PROPOSAL
CONTRACT DOCUMENTS AND SPECIFICATIONS

FOR CONSTRUCTING
UPGRADES TO THE
ETOWAH RAW WATER PUMP STATION

CITY OF ROME WATER SYSTEM
ROME, GEORGIA

ROME CITY COMMISSION

Jamie Doss – Mayor
Milton O. Slack III – Mayor Pro-Tem
Bill Collins – Commissioner
Wendy Davis – Commissioner
Bill Irmscher – Commissioner
Sue Lee – Commissioner
Craig McDaniel - Commissioner
Evie McNiece – Commissioner
Sundai Stevenson – Commissioner

Sammy Rich – City Manager
Patrick Eidson – Assistant City Manager
Mike Hackett – Water & Sewer Division Director

OWNER

City of Rome Water & Sewer Division
100 Vaughn Road
Rome, Georgia 30162
706-236-4560

E361

ISSUED FOR PERMIT: 1/15/2016
ISSUED FOR BID: 2/18/2016

Southern Engineering & Surveying, Inc.
201 Broad Street, Suite 300
Rome, Georgia 30165
office:(706)235-4143
fax:(706)235-4191
WWW.SouthernEandS.com

TABLE OF CONTENTS

	Page No.
NOTICE OF LETTING OF CONTRACT AND INVITATION FOR BIDS FOR CONSTRUCTING UPGRADES TO THE ETOWAH RAW WATER PUMP STATION FOR THE CITY OF ROME WATER SYSTEM	A-1 - A-3
INFORMATION FOR BIDDERS	IB-1 - IB-6
BID DOCUMENTS (All items must be properly executed and submitted with bid)	
1. Proposal	P-1 – P-4
2. Bid Bond	
3. Performance Bond	
4. Payment Bond	
5. Non-Collusion Affidavit	
6. Certificate of Non-Discrimination	
7. Bidder's Declaration	
8. E-Verify Compliance Affidavit	
9. SAVE Compliance Affidavit	
10. Prompt Pat Act Affidavit	
11. W-9 Form	
12. Drug Free Workplace Certification	
13. DBE/MBE Contractor and Material Supplier Form	
14. Local Contractor Form	
15. Local Material Supplier Form	
AGREEMENT	
STANDARD GENERAL CONDITIONS	
NOTICE OF AWARD	
NOTICE TO PROCEED	
CONTRACT CHANGE ORDER	
SUPPLEMENTAL GENERAL CONDITIONS (SPECIAL CONDITIONS)	
1. Contract Documents	SGC-1
2. Tools, Plant and Equipment	SGC-1
3. Inspection and Testing of Materials	SGC-1
4. Inspection and Resident Project Representative	SGC-1

TABLE OF CONTENTS

Continued

		Page No.
5.	Extras	SGC-5
6.	Time for Completion and Liquidated Damages	SGC-5
7.	Payments and Completion	SGC-6
8.	Bonds and Insurance	SGC-6
9.	Copies of Documents	SGC-7
10.	Equal Employment Opportunity	SGC-7
11.	"Anti-Kickback Act"	SGC-7
12.	Safety and Health Regulations	SGC-7
13.	Table of Contents	SGC-8
14.	Siltation	SGC-8
15.	Use and Disposal of Chemicals	SGC-8
16.	"Or Equal" Clause	SGC-8
17.	Contractor's Availability	SGC-8
18.	Modification of Quantities	SGC-9
19.	Broken Mains	SGC-9
20.	D.O.T. Specifications	SGC-9
21.	Water Service Interruption	SGC-9
22.	Work on or Near Highway	SGC-9
23.	Errors and Discrepancies	SGC-10
24.	Accidents	SGC-10
25.	Shanties	SGC-10
26.	Guarantee	SGC-10
27.	Civil Rights	SGC-11
28.	Use and Possession Prior to Completion	SGC-11
29.	Payment	SGC-11
30.	Disturbed Areas	SGC-11
31.	Engineer's Authority	SGC-11
32.	Right of Entry	SGC-11
33.	Shop and Setting Drawings	SGC-11
34.	Order of Work	SGC-12
35.	Litigations	SGC-12
36.	Coordination of Plans and Specifications	SGC-12
37.	Policy and Procedure for Accommodation of Utilities	SGC-13
38.	Utility Licensure Requirements	SGC-13
39.	Erosion and Sediment Control	SGC-13
40.	Compliance with Highway Requirements	SGC-13

TABLE OF CONTENTS

DETAILED SPECIFICATIONS		Page No.
SECTION 1 - QUALITY CONTROL OF MATERIALS		
1-01	Source of Supply	1-1
1-02	Samples and Tests	1-1
1-03	Payment	1-3
SECTION 2 - WATERLINES AND APPURTENANCES		
2-01	Scope	2-1
2-02	Excavation, Trenching and Backfilling	2-1
2-03	Select Bedding	2-3
2-04	Crushed Stone Backfill	2-3
2-05	Materials	2-4
2-06	Installation of Piping	2-8
2-07	Setting Valves	2-10
2-08	Reaction Blocking, (if Required and Authorized)	2-10
2-09	Testing	2-10
2-10	Sterilization of Completed Line	2-11
2-11	Connection to Existing Mains	2-11
2-12	State Highway Encroachments	2-12
2-13	Cut, Plug and Abandon Existing Main	2-12
2-14	Service Taps	2-12
2-15	Reset Meters and Meter Boxes	2-12
2-16	New Ball Valve Setting	2-13
2-17	New Fire Hydrants	2-13
2-18	Paved Roads or Driveways Bored in Place without Casing	2-13
2-19	Cutting and Replacing Pavement and Other Special Surfaces	2-13
2-20	Restoration of Disturbed Items and Surfaces	2-15
2-21	Clearing, Grubbing and Grassing	2-15
2-22	Cleanup	2-15
2-23	Exploratory Excavation	2-16
2-24	Salvage Existing Fire Hydrants	2-16
2-25	Replace Storm Drains (if Required)	2-16
2-26	Large Stone Riprap	2-16
2-27	Payment	2-16
Table 6 Allowable Leakage		2-17

TABLE OF CONTENTS

SECTION 3 – CLEARING AND GRUBBING		Page No.
3-01	Scope	3-1
3-02	Site Conditions	3-1
3-03	Protection of Existing Facilities	3-1
3-04	Equipment	3-1
3-05	Staking	3-1
3-06	Clearing	3-1
3-07	Grubbing	3-2
3-08	Disposal of Material	3-2
3-09	Measurement and Payment	3-2

