiliary power supplies shall provide power to remote I/O racks.
6) At the time of power-up, the power supply shall inhibit operation of the processor and I/O modules until the DC voltages are within specifications.

B. Software

1. The SI shall provide as part of the PLC system, two software packages to allow off-line or on-line program development, annotating and monitoring on a PC-based computer operator workstation. The software shall support multiple industry standard IEC 1131-3 programming languages. As a minimum, ladder diagram, structured text and Sequential Function Chart (SFC) programming shall be provided.
2. The software packages shall include a software license agreement allowing the Owner the rights to utilize the software as required for any current or future modification, documentation or development of the PLC program.
3. The software shall provide as a minimum the following functions:
   a. Annotation of all ladder elements with at least 3 lines of 6 characters each.
   b. Annotation of all ladder rungs with at least 240 characters.
   c. Provide visual “power flow” monitoring of circuit elements (when connected to the PLC).
   d. Provide annotated ladder diagram printout on a standard computer printer for documentation purposes.
   e. On-line help facility.
   f. Download or upload program from the PLC to the computer workstation.
   g. Provide ladder element and I/O cross-reference table.
   h. Provide all monitoring, forcing, programming error detection, searching, configuration, etc. functions as required to allow an operator / programmer to completely program a PLC.
   i. The programming software shall allow the PLCs to be programmed, debugged and downloaded from a computer workstation over the Ethernet data highway.

PART 105 - EXECUTION

105.1 FACTORY ACCEPTANCE TEST (FAT)

A. Refer to Section 13460.

B. All PLC systems, sub-systems and communication networks shall be tested for proper operation and approved by the Engineer at the SI factory, or other selected site, prior to shipment to the Jobsite.

C. Tests shall demonstrate all specified control functions by simulating inputs and outputs to the panels, communication to and from the HMI systems, etc.

D. Acceptance of factory tests by Owner or Engineer shall not constitute a waiver or requirements to meet field tests under specified operating conditions, nor does inspection relieve the SI of his responsibility in any way.

END OF SECTION

PART 106 - GENERAL

106.1 SCOPE OF WORK

A. The General Provisions of Section 13460 shall apply to this section.

B. The PLC Manufacturer shall furnish all labor, materials, equipment and incidentals required to provide, complete and ready for operation, the programmable logic controllers (PLCs) as specified.

C. All work in this Section shall be the product of the System Integrator (SI). Sub-suppliers and/or manufacturers may provide components, and/or services to the SI, but the final product shall conform to this specification and shall be the sole responsibility of the SI.

106.2 RELATED WORK

A. Refer to Section 13460.

106.3 SYSTEM DESCRIPTION

A. Refer to Section 13460.

B. Each PLC system shall have an initial installed capacity of I/O as shown on the drawings and as described in the I/O List plus a minimum of 20 percent installed spares. All installed action and spare I/O points shall be wired and terminated to terminal strips. Each PLC system provided shall be sized for an additional 20 percent minimum I/O expansion slots within the panel that it is installed.

C. The following new PLC system shall be furnished as specified under this Section.

PLC-CP - Northeast Pump Station

106.4 SPARE PARTS AND TEST EQUIPMENT

A. Provide spare parts and test equipment as specified below.
   1. One complete PLC systems including the following:
      a. 16-slot Chassis.
      b. Power Supply.
      c. Central Processing Unit (CPU).
      d. Communications Module.
      e. I/O Cards: One of each type used.
      f.
   2. I/O cards: 10 percent of each type used, but no less than one of each type.

B. All spare parts shall be packed in a manner suitable for long-term storage and shall be adequately protected against corrosion, humidity and temperature.

C. Program Development Software

1. Provide two (2) licenses of the PLC program development software. It shall be the latest version of Control Logic from Allen Bradley.

PART 107 - PRODUCTS

107.1 PROGRAMMABLE LOGIC CONTROLLER (PLC)

A. Hardware

1. Major hardware components of the PLC system shall include:
   a. Central Processing Unit (CPU)
   b. Communications Equipment
   c. Input / Output Modules (I/O)
   d. Power Supply and Chassis
   e. Panel-View Monitor door mounted

2. General
   a. The PLCs shall communicate between the operator workstations and field-mounted instrumentation, controllers and process actuators. Communications protocol shall be completely transparent to plant operators in the Control Room. The PLC shall be an intelligent microprocessor based device that can collect data and process control functions. Communications between PLCs and the operator workstations shall utilize an Ethernet 802.3 compliant data highway. The protocol shall be Modbus/Ethernet.
   b. All components of the PLC system shall be normally recognized industry standards and regularly sold for industrial applications. The PLC manufacturer shall assemble all components of the PLC system in structurally sound housings. All connecting cables, switches and other operator-controlled devices shall be constructed so as to withstand, without damage, all normal use and handling.
   c. Electrical supply voltage to the PLC shall be 115 VAC +/- 15%, 48 – 63 Hz. PLC system power supplies shall be fused for overload protection.
   d. The PLC shall be capable of stand-alone operation in the event of failure of the communications link to the operator workstations.
   e. The PLC shall be a digital solid-state logic system capable of performing the same functions as conventional relays, timers, counters, math functions, controllers, etc.
   f. The PLC system shall be of modular plug-in design and shall consist of a CPU, memory, I/O cards, racks, power supplies, interconnecting cables, communication lines and other items as necessary to meet the functional requirements of the specification. All components of the PLC system shall be marketed and supported by one PLC manufacturer. All necessary cable shall be provided.
   g. All products shall be designed, manufactured and tested in accordance with recognized industrial standards. All

components shall have corrosion protection and shall have UL, CSA and FM approval. The PLC subsystems shall be approved for and adhere to the following agency and environmental specifications:

1) Vibration - 3.5 mm Peak-to-Peak, 5-9 Hz: 1.0G, 9-150 Hz. The methods of testing are to be based upon IEC 68-2-6 and JIS C 0911 standards for vibration. The system shall be operational during and after testing.
2) Shock – 15G, 11 msec. The method of testing is to be based upon IEC 68-2-27 and JIS C 0912 standards for shock. The system shall be operational during and after testing.
3) Temperature – All PLC hardware shall operate at an ambient temperature of 0 to 600 C, with an ambient temperature rating for storage of –40 to +850 C.
4) Relative Humidity – All PLC hardware shall function continuously in the relative humidity range of 5% to 95% with no condensation.
5) Noise Immunity – All PLC hardware shall be designed and tested to operate in a high electrical noise environment of an industrial plant as governed by the following regulations: EEE 472, IEC 801, MILSTD 461B, IEC 255-4, NEMA ICS 2-230.40 and ANSI/IEEE C-37.90A-1978.
6)

h. The PLC manufacturer shall provide operating instruction manuals with adequate information pertaining to the following:

1) System specifications
2) Electrical power requirements
3) Application considerations
4) Assembly and installation procedures
5) Power up procedures
6) Troubleshooting procedures
7) Programming procedures
8) Internal fault diagnostics
9) Shut down procedures
10) Recommended spare parts list

i. The PLC manufacturer shall utilize a network of field sales and support personnel located in major cities throughout the United States. It shall also utilize a field service department with experienced representatives stationed in major cities with the capability to provide telephone consultation, prompt on-site service and field replacement stock.

j. The PLC manufacturer shall provide product application assistance by trained and experienced engineers to assist the Owner with program and system development through telephone consultation and on-site checkout, debug and start-up assistance.

k. The PLC manufacturer shall have the capacity to conduct on-site training programs. It shall also have the capacity to

provide videotape-training courses for operation and maintenance of PLCs.

l. Modules are defined herein as devices, which plug into a chassis and are keyed to allow installation in only one direction. The design must prohibit upside down insertion of the modules as well as safeguard against the insertion of a module into a wrong slot.

m. In a single chassis system, all system and signal power to the CPU and support modules shall be distributed on a single motherboard or backplane. Interconnecting wiring between modules via plug-terminated jumpers shall not be acceptable.

n. All system modules on the main or expansion chassis shall be designed to provide for free air flow convection cooling. Heat sinks shall be used to dissipate component heat. Internal fans shall not be permitted.

o. The PLC manufacturer shall be regularly engaged in the manufacturing and servicing of PLCs and all corresponding components.

p. The PLC manufacturer shall have a fully operational quality assurance and control program in place and shall comply with ISO9001 standards for “Quality Systems – Model for Quality Assurance in Design, Development, Production, Installation and Servicing”.

q. The PLC manufacturer or it’s authorized representative shall provide complete technical support for all of its products including a “1-800” phone line.

r. All major assemblies and sub-assemblies, circuit boards, components and modules shall be identified using permanent labels or markers, each of which indicate the manufacturer’s catalog number and a product manufacturing date code.

s. The PLC system shall be Control Logic by Allen Bradley.

3. Central Processing Unit (CPU)

a. General

1) The CPU shall be as a minimum a 16-bit microprocessor that provides system timing and is responsible for scheduling I/O updates. It shall execute user-developed relay ladder logic programs, communicate with intelligent I/O modules and perform on-line diagnostics. The CPU shall consist of a single module, which solves application logic, stores the application program, stores numerical values related to the application processes and logic and interfaces to the I/O.

2) The CPU shall sample all the discrete and analog inputs and outputs including internal coils and registers and service special function modules on every scan. The CPU shall process the I/O with user programs stored in memory, then control the outputs based on the results of the logic operation. The CPU

shall execute the user program by rapidly scanning the program stored in user memory. Both logic and data word functions are executed in the order they appear in the user program. As each rung of logic is solved, the results shall be available to any following rungs. The CPU shall have an instruction to allow a decrease in scan time by skipping over parts of the program. The CPU shall allow the PLC program to be broken into ladder logic subroutines that execute only when called. The PLC shall allow analog and discrete points to be updated immediately within the scan as the analog or discrete value is called in the ladder logic program.

3) The CPU shall be a single printed circuit board utilizing surface mount technology. The CPU shall plug directly into the backplane and shall not require additional wiring to the backplane, power supply or the I/O.
4) The CPU shall support floating point without the need of a Co-processor.
5) The CPU shall be supplied with a battery-backed time of day clock and calendar.
6) The CPU family shall allow for user program transportability from one CPU model to another.
7)

b. Capacity
   1) The CPU I/O capacity shall be 8192 bits in and 8192 bits out minimum.
   2) The processing of a typical logic program consisting of a mix of analog and digital commands shall not exceed 1.4 milliseconds for 1,024 instructions.

c. Diagnostics
   1) The CPU shall perform on-line diagnostics that monitor the internal operation of the PLC. If a failure is detected, the CPU shall initiate system shutdown and fail-over if a failure occurs. The following at a minimum shall be monitored:

      a) Memory failure
      b) Memory battery low
      c) CPU over temperature and general fault
      d) Communications port failure
      e) Scan time over run
      f) I/O failure
      g) Analog or special function I/O module failure

   2) All diagnostic information shall be accessible at the programming terminal, which attaches at the CPU. A diagnostic CRT page shall provide information, which identifies the nature of the fault, the absolute memory or I/O address of the fault, and the date and time of occurrence of the fault.

3) All diagnostic information shall be accessible to the host communications interface.
4) All diagnostic information shall be accessible to the ladder program or other executing software.
5) The CPU shall have LED indicators to show status such as PLC Ready, PROGRAM RUN and BATTERY GOOD. If any of the above mentioned failure conditions occur, provide an internal PLC diagnostic alarm contact output. The CPU within the system shall perform internal diagnostic checking and give visual indication to the user by illuminating a “green” indicator when no fault is detected and a “red” indicator when a fault is detected.

d. Programming Environment
1) The CPU shall be capable of being programmed by an external computer workstation via either a serial communication port on the CPU, or via optional Ethernet communications. Serial programming shall be possible without the use of a workstation interface board. The CPU shall be capable of programming from the PanelView window mounted on the door.
2) The programming device shall have access to the application program, the system configuration, all registers, I/O, system fault status, I/O override and system diagnostic relays.
3) Application programs may be loaded or stored while the CPU is running with minimal impact on the scan time.
4) If contacts or entire rungs are intentionally deleted from an existing logic program, the remaining program shall be automatically repositioned to fill this void. Whenever contacts or entire rungs are intentionally inserted into an existing program, the original program shall automatically be repositioned to accommodate the enlarged program.
5) The number of times a normally open (N.O.) and/or normally closed (N.C.) contact of an internal output can be programmed shall be limited only by the memory capacity to store these instructions.
6) The CPU shall support multiple industry standard IEC 1131-3 programming languages. As a minimum, ladder diagram, structured text and Sequential Function Chart (SFC) programming shall be provided. All hardware and software necessary to program the CPU in a mode other than standard ladder logic shall be supplied.

e. Memory
1) The CPU shall contain the CMOS RAM program memory. The memory shall a battery backup system capable of retaining all memory for a minimum of three months under load and shall require no external or special vents. The backup battery shall be capable

of being replaced without interruption of memory integrity.