SECTION 4 – EXCAVATION AND EMBANKMENT		
4-01	Scope and Definitions	4-1
4-02	Site Conditions	4-1
4-03	Benchmarks	4-1
4-04	Protection	4-1
4-05	Preparation	4-1
4-06	Excavation	4-2
4-07	Disposal of Materials	4-2
4-08	Embankment	4-2
4-09	Preparation and Compaction	4-3
4-10	Preparation and Protection of Subgrade	4-3
4-11	Slopes	4-4
4-12	Grading Tolerances	4-4
4-13	Yard Fills and Backfilling Around Structures	4-4
4-14	Measurement and Payment	4-4

SECTION 5 – BASE AND PAVEMENT		
5-01	Scope	5-1
5-02	Coordination with Other Construction	5-1
5-03	Protection of Existing Facilities	5-1
5-04	Materials and Methods	5-1
5-05	Preparation of Subgrade	5-2
5-06	Graded Aggregate Base	5-2
5-07	Prime and Tack Coat	5-2
5-08	Surface Course – Asphalt	5-2
5-09	Surface Course – Fibered Reinforced Concrete	5-3
5-10	Measurement and Payment	5-3

TABLE OF CONTENTS

Page No.

SECTION 6 – PUMP HOUSE CONSTRUCTION

6-01 Scope
6-02 Payment

DOCUMENTS

Metal Panels
Cold Formed Metal Framing
Composite Floor Deck
Non-Composite Floor Deck
Roof Deck
Building Insulation
Schedule of Special Inspections
Statement of Special Inspections
Statement of SI Requirements for Seismic Resistance
Statement of SI Requirements for Wind Resistance
Final Report of Special Inspections

SECTION 7 – CONCRETE WORK, REINFORCING STEEL, STRUCTURAL STEEL AND MISCELLANEOUS METAL

7-01	Scope	7-1
7-02	Concrete	7-1
7-03	Testing Laboratory Services	7-3
7-04	Forms	7-4
7-05	Depositing Concrete	7-5
7-06	Finishing and Curing Slabs	7-6
7-07	Wall Finishing	7-6
7-08	Built in Connections, Sleeves, Etc.	7-6
7-09	Walks	7-6
7-10	Construction Joints	7-6
7-11	References for Steel Construction	7-7
7-12	Shop Drawings for Reinforcing Steel and Other Fabricated Metal	7-7
7-13	Reinforcing Steel	7-8
7-14	Structural Steel Shapes, Plates, Etc.	7-9
7-15	Aluminum	7-11
7-16	Iron Castings	7-11
7-17	Payment	7-12
7-18	Aluminum Stairs, Railing and Grating	7-13

TABLE OF CONTENTS

Page No.

SECTION 8 – PUMP STATION AND CONTROLS

8-01	Scope	8-1
8-02	Clearing, Excavation, Filling and Grading	8-1
8-03	Pump House	8-3
8-04	Pump House Appurtenances	8-3
8-05	Etowah Raw Water Pump Station Pumps	8-5
8-06	Etowah Raw Water Pump Station Motors	8-8
8-07	Installation	8-11
8-08	Piping Syatems	8-12
8-09	Bronze Plaque	8-14
8-10	Painting	8-14
8-11	Mechanical Equipment	8-19
8-12	Fencing	8-21
8-13	Payment	8-22

SECTION 9 – ELECTRICAL WORK AND CONTROL EQUIPMENT

9-01	General	9-1
9-02	Standards and Codes	9-1
9-03	Materials	9-1
9-04	Drawings	9-2
9-05	Cooperation and Coordination	9-2
9-06	Raceways and Enclosures	9-2
9-07	Conductors and Conductor Installation	9-3
9-08	Grounding	9-4
9-09	Pump House	9-4
9-10	SCADA Equipment System	9-5
9-11	Nameplates and Identification	9-6
9-12	Testing	9-6
9-13	As-Built Drawings	9-6
9-14	Approval Drawings	9-6
9-15	Payment	9-7

SECTION 10 – VARIABLE FREQUENCY DRIVES

CITY OF ROME GEORGIA
PUBLIC NOTICE
INVITATION FOR BIDS
BID 007-16
FOR CONSTRUCTING
UPGRADES TO THE ETOWAH RAW WATER PUMP STATION
FOR THE CITY OF ROME, GEORGIA WATER DEPARTMENT

To Whom It May Concern:

Notice is hereby given that The City of Rome, Georgia proposes to let a Contract to the lowest responsible bidder, upon sealed proposals, for the furnishing of all labor, material, equipment and other things necessary for the constructing Upgrades to The Etowah Raw Water Pump Station for the City of Rome, Georgia Water System.

Sealed proposals will be received until 2:00 p.m. (local time), on March 17, 2016 in the office of The City of Rome Purchasing Department: P.O. Box 1433, 601 Broad Street, Rome, Georgia. Sealed bids will then and there be publicly opened and read aloud in the Purchasing Department Conference Room.

The City of Rome Georgia will hold a Pre-Bid meeting to discuss components of the proposed project and provide access to the project site. The meeting will take place at 2:00 p.m. on Thursday, March 3, 2016 in the Conference Room of the City of Rome Water and Sewer Division located at 100 Vaughn Road, Rome, Georgia 30161.

The work is to be let in one contract, and shall conform in all respects to the Specifications of Southern Engineering & Surveying, Inc., Rome, Georgia which are made out and posted conspicuously in the office of the City of Rome Purchasing Department, which is also the office of the undersigned, and said specifications, general conditions and drawings, are open to the inspection of the public.

The extent and character of the work to be done in general, consists of the construction of and supplying the following approximate quantities:

CONTRACT NO. 1
CONSTRUCT UPGRADES TO THE ETOWAH RAW WATER PUMP STATION

Construct Upgrades to the existing pump station complete including elevated pump house, pumping equipment, hoisting equipment, controls and Scada system, modify meter pit, valves and piping including connections to existing pipelines, final grading, concrete paving, fencing, plus associated work items, all as drawn and specified.

Bidders must comply with all applicable Local state and Federal Guidelines including President's Executive Order Nos. 11246 and 11375,Title VI of the Civil Rights Act of 1964, the Anti-Kickback Act and others.

Bidders will make positive efforts to use small and minority owned businesses as well as, locally owned businesses and subcontractors.

All above as more specifically shown by the plans and specifications of the Engineer as aforesaid. Reference is made to the specifications in the City of Rome Purchasing Department, for a more particular description of the work. Said work shall begin upon the written order of the city of Rome Board of Commissioners, after the formal execution of the contract.

Request for payment for said work will be made through the City of Rome not later than the fifteenth (15) day of each calendar month. The Owner shall make a progress payment to the contractor on the basis of a duly certified and approved estimate of the work performed during the preceding calendar month under this Contract; but to insure the proper performance of this Contract, the owner shall retain ten percent (10%) of the amount of each estimate of all work covered by this Contract.

Provided further, that on completion and acceptance of each separate building, public work or other division of the Contract on which the price is stated separately in the Contract, payment may be made in full including retained percentages thereon, less authorized deductions. In preparing estimates of material delivered on the site, preparatory work done may be taken into consideration, and upon the final completion and acceptance of all work covered by the Contract and the filing of a certificate of completion and approval thereof by the Engineers as aforesaid--- all retained sums will be paid.

The Information for Bidders, Form of Bid, Form of Contract, Plans, Specifications, and Forms of Bid Bond, Performance Bond, and other Contract Documents may be examined at the following:

Southern Engineering & Surveying Inc., Rome, Georgia
City of Rome Purchasing Department, 601 Broad Street, Rome, Georgia

Complete sets of contract documents, construction specifications and drawings may be obtained at the office of Southern Engineering & Surveying, 201 Broad Street, Suite 300, Rome, Georgia 30161, upon non-refundable payment of **$100.00** per set.

The Contract, if awarded, will be on a unit price and lump sum basis. No bid may be withdrawn for a period of sixty (60) days after time has been called on the date of opening. **Bids must be accompanied by a Bid Bond in an amount of not less than five percent (5%) of the base bid. All bonds must be signed or countersigned by a Georgia Resident Agent.**

A faithful Performance Bond in the amount of one hundred percent (100%) of the amount of the bid, and a Labor Materials Payment Bond in the amount of not less than the amount of said Bid, one hundred percent (100%) as provided by Georgia Code Section 23-1704 and 23-1705, shall be furnished by the successful bidders.

The right is reserved to the City of Rome Georgia to delay the award of the contract for a period not to exceed sixty (60) days from the date of the opening of bids, during which time bids shall remain open and subject to withdrawal. The right is also reserved to the City of Rome to reject any and all bids and to waive any and all technicalities or informalities. Any contract executed pursuant to this notice shall be binding upon the City of Rome, such as, but will not create liability expressed or implied against any member of the City of Rome, the City Manager, or any officer or employee of the City of Rome, in his or her individual capacity.

The City of Rome Georgia

By: William P. Gilliland

Public Notice 126
February 19, 26, March 3, 10
Water and Sewer

INFORMATION FOR BIDDERS

1. Receipt and Opening of Bids

The City of Rome, Georgia, (herein called the "Owner"), invites bids on the form attached hereto, all blanks of which must be appropriately filled in. The Owner will receive bids at the office of The City of Rome Purchasing Department: P.O. Box 1433, 601 Broad Street, Rome, Georgia until 2:00 p.m. (local time), March 17, 2016. Bids will then and there be publicly opened and read aloud in the Purchasing Department Conference Room. The envelopes containing the bids must be sealed, addressed to the City of Rome Purchasing Department, P. O. Box 1433, 601 Broad Street, Rome, Georgia 30162-1433, and designated as Bid for the UPGRADES TO THE ETOWAH RAW WATER PUMP STATION.

The utility contractor license number of the person who will perform the utility work must be written on the face of the bid envelope.

The Owner may consider informal any bid not prepared and submitted in accordance with the provisions hereof and may waive any informality or reject any and all bids. Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered. No Bidder may withdraw a bid within sixty(60) days after the actual date of the opening thereof.

2. Pre-Bid Meeting

The City of Rome Water Department will hold a Pre-Bid meeting to discuss components of the proposed project and provide access to the project site. This meeting will take place at **2:00 p.m. on Thursday March 3, 2016** in the Conference Room of the City of Rome Water and Sewer Division located at 100 Vaughn Road, Rome, Georgia 30161. A visit to the project site will follow.

3. Preparation of Bid

Each bid must be submitted on the prescribed form. All blank spaces for bid prices must be filled in, with ink or typewritten.

Each bid must be submitted in a sealed envelope bearing on the outside the name of the Bidder, his address, and the name of the project for which the bid is submitted. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed as specified in the bid form.

For utility construction projects, the utility construction license number of the person who will perform the utility work must be written on the face of the bid envelope.

4. Subcontracts

The Bidder is specifically advised that any person, firm or other party to whom it is proposed to award a subcontract under this contract must be acceptable to the Owner and the Engineer.

The successful Bidder will be required to furnish a full time qualified superintendent on the job who is empowered to act in all matters on behalf of the subcontractor.

5. Electronic Modification

Any Bidder may modify his bid in writing by e-mail or fax at any time prior to the scheduled closing time for receipt of bids, provided such electronic communication is received by the Owner prior to the closing time, and, provided further, the Owner is satisfied that a written confirmation of the electronic modification over the signature of the Bidder was mailed prior to the closing time. The electronic communication should not reveal the bid price but should provide the addition or subtraction or other modification so that the Owner will not know the final prices or terms until the sealed bid is opened. If written confirmation is not received within 48 hours from the closing time, no consideration will be given to the electronic modification.

6. Method of Bidding

The Owner invites the following bids:

CONTRACT NO. 1 – UPGRADES TO THE ETOWAH RAW WATER PUMP STATION

7. Qualification of Bidder

The Owner may make such investigations as he deems necessary to determine the ability of the Bidder to perform the work, and the Bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein. Conditional bids will not be accepted.

8. Bid Security

Each bid must be accompanied by cash, certified check of the Bidders, or a bid bond prepared on the form of bid bond attached hereto, duly executed by the Bidder as principal and having as surety thereon a surety company approved by the Owner, in the amount of five percent (5%) of the bid. Such cash, checks or bid bonds will be returned to all except the three lowest Bidders within three days after the opening of bids, and the remaining cash, checks, or bid bonds will be returned promptly after the Owner and the accepted Bidder have executed the Contract, or, if no award has been made within sixty days after the date of the opening of bids, upon demand of the Bidder at any time thereafter, so long as he has not been notified of the acceptance of his bid. Bid Bonds must be signed or countersigned by a Georgia Resident Agent.