2) A visual indication of backup battery status shall be provided. In the event of low battery voltage, a visual indication and a low battery output alarm contact (for remote alarm) actuation shall be provided before battery failure.
3) The program memory shall be sized as required to implement the functions specified plus a minimum of 10 words (16 bit) for each I/O provided as spare, but not less than 48K bytes. The entire program memory shall be available for user program storage. Scratch pad or "housekeeping" programs shall not be counted in memory size rating.
4) The PLC CPU memory shall consist of the following functional types of memory:

    a) Ladder logic program memory
    b) Constant data memory
    c) Variable data memory
    d) Input / output memory
    e) CPU status data memory
    f) I/O word memory
    g) User memory for compiled programs

5) Various memory combinations up to the maximum limits shall be software configurable between logic and data storage to more closely match the application requirements.

f. Instruction Set
    1) The PLC CPU shall be capable of performing the same functions as a conventional relay logic system, including relays, timers, counters and shift registers. The CPU shall also be capable or performing high-level instructions including data word functions such as:

        a) Four-Function Math: The CPU shall be capable of performing addition, subtraction, multiplication and division on integer numbers.
        b) Compare Function: The CPU shall perform the compare function that compares two integers for less than, equal to, greater than and not equal to. The programming function shall energize when true and de-energize when false.
        c) Square Root Function: The CPU shall be capable of taking the square root of a positive integer.
        d) Move Function: The CPU shall be able to move an integer value from one memory location to another memory location.

e) Other data word capabilities shall include data file compare with pointer, file (block) move, word rotate, bit set, pick and clear.

2) The PLC CPU shall perform all the functions of the conventional three-mode (PID) analog controller. The CPU shall be able to process up to 64 PID loops with the processing time of each controller selectable. Each PID loop shall incorporate an anti-windup algorithm on reset.

3) The system shall have the capability to address software timers and software counters in any combination and quantity up to the limit of available memory. The CPU shall handle all management of these instructions into memory. Instructions shall permit programming timers in the “ON” or “OFF” delay modes. Timer programming shall also include the capability to interrupt timing without resetting the timers. Counters shall be programmable using up-increment and down-increment.

4) Timer instructions shall include selectable time bases in increments of 1.0 second and 10 milliseconds. The timing range of each timer shall be from 0 to 32,767 increments as a minimum. It shall be possible to program and display separately the timer’s preset and accumulated values.

5) When using modules such as analog where multiple channels are terminated on one module, it shall be possible to transfer the current status of all channels to the CPU upon execution of one program instruction. This instruction shall be bi-directional to include data transfer from the CPU to the module or from the module to the CPU.

6) Instructions shall be provided for grouping contiguous 16 bit data words into a file. The system shall address up to 1,000 files with up to 1,000 words per file. File manipulation instructions such as high speed “file copy” and “file fill”, “file to file” move, “element to file” move, “file to element” move and “first in-first out” shall be supported by the system. The four function math instructions and instructions for performing “logical OR”, “logical AND”, “exclusive OR” and comparison instructions such as “less than”, “greater than” and “equal to” shall be included within the system. All instructions shall execute on either single word or files.

7) The system shall contain instructions, which will construct asynchronous and synchronous 16-bit word shift registers. Additional instructions shall be provided to construct synchronous bit shift registers.

8) The PLC shall have a jump instruction, which will allow the programmer to jump over portions of the user program to a portion marked by a matching label instruction.

9) It shall be a function of the CPU to automatically manage all data types.
10) In applications requiring repeatable logic runs it shall be possible to place such rungs in a subroutine section. Instructions, which call the subroutine and return to the main program, shall be included within the system. It shall be possible to program several subroutines and define each subroutine by a unique program file designator. The processor shall support nesting of subroutines up to seven levels deep. The program format as displayed on the CRT shall clearly define the main program and all subroutines. It shall be possible to pass selected values (parameters) to a subroutine before its execution.
11) The program format shall display all instructions on a CRT programming panel with appropriate mnemonics to define all data entered by the programmer. The system shall be capable of providing a “HELP” instruction, which when called by the programmer will display on the CRT a list of instructions and all data and keystrokes required to enter an instruction into the system memory.
12) The system shall have the capability to enter rung comments above ladder logic rungs. These comments may be entered at the same time the ladder logic is entered.
13) The system shall have the capability to enter address comments and symbols. These entities may be entered at the same time the ladder logic is entered.
14) A means to program a fault recovery routine shall exist. When a major system fault occurs in the system, the fault recovery routine shall be executed and then the system shall determine if the fault has been eliminated. If the fault is eliminated, program execution resumes. If the fault still exists, the system will shut down. A user shall have the option to either resume operation or to shut down upon fault detection.
15) An interrupt routine shall be programmable such that the routine shall be executed regularly. The interval at which the routine is executed shall be user-specified in the range of 1 to 65,535 milliseconds.
16) The CPU shall support indexed and indirect addressing of inputs and outputs, along with all data table words (integer, binary, floating point, timers and counters) for the software instruction set.
17) Trigonometric instructions supported must include Sine, Cosine, Tangent, Inverse Sine, Inverse Cosine, and Inverse Tangent. These instructions must fully support floating-point math.
18) Additional floating point instructions supported must include Log 10, Natural Log and Exponential.

19) It shall be possible to complete complex, combined calculations in a single instruction, such as flow totalizing or equations of the format ((A+((B-C)*D))/E).
20) File function instructions supported shall also include Sort, Average, Square Root and Standard Deviation.
21) The processor instruction set shall provide support for a variety of ASCII string manipulation instructions such as search, concentration, extraction, compare and to/from integer conversion.
22) The processor shall support ladder functions providing ASCII port control such as read, write, handshake line control, buffer examination, etc.
23) An interrupt routine shall be programmable such that the routines shall be executed based upon the input condition of one of sixteen discrete hardware inputs in the processor chassis. The routine will be executed within two milliseconds of the detection of the input signal.
24) It shall be possible to divide user logic into multiple program blocks (structured programming).

g. Communication Ports and Remote I/O (RIO) Communications.
1) The CPU shall have at least three built-in communication ports for programming, operator interface and remote I/O operations.
2) The CPU shall be capable of communicating with up to 31 remote base locations at a combined distance of 15000 feet. The CPU shall automatically sample and update all local and remote I/O modules every scan cycle of the CPU.
3) The communication link between the CPU and any RIO chassis shall be via coaxial cable as recommended by the PLC manufacturer. RIO Communications speeds shall not be diminished with increased cable length.
4) Diagnostic and equipment status information shall be available from each RIO.
5) The remote I/O system shall have available a remote input/output arrangement capable of operation at locations physically separated from the PLC CPU by up to15,000 feet.

4. Input / Output Modules (I/O)
a. General

1) The I/O count and type has been determined by the Engineer in conjunction with the Owner and includes an allowance for active spares as noted below.
2) Each I/O system per location shall include 20 percent (minimum of 4 for each type) active input and output points (both DI, DO, AI and AO) for future use. The spares shall be the same type of I/O module as the

active I/O modules and shall be wired down to the terminal strip.

3) Minimum isolation between input/output and logic voltage shall be 2,500v RMS per NEMA standards via opto-isolation.
4) All outputs shall have field replaceable fuse protection and blown fuse indicators.
5) I/O modules shall be plug-in mounted to the I/O mounting bases. I/O modules shall be designed to allow insertion at any point on the mounting base.
6) Field wiring terminal blocks shall be pull a part type if mounted on the I/O modules or mounted on the I/O mounting base to allow I/O module replacement without disconnecting of the field wiring. All field wiring terminal blocks shall be 300V minimum NEMA rated and accommodate no less than two (2) #14 gauge wires.
7) I/O modules shall comply with the following schedule unless noted otherwise:
8)
    a) Analog input modules shall be 4-20 mA and shall have a maximum of eight (8) isolated differential channels per module. Common mode input protection of 30 volts DC minimum shall be provided. Input signal conversion shall be a minimum of 14-bit resolution.
    b) Analog output modules shall be 4-20 mA and shall have a maximum of eight (8) isolated differential channels per module. Output load capability shall be 750 ohms minimum for each output. Accuracy shall be 0.1 percent of full-scale output span. Analog output modules shall be selectable on a point per point basis to either hold the last state or to return to zero upon reset or stop of the PLC.
    c) Discrete input modules shall be 120 VAC and shall have a maximum of sixteen (16) circuits per module. Inputs shall be optically isolated (channel-to-channel) to protect bus circuits from transients and surges. Isolation resistance shall be 1000 ohms minimum at 300 VDC between any set of terminals and any other set or earth ground. Light emitting diodes shall be provided adjacent to each pair of output terminals for on status indication.
    d) Discrete output modules shall be 120 VAC and shall have a maximum of sixteen (16) circuits per module. Outputs shall be optically isolated (channel-to-channel) to protect bus circuits from transients and surges. Light emitting diodes, one adjacent to each pair of input terminals shall be provided to indicate a closed contact, conducting transistor switch; a low

positive logic level, AC line voltage on conditions.

9) I/O points shall be optically isolated and capable of withstanding low energy common mode transients of 1,500 volts peak.

5. I/O List

a. Please see schematic diagrams.

6. Communications Module

a. PLC system shall communicate with the Panel-View window and also through Ethernet communication.
b. The communications module shall provide real-time peer-to-peer communications as well as I/O scanning and a Modbus/TCP server.
c. The module shall include the following features:

1) Communications to a data highway via an integrated 10/100BASE-TX, full duplex capable, shielded twisted pair port. The port shall be an RJ-45 receptacle for connection to a shielded, twisted pair Ethernet cable.
2) Communications to a data highway via an integrated 100BASE-FX multimode, full duplex capable, fiber-optic port. The port shall be an MT-RJ receptacle for connection to a 100-megabit fiber-optic Ethernet cable.
3) The module shall include File Transfer Protocol (FTP) server and HyperText Transport Protocol (HTTP) server, which are available as soon as the module has received an IP address.
4)
5) The module shall include BOOTstrap protocol (BOOTP) software compliant with RFC 951 that is used to assign IP addresses to nodes or devices on an Ethernet network. The devices will use the assigned IP addresses for all communications occurring on the network.
6) The module shall be configured with Simple Network Management Protocol (SNMP), which is the standard protocol used to manage a local area network (LAN). It defines exactly how a manager communicates to an agent following the conventional client-server model.
7) The module shall be capable of peer-to-peer communication by transferring data to and from nodes on a TCP/IP network through the use of a special master instruction (MSTR) or by the addition of a Modbus I/O scanner, which can be configured by the development software.
8) The module shall be capable of accessing data from the controller using the standard Modbus/TCP protocol. The protocol shall allow any device such as

a computer workstation, HMI package, another PLC or any Modbus/TCP compliant device to access data from the PLC.

9) The module shall be capable of supporting user configured Web Pages.
   a) The module shall include a multi-function diagnostic LED indicator panel on the front of the module.

7. Power Supply and Chassis

a. The I/O chassis shall provide for direct mounting of the CPU, power supplies, communication modules and I/O modules. The chassis shall be available for direct mounting in a 19-inch rack, flush or surface mounted. The I/O chassis shall have at least the number of I/O slots necessary to accommodate any mixture of CPUs, power supplies, communications modules or I/O modules. Modules shall be electrically isolated from each other (as a minimum 1,500VDC) allowing mixed voltages on the same I/O chassis. The chassis shall also allow for mounting both analog and digital I/O modules on the same I/O chassis. The chassis shall be capable of operating as either a CPU or expansion rack.

b. The power supply shall operate on 120 VAC, 60 Hz, single-phase to power the CPU, communication modules and I/O modules. Power supply shall include a fuse and fuse holder, which is accessible without requiring the removal of the power supply from the chassis.

c. The CPU shall monitor the power supply status and voltage levels.

d. The power supply shall operate at the following:

1) 120 VAC rms +/- 15% continuously.
2) 120 VAC rms +/- 30% maximum for no more than 30 seconds.
3) 120 VAC rms +/- 100% maximum for no more than 17 milliseconds.
4) Line spikes at 100 VAC (5,000 microseconds duration), 0.5% maximum duty cycle.
5) A single main power supply shall power the CPU and local I/O modules. Auxiliary power supplies shall provide power to remote I/O racks.
6) At the time of power-up, the power supply shall inhibit operation of the processor and I/O modules until the DC voltages are within specifications.

B. Software

1. The SI shall provide as part of the PLC system, two software packages to allow off-line or on-line program development, annotating and monitoring on a PC-based computer operator workstation. The software shall support multiple industry standard IEC 1131-3 programming languages. As a minimum, ladder

diagram, structured text and Sequential Function Chart (SFC) programming shall be provided.

2. The software packages shall include a software license agreement allowing the Owner the rights to utilize the software as required for any current or future modification, documentation or development of the PLC program.
3. The software shall provide as a minimum the following functions:

    a. Annotation of all ladder elements with at least 3 lines of 6 characters each.
    b. Annotation of all ladder rungs with at least 240 characters.
    c. Provide visual “power flow” monitoring of circuit elements (when connected to the PLC).
    d. Provide annotated ladder diagram printout on a standard computer printer for documentation purposes.
    e. On-line help facility.
    f. Download or upload program from the PLC to the computer workstation.
    g. Provide ladder element and I/O cross-reference table.
    h. Provide all monitoring, forcing, programming error detection, searching, configuration, etc. functions as required to allow an operator / programmer to completely program a PLC.
    i. The programming software shall allow the PLCs to be programmed, debugged and downloaded from a computer workstation over the Ethernet data highway.

PART 108 - EXECUTION

108.1 FACTORY ACCEPTANCE TEST (FAT)

A. Refer to Section 13460.

B. All PLC systems, sub-systems and communication networks shall be tested for proper operation and approved by the Engineer at the SI factory, or other selected site, prior to shipment to the Jobsite.

C. Tests shall demonstrate all specified control functions by simulating inputs and outputs to the panels, communication to and from the HMI systems, etc.

D. Acceptance of factory tests by Owner or Engineer shall not constitute a waiver or requirements to meet field tests under specified operating conditions, nor does inspection relieve the SI of his responsibility in any way.