9. Liquidated Damages for Failure to Enter into Contract

The successful Bidder, upon his failure or refusal to execute and deliver the contract and bonds required within ten days after he has received notice of the acceptance of his bid, shall forfeit to the Owner, as liquidated damages for such failure or refusal, the security deposited with his bid.

10. Time of Completion and Liquidated Damages

The Bidder hereby agrees to commence work on or before a date to be specified in a written "Notice to Proceed" of the Owner and to fully complete the work within the following consecutive calendar days from said date:

CONTRACT NO. 1 – 180 DAYS

The Bidder further agrees to pay as liquidated damages the sum of $100.00 for each consecutive day thereafter for each contract. The parties understand and agree that a determination of the damages, which could be incurred by the Owner, is difficult to measure and that the amount of damages is fixed and agreed upon by the parties, not as a penalty, but as an amount which reflects the probable and foreseeable damages due to late performance by the Bidder. Payment of such damages shall not constitute a limitation or waiver of any rights or remedies of the Owner.

11. Conditions of Work

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

12. Addenda and Interpretations

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

All addenda and additional information will be posted on line at www.romefloyd.com and it is the responsibility of interested parties to visit the site regularly to insure the receipt of any and or new information that may be posted.

All questions should be submitted via e-mail simultaneously to Bill Gilliland at bgilliland@romega.us and Chuck Hardin at chardinses@bellsouth.net. All questions and answer will be posted on our website.

Questions and answers not submitted in writing will be considered general commentary and not to serve as addenda nor as an official response.

Failure of any Bidder to receive any such addendum or interpretation shall not relive such Bidder from any obligation under his bid as submitted. All addenda so issued shall become part of the contract documents.

13. General Bond Requirements

Bids must be accompanied by a Bid Bond in an amount of not less than five percent (5%) of the base bid.

A faithful Performance Bond in the amount of one hundred percent (100%) of the amount of the bid, and a Labor Material Payment Bond in the amount of not less than the amount of said bid, one hundred percent (100%), shall be furnished by the successful Bidder. All bonds must be signed or countersigned by a Georgia Resident Agent.

14. Power of Attorney

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

15. Notice of Special Conditions

Attention is particularly called to those parts of the contract documents and specifications, which deal with the following:

(a) Inspection and testing of materials

(b) Insurance requirements

16. Laws and Regulations

The Bidder's attention is directed to the fact that all applicable State laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout, and they will be deemed to be included in the contract the same as though herein written out in full.

The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction promulgated under Occupational and Health Act of 1970 (PL 91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL 91-54). It is required that the Contractor and all Sub-Contractors comply with the requirements as set forth.

Utility work 5 feet or more underground, which cost over $100,000, must be performed by a Georgia licensed Utility Contractor. A certified foreman holding a state certificate must be present at the utility job site.

17. Method of Award – Lowest Qualified Bidder

If at the time this contract is to be awarded, the lowest bid schedule submitted by a responsible Bidder does not exceed the amount of funds then estimated by the Owner as available to finance the contract, the contract will be awarded to the lowest qualified Bidder.

If such bids exceed such amount, the Owner may take one of the following actions, at his discretion:

(a) All bids will be rejected, and project re-bid at a later date.

(b) The funds available may be augmented in an amount sufficient to enable award to the lowest resulting net bid.

18. Obligation of Bidder

At the time of the opening of bids each Bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the plans and contract documents (including all addenda). The failure or omission of any Bidder to examine any form, instrument or document shall in no way relieve any Bidder from any obligation in respect of his bid.

19. Non-Discrimination and Non-Segregation

Bidders must comply with the President's Executive Orders No. 11246 and 11375, which prohibit discrimination in employment regarding race, creed, color, sex, or national origin.

Bidders must certify that they do not, and will not, maintain or provide for their employees any facilities that are segregated on a basis of race, color, creed or national origin.

20. Erosion and Sediment Control

The Bidder should familiarize himself with the State of Georgia Rules and Regulations, Best Management Practices, and Paragraph 39 of the Supplemental General Conditions (Special Conditions), as they relate to erosion and sediment control that will be required during this project.

PROPOSAL

BID FOR UNIT PRICE CONTRACT

Place: _____

Date: _____

Proposal of _____ (hereinafter called "Bidder") *a corporation, organized and existing under the laws of the State of _____; *a partnership; or *an individual doing business as _____, to the City of Rome, Georgia (hereinafter called "Owner").

The Bidder, in compliance with your invitation for bids for the constructing Upgrades to The Etowah Raw Water Pump Station for The City of Rome Water & Sewer Division, having examined the plans and specifications with related documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials, and supplies, and to construct the project in accordance with the contract documents, within the time set forth therein, and at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the contract documents, of which this proposal will become a part.

_____

*Insert corporation, partnership, or individual as applicable.

CONTRACT NO. 1

UPGRADES TO THE ETOWAH RAW WATER PUMP STATION

Item No.	Description	Unit	Approx. Quantity	Unit Price	Amount
1.	Construct Upgrades to the Etowah Raw Water Pump Station complete including pump house, catwalks, pumps, motors, hoisting equipment, controls and Scada system, meter pit modifications, valves and piping including new 24" manifold and connections to existing pipelines, final grading, silt fences, concrete paving, and fencing, plus associated work items, all as drawn and specified.	L.F.	Job	_____	_____
	(Additional Items if Required)				
2.	Additional Type "B" Silt Fence, (if Required)	L.F.	100	_____	_____
3.	Additional Type "C' Silt Fence, (if Required)	L.F.	100	_____	_____
4.	Additional Crushed Stone Backfill (if Required)	Tons	15	_____	_____
5.	Additional Reinforced Concrete Including Forms (if Required)	C.Y.	15	_____	_____
6.	Additional 24" D.I. Pipe (if Required)	L.F.	20	_____	_____
7.	Additional 14" D.I. Pipe (if Required)	L.F.	20	_____	_____

CONTRACT NO. 1

UPGRADES TO THE ETOWAH RAW WATER PUMP STATION

Item No.	Description	Unit	Approx. Quantity	Unit Price	Amount
8.	Additional 14" Butterfly Valve and Box (if Required)	Ea.	1	_____	_____
9.	Additional 14" Gate Valve and Box (if Required)	Ea.	1	_____	_____
10.	Additional D.I. Compact Bodied M.J. Fittings with Megalug Restrained Joint Glands (if Required)	Ton	0.1	_____	_____
11.	Additional Restrained Joints Field Lok Gaskets, (if Required) by U.S. Pipe, or Equal, in Lieu of Regular Push-On Joint Gaskets				
	a. 24" Gasket	Ea.	1	_____	_____
	b. 14" Gasket	Ea.	1	_____	_____

TOTAL BID CONTRACT NO. 1 $ _____

NOTES:

1) Megalug restrained joint glands are manufactured by EBBA Iron, Inc.

2) Field Lok Gaskets by U.S. Pipe or equal shall be used on all push-on joints (except plugged ends) within 50 feet of a mechanical joint restrained gland (megalug restrained joint).

THE OWNER RESERVES THE RIGHT TO DEDUCT FROM OR ADD TO ANY PART OF THE CONTRACT AT THE UNIT PRICES GIVEN IN THE PROPOSAL.

The above prices shall include all labor, materials, overhead, profit, insurance, etc. to cover the finished work of the several kinds called for.

Bidder understands that the Owner reserves the right to reject any or all bids and to waive any informality in the bidding.

The Bidder hereby agrees to commence work under this contract on a date to be specified in written "NOTICE TO PROCEED" of the Owner and to fully complete the work within **180** consecutive calendar days for Contract No. 1 from said date.

The Bidder further agrees to pay liquidated damages in the amount of $100.00 for each consecutive calendar day thereafter, as hereinafter provided in the General Conditions.

The Bidder agrees that this bid shall be good and may not be withdrawn for a period of 60 calendar days after the scheduled closing time for receiving bids.

Upon receipt of written notice of the acceptance of this bid, Bidder will execute the formal contract attached within 10 days and deliver a Surety Bond or Bonds, as required by the General Conditions. The bid surety attached in the sum of _____ $ _____ is to become the property of the Owner in the event the Contract and Bond are not executed within the time above set forth, as liquidated damages for the delay and additional expense to the Owner caused thereby.

Respectfully submitted:

(SEAL – if bid is by a corporation)

By: _____

_____
(Title)

_____

_____

_____

_____
(Address)

BID BOND

KNOWN ALL MEN BY THESE PRESENTS that we, the undersigned, _____, as Principal, and _____, as Surety, are hereby held and firmly bound unto _____ as **OWNER** in the penal sum of _____ for the payment which, well and truly to be made, we hereby jointly and severally bind successors, assigns and ourselves. Signed, this _____ day of _____, 20___. The condition of the above obligation is such that whereas the Principal has submitted to _____ a certain **BID** attached hereto and hereby made a part hereof to enter into a contract in writing for the *UPGRADES TO THE ETOWAH RAW WATER PUMP STATION, ROME, GEORGIA.*

NOW, THEREFORE,

(a) If said **BID** shall be rejected, or

(b) If said **BID** shall be accepted and the principal shall execute and deliver a contract in the form of Contract attached hereto (properly completed in accordance with said **BID**) and shall furnish **BOND** for faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said **BID**, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, herby stipulates and agrees that the obligations of said Surety and its **BOND** shall be in no way impaired or affected by any extension of the time within which the **OWNER** may accept such **BID**; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____(L.S.)
Principal

_____
Surety

By:_____

IMPORTANT: Surety companies executing **BONDS** must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

PERFORMANCE BOND

KNOWN ALL MEN BY THESE PRESENTS: that

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____, hereinafter called Principal, and
(Corporation, Partnership or Individual)

_____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto_____

_____

_____

hereinafter called **OWNER**, in the penal sum of _____ _____dollars, ($_____) in lawful money of the United States, for the payment of which sum will and truly be made; we bind ourselves, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the **OWNER**, dated the _____ day of _____, 20___, a copy of which is hereto attached and made a part hereof for the construction of the *UPGRADES TO THE ETOWAH RAW WATER PUMP STATION, ROME, GEORGIA.*

NOW THEREFORE, if the Principal shall well, truly and faithful perform its duties, all the undertakings, covenants, terms, conditions and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the **OWNER**, with or without notice to the Surety and during the one year guaranty period, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the **OWNER** from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse

and repay the **OWNER** all outlay and expense which the **OWNER** may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDE, FURTHER, that the said surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to **WORK** to be performed thereunder or the **SPECIFICATIONS** accompanying the same shall in any wise affect its obligation on this **BOND**, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the **WORK** or to the **SPECIFICATIONS.**

PROVIDED, FURTHER, that no final settlement between the **OWNER** and the **CONTRACTOR** shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20_____.

ATTEST:

_____
Principal

_____
(Principal) Secretary

BY:_____

(SEAL)

_____
Witness as to Principal

_____
Address

_____
Address

_____

_____
Surety

ATTEST:

E361

_____

(Surety) Secretary

(SEAL)

_____ BY:_____

Witness to Principal Attorney-in-Fact

_____ _____

Address Address

_____ _____

NOTE: Date of **BOND** must not be prior to date of Contract. If **CONTRACTOR** is Partnership, all partners should execute **BOND.**

IMPORTANT: Surety companies executing **BONDS** must appear on the Treasury Department's most current list (Circular 570 amended) and be authorized to transact business in the state where the **PROJECT** is located.

PAYMENT BOND

KNOWN ALL MEN BY THESE PRESENTS: that

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____, hereinafter called Principal, and
(Corporation, Partnership or Individual)

_____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto_____

_____

_____

hereinafter called **OWNER**, in the penal sum of _____ _____dollars, ($_____) in lawful money of the United States, for the payment of which sum will and truly be made, we bind ourselves, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the **OWNER,** dated the _____ day of _____, 20___, a copy of which is hereto attached and made a part hereof for the construction of the *UPGRADES TO THE ETOWAH RAW WATER PUMP STATION.*

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, **SUBCONTRACTORS,** and corporations furnishing materials for or performing labor in the prosecution of the **WORK** provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the

construction of such **WORK**, and all insurance premiums on said **WORK,** and for all labor performed in such **WORK** whether by **SUBCONTRACTOR** or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the **WORK** to be performed thereunder or the **SPECIFICATIONS** accompanying the same shall in any wise affect its obligation on this **BOND**, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the **WORK** or to the **SPECIFICATIONS.**

PROVIDED, FURTHER, that no final settlement between the **OWNER** and the **CONTRACTOR** shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20_____.