END OF SECTION

GENERAL

108.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

108.3 SUMMARY

A. This Section includes requirements for submersible wastewater pumps. Pump types included in this section are:
   1. Dry pit.

B. Unit Responsibility:
   1. The work requires that the equipment specified herein shall be complete with all accessories and appurtenances, and shall be the end product of one responsible system manufacturer or responsible system supplier.
   2. The Contractor shall obtain each system from the responsible supplier of the equipment. The Supplier shall furnish all components and accessories of the system to enhance compatibility, ease of operation and maintenance, and as necessary to place the equipment in operation in conformance with the specified performance, features, and functions.
   3. The Contractor is responsible for ensuring that new equipment is fully compatible with existing equipment and that the entire facility is fully functional.

C. Related Sections include the following:
   1. Division 01 Section "Closeout Procedures" for warranty submission requirements.
   2. Division 01 Section "Project Record Documents" for post construction requirements.
   3. Division 26 Electrical sections for electrical requirements.
   4. Division 40 Process Integration sections for instrumentation equipment.

108.4 DEFINITIONS / STANDARDS

A. Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:
   1. Hydraulic Institute (HI)
   2. National Sanitation Foundation (NSF).
   3. American Society of Mechanical Engineers (ASME).
   4. National Electrical Manufacturers' Association (NEMA).
   5. Underwriters Laboratories (UL).
   6. National Electrical Code (NEC).

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.

108.5 SUBMITTALS

A. Product Data: Complete engineering data including, but not limited to, descriptive data, material specifications, pump performance curves, mass moment of inertia calculations for the impeller, motor performance data, piping

diagrams, and wiring diagrams. Differentiate between manufacturer-installed and field installed wiring.

B. Characteristic pump performance curves: Submit to the Engineer for approval prior to beginning fabrication of the pumping units.

C. Certified pump performance curves: Submit to the Engineer for approval prior to shipping the units.

D. Characteristic and certified performance curves shall depict, at a minimum, the following information:
1. Head (Ft.) vs. Capacity (GPM).
2. Pump Speed (RPM).
3. Impeller diameter (In.)
4. Diameter (In.) of largest spherical solid that can be passed.
5. Area (Sq. In.) of the eye of the impeller.
6. Clearly marked operating points.
7. Power requirements (HP).
8. Shut-off head (Ft.).
9. Kilowatt (kW) usage at design conditions.
10. Net positive suction head (NPSH) requirements.
11. Efficiency (%) at design conditions.
12. Combined weight of pump & motor.

E. Shop Drawings:
1. Complete layout and connection drawings for pumping systems, including plan, elevation, sections, and details. Include setting drawings with templates, directions for installing foundation and anchor bolts, and other anchorages.
2. Control panel schematics and layout drawings.
3. Descriptive literature and catalog cut sheets.
4. The Contractor shall, in writing, call to the Engineer's attention any deviations that the submittal has from the requirements of the Contract Drawings and Specifications.

F. Operation and Maintenance Data: Provide O&M manuals for pumps as specified in Division 01 and in “Operation and Maintenance Manuals” article of this specification.

G. Manufacturer’s Certification: Provide a certification by a qualified representative of the pumping system manufacturer that the equipment is installed properly, operating within the design parameters, and will be warranted as specified herein. Certification shall be based on a detailed inspection of the installation following the successful start-up of the systems.

108.6 QUALITY ASSURANCE

A. All pumps shall be of approved design and products of manufacturers who have built equipment of similar type, size, and capacity.

B. The supplier shall furnish a completely automated, operable pumping system, including submersible pumps and motors, submersible power and monitoring cables, pump discharge elbows, pump guide rail systems, control systems and all appurtenances and accessories as shown on the Drawings and specified hereinafter.

C. When a pressure transducer style pump control system is provided, an emergency back-up float system shall also be provided.

D. The Contractor shall provide all labor, materials, equipment, and method of installation necessary to complete the work.

E. The work shall be complete with installation of pumps, electrical work, connecting piping, and appurtenances, as shown on the Drawings and specified hereinafter.

F. Telemetry system connection is required as part of the work, provisions shall be made for connection to the existing telemetry system.

G. Product Options: Drawings indicate size, profiles, connections, and dimensional requirements of pumps and are based on specific manufacturer type and model indicated.

H. Additional Submittals: The Contractor shall submit, upon request, any additional information that the Engineer may deem necessary to determine the ability of the proposed manufacturer to produce the specified equipment.

I. Pump Performance Testing:
1. Notify Engineer at least 30 days prior to date scheduled for performance tests.
2. Perform certification tests on the actual assembled pumps to be supplied.
3. Perform factory tests on each pumping unit in the manufacturer's facility and in accordance with applicable standards of the Hydraulic Institute to demonstrate compliance with specified requirements.
4. Certification tests shall be performed over an operating range from shut-off head to a minimum of 20 percent beyond the specified design performance capacity. Certification tests shall be conducted on each pump being supplied.
5. A pump curve shall be generated showing actual flow, head, BHP, and hydraulic efficiency for each pump being supplied.
6. A registered Professional Engineer shall certify each pump curve.
7. Engineer to witness all pump performance tests.

J. Materials, pumps and installation shall comply with federal, state and local code requirements, including any requirements of authorities having jurisdiction.

K. Verify that specified equipment does not exceed space allocation, and provide the manufacturer Plans as necessary.

L. Replacement Parts Capability: Pump station components shall be the products of manufacturers who can produce evidence of their ability to promptly furnish any and all interchangeable replacement parts as may be needed at any time within the expected life of the components.
1. Upon request, the Contractor shall submit full details of the proposed component manufacturer's ability to promptly fill replacement orders.

M. Manufacturer Information: All manufacturer information required by the specifications shall be submitted by the Contractor within thirty (30) calendar days of the date of receipt of the Notice to Proceed.
1. Any additional information or data, specifically requested by the Engineer, concerning manufacturer's capabilities (especially relating to requirements described hereinbefore), shall be submitted by the Contractor within fourteen (14) calendar days of the receipt of the written request therefore, unless otherwise specified.

2. Approval of manufacturers will not be given until all information required by the specifications or requested by the Engineer has been submitted and acceptable.

N. Disqualification of Manufacturer:
1. Failure to successfully comply with the provisions of this paragraph will constitute grounds for disqualification of the pump manufacturer.
2. Poor performance of similar pumps in operation under the specified conditions of service, constitute grounds for disqualification of the pump/pump station manufacturer unless such poor performance has been corrected.