ATTEST:

_____
Principal

_____
(Principal) Secretary

BY:_____

(SEAL)

_____
Witness as to Principal

_____
Address

_____
Address

_____
Surety

ATTEST:

_____	BY:_____
Witness as to Surety	Attorney-in-Fact
_____	_____
Address	Address
_____	_____

NOTE: Date of **BOND** must not be prior to date of Contract. If **CONTRACTOR** is Partnership, all partners should execute **BOND.**

IMPORTANT: Surety companies executing **BONDS** must appear on the Treasury Department's most current list (Circular 570 amended) and be authorized to transact business in the state where the **PROJECT** is located.

BIDDERS DECLARATION

The bidder understands, agrees and warrants:

That the bidder has carefully read and fully understands the full scope of the specifications:

That the bidder has the capability to successfully undertake and complete the responsibilities and obligations in said specifications.

That the bidder has liability insurance and a declaration of insurance form is included in the bid package.

That this bid may be withdrawn by requesting such withdrawal in writing at any time prior to **March 17, 2016 at 2:00 p.m.** but may not be withdrawn after such date and time.

That the City of Rome reserves the right to reject any or all bids and to accept that bid which will, in its opinion, best serve the public interest. The City of Rome reserves the right to waive any technicalities and formalities in the bidding.

That by submission of this bid the bidder acknowledges that the City of Rome has the right to make any inquiry or investigation it deems appropriate to substantiate or supplement information supplied by the bidder.

If a partnership, a general partner must sign.

If a corporation, the authorized corporate officer(s) must sign and the corporate seal must be affixed to this bid.

BIDDER:

_____	_____
Name	Title
_____	_____
Name	Title

AFFIX CORPORATE SEAL (If Applicable)

CERTIFICATE OF NON-DISCRIMINATION

In connection with the performance of work under this contract, the bidder agrees as follows:

The bidder agrees not to discriminate against any employee or applicant for employment because of race, creed, color, sex, national origin, ancestry or disability. The vendor shall take affirmative action to insure that employees are treated without regard to their race, creed, color, sex, national origin, ancestry or disability. Such action shall include, but not be limited to the following: employment, upgrading, demotion, transfer, recruiting or recruitment, advertising, lay-off or termination, rates of pay or other compensation and selection for training, including apprenticeship.

In the event of the bidder's non-compliance with this non-discrimination clause, the contract may be canceled or terminated by the City of Rome. The bidders may be declared, by the City of Rome, ineligible for further contracts with the City of Rome until satisfactory proof of intent to comply shall be made by the vendor.

The bidder agrees to include this non-discrimination clause in any sub-contracts connected with the performance of this agreement.

_____

BIDDER

_____

SIGNATURE

_____

TITLE

NON-COLLUSION AFFIDAVIT

The following affidavit is to accompany the bid:

STATE OF

COUNTY OF

Owner, Partner or Officer of Firm

Company Name, Address, City and State

Being of lawful age, being first duly sworn, on oath says that he/she is the agent authorized by the bidder to submit the attached bid. Affidavit further states as bidder, that they have not been a party to any collusion among bidders in restraint of competition by agreement to bid at a fixed price or to refrain from bidding; or with any office of the City of Rome or any of their employees as to quantity, quality or price in the prospective contract; or any discussion between bidders and any official of the City of Rome or any of their employees concerning exchange of money or other things of value for special consideration in submitting a sealed bid for:

FIRM NAME _____

SIGNATURE _____

TITLE _____

Subscribed and sworn to before me this_____ day of _____ 20_____

_____

NOTARY PUBLIC

STATE OF GEORGIA PROMPT PAY ACT AFFIDAVIT

THIS AFFIDAVIT IS TO ACCOMPANY THE BID

GEORGIA PROMPT PAY ACT: The Georgia Prompt Pay Act was enacted by the General Assembly in 1994 and took effect January 1, 1995. This act requires owners to pay contractors within 15 days of receipt of a pay request by the owner or the owner's representative. If payment is not made the owner shall pay the contractor 1% per month interest on the delayed payment. Additionally, the contractor must pay subcontractors within 15 days of receipt of payment from the owner.

This Act is Code Section 13-11-1 (Georgia Laws of 1994, p. 1398 par. 4)

Firm Name: _____

Signature: _____

Title: _____

Subscribed and Sworn to before me this_____ day of _____, 20_____

_____
Notary Public

Form **W-9**
(Rev. December 2014)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

Give Form to the requester. Do not send to the IRS.

Print or type
See **Specific Instructions** on page 2.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.

2 Business name/disregarded entity name, if different from above

3 Check appropriate box for federal tax classification; check only **one** of the following seven boxes:
☐ Individual/sole proprietor or single-member LLC ☐ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate
☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶
Note. For a single-member LLC that is disregarded, do not check LLC; check the appropriate box in the line above for the tax classification of the single-member owner.
☐ Other (see instructions) ▶

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):
Exempt payee code (if any)
Exemption from FATCA reporting code (if any)
(Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.)

Requester's name and address (optional)

6 City, state, and ZIP code

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the instructions for line 1 and the chart on page 4 for guidelines on whose number to enter.

Social security number
☐☐☐ – ☐☐ – ☐☐☐☐

or

Employer identification number
☐☐ – ☐☐☐☐☐☐☐

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 3.

Sign Here **Signature of U.S. person ▶** **Date ▶**

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. Information about developments affecting Form W-9 (such as legislation enacted after we release it) is at *www.irs.gov/fw9*.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following:

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding? on page 2.

By signing the filled-out form, you:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),

2. Certify that you are not subject to backup withholding, or

3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and

4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting?* on page 2 for further information.

CITY OF ROME

DRUG-FREE WORKPLACE CERTIFICATE

By signature on this certificate, the Bidder certifies that the provisions of O.C.G.A. Section 50-24-1 through 50-24-6 related to the "Drug-Free Workplace Act" will be complied with in full. The Bidder further certifies that:

1. A drug-free workplace will be provided for the Bidder's employees during the performance of the contract; and

2. Each contractor who hires a subcontractor to work in a drug-free workplace shall secure from that subcontractor the following written certification: "As part of the subcontracting agreement with (contractor's name), (subcontractor's name) certifies to the contractor that a drug-free workplace will be provided for the subcontractor's employees during the performance of this contract pursuant to O.C.G.A. Section 50-24-3(b)(7)."

By signature on this certificate, the Bidder further certifies that it will not engage in the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana during the performance of the contract.