O. Experience:
1. The pump(s) shall be the product of a recognized manufacturer whose personnel have been regularly engaged in the design and manufacturing of such equipment. The manufacturer must be able to demonstrate experience with the design, fabrication, supply and successful operation of pumps of similar size and capacity. The manufacturer/supplier shall demonstrate upon the request of the engineer that:
2. They maintain a reasonable stock of spare parts for this equipment.
3. They employ sufficient qualified technical personnel to insure adequate servicing and operational control advice covering hydraulic, mechanical, and electrical optimization of pump station procedures and practices.

P. Alternate Manufacturers:
1. The Drawings and Specifications use Fairbanks Morse as the "basis of design equipment". Additional acceptable pump manufacturers include ITT Flygt and Morris Pumps. This is not intended to restrict competition or rule out comparable competitive alternate pumps that may have certain superior or inferior features not affecting the basic operation of the equipment, but is for the purpose of establishing the desired standard of quality and features.
2. The Engineer will not provide new Drawings for construction showing alternate pumps. Manufacturers of alternate pumps shall provide revised Drawings to the Contractor. The revised Drawings will be amendments to the Construction Documents and will become part of the Contract Documents. Change Orders will not be issued to pay the cost of the changes necessary for use of an alternate pump. Contract time will not be increased for the use of an alternate pump.

108.7 DELIVERY, STORAGE, AND HANDLING

A. Retain shipping flange protective covers and protective coatings during storage.

B. Protect bearings and couplings against damage.

C. Comply with pump manufacturer's rigging instructions for handling.

108.8 WARRANTIES AND BONDS

A. Provide a warranty against defective or deficient materials and workmanship in accordance with the requirements of Division 01.

B. The equipment manufacturer warranty shall be against defective or deficient equipment, workmanship and materials under normal use, operation and service. The warranty shall end five years from the date of Substantial Completion. The warranty shall be in printed form and apply to all similar units.

PART 109 - PRODUCTS

109.1 GENERAL

A. Supports and Thrust Blocks: All pipes connected to the pump station shall be supported to prevent piping loads from being transmitted to the pumps. Pump station discharge force main piping shall be anchored with thrust blocks and supports where shown on the Contract Drawings.

B. Pipe, Fittings, and Valves: All inside (pumping station and valve vault) piping shall be flanged ductile iron with threaded flanges in accordance with ANSI A21.15, latest revision, or seamless schedule 40 carbon steel with malleable iron fittings. All piping shall be rated for a minimum of 150 psi and shall have ring gaskets, 1/8 inch thick. Ductile iron pipe and fittings shall be in accordance with Division 33 Section "Ductile Iron Pipe and Fittings".
   1. Check valves shall be provided on the discharge line between the pumps and plug valves as shown on the Drawings.
   2. Check valves shall be wafer type, bronze fitted, have external arms to facilitate draining/back flushing of lines, and shall be as supplied by the pump station manufacturer. The valve clapper shall swing completely clear of the waterway when the valve is open permitting a "full flow" thru the valve equal to nominal pipe diameter.

C. Running Time Meters: A running time meter shall be supplied for each pump to show the number of hours of operation. The meter shall be enclosed in a dust and moisture-proof molded plastic case. The flush mounted dial shall register in hours and tenths of hours up to 99999.9 hours before repeating. The meter shall be suitable for operation on 120V AC supply.

D. Gauges: Each sewage pump shall be equipped with 4-inch indicating gauges to be mounted in the discharge line between the pump and the check valve. The gauges shall have graduated scale reading from 0 to 250 feet. The gauges shall be provided with cutoff cocks and brass pipe connections. Gauges shall have C510 Grade A phosphor bronze bourdon tubes with silver bronzed brass tipped, black and white luminated phenol dials, micrometer adjustment of pointers shall be liquid filled, and shall be diaphragm sealed. They shall be the first grade of the manufacturer, and shall be Ashcroft "Dura-Gauge Type 1379", or approved equal.

109.2 PUMP CRITERIA

A. Provide complete pumping units designed to comply with the following pump criteria:

1.	Duty Point:		1750 GPM @ 20’ TDH
2.	Maximum Pump Speed:		1200 RPM
3.	Maximum Motor Horsepower:		15 HP
4.	Minimum Shut-off Head:		35 Feet
5.	NPSH Required at Duty Point:	Max	12 Feet
6.	Minimum Pump Efficiency at Duty Point:		70%
7.	Minimum Impeller Eye Diameter:		4 Inches
8.	Cooling Jacket:		Yes
9.	Number of Pumps Required:		2

B. Duty point shall fall within 70% to 120% of the pump Best Efficiency Point capacity.

109.3 SUBMERSIBLE WASTEWATER PUMPS, GENERAL

A. Description: Factory-assembled and -tested, heavy-duty, centrifugal dry pit units, close-coupled (as applicable) with submersible electric motors, capable of pumping raw, unscreened sewage and wastewater, fully guaranteed for the application, and constructed for permanent installation.

B. The entire pumping system, including the pump, motor and power cable, shall be approved for use in areas classified as hazardous locations in accordance with the NEC Class 1, Div. 1, Group C and D service as determined and approved by a U.S. nationally recognized testing laboratory (e.g. U.L., FM, CSA) at the time of the bidding of the project. As required by Factory Mutual (FM) the motor shall be capable of operating in pumped media up to 104 degrees Fahrenheit. Motor thermal switches shall monitor and protect the motor from excessive temperature.

C. Pumps shall operate at specific speeds below the “Upper Limits of Specific Speeds” established by the Hydraulic Institute to minimize the potential for cavitation.

D. Pumping system components shall not contain asbestos.

109.4 PUMPING SYSTEM DESIGN

A. Submersible power cable shall be of adequate length to accommodate the pumping system installation as shown on the Drawings, sized according to NEC and ICEA standards, P-MSHA approved.

B. Each pump shall be provided with adequate length of lifting chain or stainless steel cable. The capacity of the lifting system shall be a minimum of 50 percent greater than the combined weight of the pump and motor assembly.

C. Power and pilot cable supports shall be provided and shall consist of a wire braid sleeve with attachment loops or tails to connect to the under side of the access frame.

D. Manufacturer's Preparation for Shipping: Clean flanges and exposed machined metal surfaces and treat with anticorrosion compound after assembling and testing. Protect flanges, pipe openings, and nozzles with wooden flange covers or with screwed-in plugs.

109.5 PUMPING SYSTEM CONSTRUCTION

A. Pumps:
1. Major pump components, including pump casing, impeller, intermediate housing, and motor housing, shall be of gray cast iron, ASTM A-48, Class 30 or Class 35B, with smooth surfaces devoid of blow holes or other casting irregularities.
2. All exposed nuts or bolts shall be ASTM A-276 Type 316 stainless steel.
3. All metal surfaces coming into contact with the pumped media, other than stainless steel, shall be protected by a factory applied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish on the exterior of the pump.
4. Sealing design shall incorporate metal-to-metal contact between machined surfaces. Pump/motor unit mating surfaces shall be machined and fitted with Nitrile or Viton rubber O-rings. Joint sealing will be the result of controlled compression of rubber O-rings in two planes and O-ring contact on four sides without the requirement of a specific bolt torque limit. Rectangular cross-sectioned rubber, paper or synthetic gaskets that require specific torque limits to achieve compression shall not be

considered adequate or equivalent to specified requirements. Secondary sealing compounds, elliptical O-rings, grease or other devices are unacceptable.