Bidder: _____

By: _____

Name Printed: _____

Title: _____

Date: _____

CITY OF ROME, GEORGIA
E-VERIFY COMPLIANCE AFFADAVIT

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 on behalf of the City of Rome, Georgia has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned contractor will continue to use the federal work authorization program throughout the contract period and the undersigned contractor will contract for the physical performance of services in satisfaction of such contract only with subcontractors who present an affidavit to the contractor with the information required by O.C.G.A, § 13-10-91 (b). Contractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

_____
Federal Work Authorization User Identification number
(Not Required if Less than 10 Employees)

_____
Signature (if less than 10 employees)

_____
Date of Authorization

_____
Name of Contractor

_____
Name of Project

_____
Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____, ____, 20____ in _____(city) _____ (state).

_____
Signature of Authorized Officer or Agent

_____
Printed Name and Title of Authorized Officer or Agent

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

_____
NOTARY PUBLIC
My Commission Expires:

CITY OF ROME, GEORGIA

SAVE COMPLIANCE AFFADAVIT

O.C.G.A § 50-36-1(e) (2) Affidavit

By executing this affidavit under oath, as an applicant for a (n) Contract or Services, as referenced O.C.G.A. C. § 50-36-1, from the City of Rome, Georgia, the undersigned applicant verifies one of the following with respect to my application for a public benefit:

1) _____ I am a United State citizen.

2) _____ I am a legal permanent resident of the United States

3) _____ I am a qualified alien or non-immigrant under the Federal Immigration and Nationality Act with an alien number issued by the Department of Homeland Security or other federal immigration agency.
My alien number issued by the Department of Homeland Security or other federal immigration agency is: _____.

The undersigned applicant also hereby verifies that he or she is 18 years of age or older and has provided at least one secure and verifiable document, as required by O.C.G.A. § 50-36-1(e) (1), with this affidavit. The secure and verifiable document provided with this affidavit can best be classified as:
_____.

In making the above representation under oath, I understand that any person who knowingly and willfully makes a false, fictitious, or fraudulent statement or representation in an affidavit shall be guilty of a violation of O.C.G.A. § 16-10-20, and face criminal penalties as allowed by such criminal statute.

Executed in _____ (city), _____ (state).

_____
Signature of Applicant

_____ Printed
Name of Applicant

SUBSCRIBED AND SWORN

BEFORE ME ON THIS THE

_____DAY OF _____, 20_____

_____
NOTARY PUBLIC
My Commission Expires:

LIST OF DBE/MBE SUBCONTRACTORS/SUPPLIERS

Etowah Raw Water Pump Station

The following is the list of DBE/MBE Subcontractors referenced in the Bid Form submitted by:

(Bidder).....

Dated.....……and which is an integral part of the Bid Form.

The following work will be performed (or provided) by MBE/DBE and coordinated by us:

WORK SUBJECT NAME

Earthwork ……..……

Concrete /Masonry……

Piping/Plumbing……..……

Other…….

SUPPLIERS: NAME

Concrete……..…….

Piping……..……..

Electrical Materials……

Other……

END OF DOCUMENT

LOCAL SUBCONTRACTORS

Etowah Raw Water Pump Station

The following is the list of Subcontractors referenced in the Bid Form submitted by:

(Bidder).....

Dated.....……and which is an integral part of the Bid Form.

The following work will be performed (or provided) by Subcontractors and coordinated by us:

WORK SUBJECT NAME

Earthwork Contractor……

Concrete Contractor……..

Demolition Contractor…….

Steel Erector……..

Glazing/Storefront Contractor……..

Cabinet Manufacturer……..

Painting Contractor……..

Drywall Contractor……...

Interior Framing……

Sprinkler Systems…….

Plumbing……..

HVAC……..

Electrical……..

LOCAL MATERIAL SUPPLIERS

The following is the list of Local Material Providers referenced in the Bid Form submitted by:

(Bidder).....

Dated.....……and which is an integral part of the Bid Form.

The following work will be materials provided by Local suppliers.

MATERIALS NAME

Electrical……..……

Concrete……..

Steel…….…….

Brick……..

Lumber……..……..

Doors and Windows…….

Other……..

AGREEMENT

THIS AGREEMENT, made this _____ day of _____, 20 _____, by and between _____, hereinafter called **"OWNER**" and
(Name of Owner)

_____ doing business as (an individual) or (a partnership) or (a corporation) hereinafter called **"CONTRACTOR"**.

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned:

1. The **CONTRACTOR** will commence and complete the construction of _____ _____.

2. The **CONTRACTOR** will furnish all of the material, supplies, tools, equipment, labor and other services necessary for the construction and completion of the **PROJECT** described herein.

3. The **CONTRACTOR** will commence the work required by the **CONTRACT DOCUMENTS** within _____ calendar days after the date of the **NOTICE TO PROCEED** and will complete the same within _____ calendar days unless the period for completion is extended otherwise by the **CONTRACT DOCUMENTS**.

4. The **CONTRACTOR** agrees to perform all of the **WORK** described in the **CONTRACT DOCUMENTS** and comply with the terms therein for the sum of $_____ or as shown in the **BID** schedule.

5. The term **"CONTRACT DOCUMENTS"** means and includes the following:

(a) Advertisement for **BIDS**

(b) Information for **BIDDERS**

(c) **BID**

(d) **BID BOND**

(e) **Agreement**

(f) General Conditions

(g) **SUPPLEMENTAL GENERAL CONDITIONS**

(h) Payment **BOND**

(i) Performance **BOND**

(j) **NOTICE OF AWARD**

(k) **NOTICE TO PROCEED**

(l) **CHANGE ORDER**

(m) **DRAWINGS** prepared by _____

numbered _____ through _____, and dated _____.

(n) **SPECIFICATIONS** prepared or issued by _____

dated _____.

(o) **ADDENDA:**

No. _____, dated _____.

No. _____, dated _____.

No. _____, dated _____.

No. _____, dated _____.

No. _____, dated _____.

6. The **OWNER** will pay to the **CONTRACTOR** in the manner and at such times as set forth in the General Conditions such amounts as required by the **CONTRACT DOCUMENTS**.

7. This **AGREEMENT** shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, this Agreement in _____ copies, each of which shall be deemed an original on the date first above written.