B. Cooling System:
1. Each pump/motor unit shall be provided with an integral, self-supplying cooling system.
2. The motor water jacket shall encircle the stator housing and shall be made of cast iron, ASTM A-48, Class 35B.
3. The water jacket shall provide heat dissipation for the motor regardless of whether the motor unit is submerged in the pumped media or surrounded by air.
4. Impeller back vanes shall provide the necessary circulation of the cooling liquid through the cooling system. Two cooling liquid supply pipes, one discharging low and one discharging high within the jacket, shall supply the cooling liquid to the jacket. An air evacuation tube shall be provided to facilitate air removal from within the jacket. Any piping internal to the cooling system shall be shielded from the cooling media flow allowing for unobstructed circular flow within the jacket about the stator housing. Two cooling liquid return ports shall be provided. The internals to the cooling system shall be non-clogging by virtue of their dimensions. Drilled and threaded provisions for external cooling and seal flushing or air relief are to be provided. The cooling jacket shall be equipped with two flanged, gasketed and bolted inspection ports of not less than four inches in diameter located 180 degrees apart. Provisions for external cooling and seal flushing shall also be provided. The cooling system shall provide for continuous submerged or completely non-submerged pump operation in liquid or in air having a temperature of up to 40 degrees Celsius (104 degrees Fahrenheit), in accordance with NEMA standards. Restrictions limiting the ambient or liquid temperatures to less than 40 degrees Celsius are unacceptable.

C. Cable and Cable Entry Seal:
1. The power cable shall be suitable for submersible pump and motor applications and sized according to NEC and ICEA standards.
2. The power cable provided shall be of sufficient length to extend from the pumping unit to the terminal junction box without being spliced and shall include enough slack to allow it to be routed and secured out of the way of any equipment in the dry well. It shall be the Contractor's responsibility to ensure that the cable provided by the system supplier is of adequate length to comply with the specified requirements.
3. The outer jacket of the power cable shall be oil resistant chloroprene rubber.
4. The cable seal design shall preclude specific torque requirements to insure a watertight and submersible seal. The cable entry shall consist of dual cylindrical elastomer grommets, flanked by Type 316 stainless steel washers, all having a close tolerance fit against the cable outside diameter and the cable entry inside diameter. The grommets shall be compressed by the cable entry unit, thus providing a strain relief function. The assembly shall provide ease of changing the cable when necessary using the same entry seal. The cable entry junction chamber and motor shall be sealed from each other, which shall isolate the stator housing from foreign material gaining access through the pump top. Epoxies, silicones, or other secondary sealing systems are unacceptable.

D. Motor:
1. The motor shall be suitable for 460-volt, 60 Hertz, 3-phase electric power. Motor horsepower shall be as specified in this Section.

2. The pump motor shall a NEMA B (3 phase) design, induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber. The stator windings shall be insulated with moisture resistant Class H insulation rated for 180 degrees Celsius (356 degrees Fahrenheit). The stator insulated by the trickle impregnation method using Class H monomer-free polyester resin resulting in a winding fill factor of at least 95 percent. The motor shall be inverter duty rated. Inverter duty rated motors shall be in accordance with NEMA MG1, Part 31. The stator shall be heat-shrink fitted into the cast iron stator housing. The use of multiple step dip and bake-type stator insulation process is unacceptable. The use of bolts, pins or other fastening devices requiring penetration of the stator housing is unacceptable. The motor shall be specifically designed for submersible pump usage and designed for continuous duty pumping media of up to 40 degrees Celsius (104 degrees Fahrenheit) with an 80 degrees Celsius temperature rise and capable of at least 15 evenly spaced starts per hour. The rotor bars and short circuit rings shall be made of cast aluminum. Thermal switches shall be embedded in the stator end coils to monitor the temperature of each phase winding. The thermal switches shall be used in conjunction and supplemental to external motor overload protection and shall be connected to the control panel. The junction chamber shall be sealed off from the stator housing and shall contain a terminal board for connection of power and pilot sensor cables using threaded compression type terminals. The use of wire nuts or crimp-type connectors is unacceptable. The same manufacturer shall produce the motor and the pump.
3. The combined service factor (combined effect of voltage, frequency and specific gravity) shall be a minimum of 1.15. The motor shall have a voltage tolerance of plus or minus 10 percent. A performance chart shall be provided in the submittal showing curves for torque, current, power factor, input/output kW, efficiency, and data on starting and no-load characteristics.
4. The motor and cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet.
5. The motor horsepower shall be adequate so that the pump is non-overloading throughout the entire pump performance curve from shut-off through run-out.

E. Pilot Cable:
1. The pilot cable shall be designed specifically for use with submersible pumps and shall be type SUBCAB (Submersible Cable). The cable shall be shielded, multi-conductor type with a chloroprene outer jacket and the tinned copper conductors insulated with ethylene-propylene rubber. The conductors shall be arranged in twisted pairs. The cable shall be rated for 600 volts and 90 degrees Celsius (194 degrees Fahrenheit) with a 40 degrees Celsius (104 degrees Fahrenheit) ambient temperature and shall be approved by Factory Mutual (FM). The cable length shall be adequate to reach the junction box without the need for splices.

F. Bearings:
1. The pump shaft shall rotate on at least 2 grease-lubricated bearings. The upper bearing, provided for radial forces, shall be a single roller bearing. The lower bearing shall consist of at least one roller bearing for radial forces and one or two angular contact ball bearings for axial thrust.
2. The minimum L10 bearing life shall be 100,000 hours at any point along the usable portion of the pump curve at maximum product speed.

G. Mechanical Seal:

1. Each pump shall be provided with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The lower seal shall be independent of the impeller hub. The seals shall operate in a lubricant reservoir that hydrodynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary and one positively driven rotating corrosion resistant tungsten-carbide seal ring. The upper, secondary seal unit, located between the lubricant chamber and the motor housing, shall contain one stationary and one positively driven rotating corrosion resistant tungsten-carbide seal ring. Each seal interface shall be held in contact by its own spring system. The seals shall require neither maintenance nor adjustment and shall be capable of operating in either clockwise or counter clockwise direction of rotation without damage or loss of seal.
2. Should both seals fail and allow fluid to enter the stator housing, a port shall be provided to direct that fluid immediately to the stator float switch to shut down the pump and activate an alarm. In the event of fluid intrusion, fluid shall not come into contact with the lower bearings.
3. The following seal types are not considered acceptable equivalents or alternates to the dual independent seal specified: (a) shaft seals without positively driven rotating members, and (b) conventional double mechanical seals containing either a common single or double spring acting between the upper and lower seal faces. Systems requiring a pressure differential to offset pressure and to affect sealing shall not be used.
4. Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and to provide lubricant expansion capacity. The drain and inspection plug, with positive anti-leak seal shall be easily accessible from the outside. The seal system shall not rely upon the pumped media for lubrication. The motor shall be able to operate continuously while non-submerged without damage while pumping under load.
5. Seal lubricant shall be FDA approved and non-toxic.

H. Pump Shaft:
1. Pump and motor shaft shall be a solid, continuous shaft. The pump shaft shall be an extension of the motor shaft. Couplings shall not be acceptable. The pump shaft shall be of stainless steel and shall be completely isolated from the pumped liquid.

I. Impeller
1. Impellers shall be of gray cast iron, Class 35B, dynamically balanced, multiple vaned, double shrouded non-clogging design having long throughlets without acute turns. The impellers shall be capable of handling solids, fibrous materials, heavy sludge and other matter found in wastewater. Impellers shall be keyed to the shaft, retained with an expansion ring and shall be capable of passing a minimum four inch diameter solid. All impellers shall be coated with an acrylic dispersion zinc phosphate primer.

J. Wear Rings:
1. A wear ring system shall be incorporated into the pump design to provide efficient sealing between the volute and suction inlet of the impeller. Each pump shall be equipped with a Nitrile rubber coated steel or brass ring insert that is drive fitted to the volute inlet.
2. This pump shall also have a stainless steel impeller wear ring heat-shrink fitted onto the suction inlet of the impeller.

K. Volute:
1. Pump volutes shall be single-piece gray cast iron, ASTM Class 30 or Class 35B, non-concentric design with smooth passages large enough to pass any solids that may enter the impeller. Minimum inlet and discharge size shall be as shown on the Plans.

L. Protection:
1. All stators shall incorporate thermal switches in series to monitor the temperature of each phase winding. Should high temperature occur, the thermal switches shall open, stop the motor and activate an alarm.
2. A lower bearing temperature sensor shall be provided. The sensor shall directly contact the outer race of the thrust bearing providing for accurate temperature monitoring.
3. A leakage sensor shall be provided to detect water in the stator chamber. The Float Leakage Sensor (FLS), a small float switch, shall be used to detect the presence of water in the stator chamber. When activated, the FLS will stop the motor and activate an alarm. Use of voltage sensitive solid state sensors shall not be allowed.
4. The thermal switches, FLS and the lower bearing temperature monitor shall be connected to a CAS (Control and Status) monitoring unit. The CAS design shall be such to allow it to be mounted in the control panel.

M. Spare Parts: Provide the following spare parts for each pump unit:
1. One (1) O-ring kit.
2. One (1) Upper Mechanical Seal.
3. One (1) Lower Mechanical Seal.
4. One (1) Upper Bearing.
5. Two (2) Lower Bearings.
6. One (1) Volute Wear Ring.
7. One (1) Impeller Wear Ring.

N. Painting: The pump shall be painted after assembly and testing, with a water reducible air dry enamel. The paint shall be applied in one coat covering all exterior surfaces. The pump shall be air dried after testing and before painting.

FACCESSORIES

O. Chain Holder: Chain holder shall be Type 316 stainless steel and of the size recommended by the pumping system manufacturer.

P. Anchor Bolts:
1. Anchor bolts shall be Type 316 stainless steel. Pump manufacturer shall provide the size and layout dimensions for all anchor bolts for railings, pump supports, pumps, and accessories.

PART 110 - EXECUTION

EXAMINATION

A. Examine pumping system installation areas, equipment foundations, and conditions with Installer present to verify compliance with requirements for installation and other conditions affecting installation and performance of pumping systems before beginning pump installation.

B. Examine rough-in for piping systems to verify actual locations of piping connections prior to installation.

INSTALLATION

C. Install pumping systems and accessories in accordance with manufacturer's written installation and alignment instructions and shop drawings.

D. Support piping such that pumps do not support weight of piping.

CONNECTIONS

E. Install pressure gages on the discharge pipe of each pump.

F. Install electrical connections for power, controls, and instrumentation devices. Electrical power components, wiring, and connections are specified in Division 16 Sections. Control and instrumentation devices are specified elsewhere in this Section.

G. Ground Equipment:
1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

ADJUSTING

H. Pump Controls: Set pump controls for automatic start, stop, and alarm operation as required for system application.

COMMISSIONING

I. Final Checks before Starting: Perform all preventive maintenance operations and checks before start-up in strict conformance with manufacturer’s written instructions.

J. Starting Procedure: Perform start-up for each pumping unit in strict conformance with the manufacturer’s written instructions and in the presence of the Owner and Engineer. Provide manufacturer’s certification of installation and operation as specified.

K. Factory Service
1. The equipment manufacturer shall provide factory service for installation inspection, equipment start-up, and operator training. Length of service shall be as required to fully train the Owner’s personnel in the operation and maintenance of the equipment.
2. At any time within six months of the date of start-up, provide, at Owner’s request and at no additional cost, the services of equipment manufacturer’s representative(s) on the site for a period not to exceed two days.

OPERATION AND MAINTENANCE MANUALS

L. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing initial testing. Engineer will comment on whether general scope and content of manual are acceptable.

M. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing initial testing. Engineer will return copy with comments.

N. Correct or revise each manual to comply with Engineer's comments. Submit copies of each corrected manual within 15 days of receipt of Engineers comments and prior to commencing initial testing.

O. Furnish, prior to substantial completion, eight copies of final maintenance manuals. All corrections shall have been made necessary to comply with Engineer's comments in the final manuals. Final manuals shall be indexed and composed of suppliers' maintenance manuals on all equipment and suppliers' brochures on all specialty equipment, including performance curves with size, model, figure number, etc., indicated to identify unit furnished.

P. Maintenance manuals are to be of a hardback, loose-leaf type and of a durable quality. In addition, a complete electronic copy shall be provided in MS-Word or searchable Adobe PDF format.

Q. Manuals are to be for the specific equipment provided. Manuals describing general equipment lines will not be accepted. Where non-relevant information is present in the manual, it shall be neatly marked out with a single "X" through non-relevant portions.

R. Include in each set of manuals the following:
1. Manufacturer's parts list identified with the make, model and serial number of the equipment furnished.
2. Control and wiring diagrams.
3. Installation, operation (including start up and shut down procedures), lubrication and maintenance instructions.
4. Manufacturers recommended spare parts list.

S. If an Owner's representative is assigned to the project either through the Owner or the Engineer, the Contractor shall make a copy of all instruction manuals available to the Representative. Manuals on specific items shall be available prior to installation of the item. This requirement in no way relieves the Contractor of his other responsibilities.

END OF SECTION