OWNER:

_____

By: _____

Name: _____
(Please Print)

Title: _____

(SEAL)

ATTEST:

_____

Name: _____
(Please Print)

Title: _____

CONTRACTOR:

_____

By: _____

Name: _____
(Please Print)

Address: _____

_____

F.E.I. No. _____

(SEAL)

ATTEST:

_____

Name: _____
(Please Print)

Title: _____

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the Controlling Law.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
a practice division of the

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

AMERICAN CONSULTING ENGINEERS COUNCIL

AMERICAN SOCIETY OF CIVIL ENGINEERS This

document has been approved and endorsed by

The Associated General Contractors of America Construction

Specifications Institute

These General Conditions have been prepared for use with the Owner-Contractor Agreements (No. 1910-8-A-1 or 1910-8-A-2) (1996 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the EJCDC User's Guide (No. 1910-50). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (No. 1910-17) (1996 Edition).

Copyright ©1996

National Society of Professional Engineers
1420 King Street, Alexandria, VA 22314

American Consulting Engineers Council 1015
15th Street N.W., Washington, DC 20005

American Society of Civil Engineers 345
East 47th Street, New York, NY 10017

TABLE OF CONTENTS

Page

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY 6
1.01 *Defined Terms* 6
1.02 *Terminology* 8

ARTICLE 2 - PRELIMINARY MATTERS 9
2.01 *Delivery of Bonds* 9
2.02 *Copies of Documents* 9
2.03 *Commencement of Contract Times; Notice to Proceed* 9
2.04 *Starting the Work* 9
2.05 *Before Starting Construction* 9
2.06 *Preconstruction Conference* 10
2.07 *Initial Acceptance of Schedules* 10

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE 10
3.01 *Intent* 10
3.02 *Reference Standards* 11
3.03 *Reporting and Resolving Discrepancies* 11
3.04 *Amending and Supplementing Contract Documents* 11
3.05 *Reuse of Documents* 11

ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS 12
4.01 *Availability of Lands* 12
4.02 *Subsurface and Physical Conditions* 12
4.03 *Differing Subsurface or Physical Conditions* 12
4.04 *Underground Facilities* 13
4.05 *Reference Points* 14
4.06 *Hazardous Environmental Condition at Site* 14

ARTICLE 5 - BONDS AND INSURANCE 15
5.01 *Performance, Payment, and Other Bonds* 15
5.02 *Licensed Sureties and Insurers* 16
5.03 *Certificates of Insurance* 16
5.04 *CONTRACTOR's Liability Insurance* 16
5.05 *OWNER's Liability Insurance* 17
5.06 *Property Insurance* 17
5.07 *Waiver of Rights* 18
5.08 *Receipt and Application of Insurance Proceeds* 18
5.09 *Acceptance of Bonds and Insurance; Option to Replace* 19
5.10 *Partial Utilization, Acknowledgment of Property Insurer* 19

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES 19
6.01 *Supervision and Superintendence* 19
6.02 *Labor; Working Hours* 19
6.03 *Services, Materials, and Equipment* 20
6.04 *Progress Schedule* 20
6.05 *Substitutes and "Or-Equals"* 20
6.07 *Patent Fees and Royalties* 22
6.08 *Permits* 23
6.09 *Laws and Regulations* 23

6.10 *Taxes* 23
6.11 *Use of Site and Other Areas* 23
6.13 *Safety and Protection* 24
6.14 *Safety Representative* 24
6.15 *Hazard Communication Programs* 24
6.16 *Emergencies* 24
6.17 *Shop Drawings and Samples* 25
6.18 *Continuing the Work* 26
6.19 *CONTRACTOR's General Warranty and Guarantee* 26
6.20 *Indemnification* 26

ARTICLE 7 - OTHER WORK 27
7.01 *Related Work at Site* 27
7.02 *Coordination* 28

ARTICLE 8 - OWNER'S RESPONSIBILITIES 28
8.01 *Communications to Contractor* 28
8.02 *Replacement of ENGINEER* 28
8.03 *Furnish Data* 28
8.04 *Pay Promptly When Due* 28
8.05 *Lands and Easements; Reports and Tests* 28
8.06 *Insurance* 28
8.07 *Change Orders* 28
8.08 *Inspections, Tests, and Approvals* 28
8.09 *Limitations on OWNER's Responsibilities* 28
8.10 *Undisclosed Hazardous Environmental Condition* 28
8.11 *Evidence of Financial Arrangements* 28

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION 29
9.01 *OWNER'S Representative* 29
9.02 *Visits to Site* 29
9.03 *Project Representative* 29
9.04 *Clarifications and Interpretations* 29
9.05 *Authorized Variations in Work* 29
9.06 *Rejecting Defective Work* 29
9.07 *Shop Drawings, Change Orders and Payments* 30
9.09 *Decisions on Requirements of Contract Documents and Acceptability of Work* 30
9.10 *Limitations on ENGINEER's Authority and Responsibilities* 30

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS 31
10.01 *Authorized Changes in the Work* 31
10.02 *Unauthorized Changes in the Work* 31
10.03 *Execution of Change Orders* 31
10.04 *Notification to Surety* 31
10.05 *Claims and Disputes* 32

ARTICLE 11 - COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK 32
11.01 *Cost of the Work* 32
11.02 *Cash Allowances* 34
11.03 *Unit Price Work* 34

ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES 35
12.01 *Change of Contract Price* 35
12.02 *Change of Contract Times* 36
12.03 *Delays Beyond CONTRACTOR's Control* 36

12.04 *Delays Within CONTRACTOR's Control* 36
12.06 *Delay Damages* 36

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK 36
13.01 *Notice of Defects* 36
13.02 *Access to Work* 36
13.03 *Tests and Inspections* 37
13.04 *Uncovering Work* 37
13.05 *OWNER May Stop the Work* 37
13.06 *Correction or Removal of Defective Work* 38
13.07 *Correction Period* 38
13.08 *Acceptance of Defective Work* 38
13.09 *OWNER May Correct Defective Work* 38

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION 39
14.01 *Schedule of Values* 39
14.02 *Progress Payments* 39
14.03 *CONTRACTOR's Warranty of Title* 41
14.04 *Substantial Completion* 41
14.05 *Partial Utilization* 41
14.06 *Final Inspection* 42
14.07 *Final Payment* 42
14.09 *Waiver of Claims* 43

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION 43
15.01 OWNER May Suspend Work 43
15.02 *OWNER May Terminate for Cause* 43
15.03 *OWNER May Terminate For Convenience* 44
15.04 *CONTRACTOR May Stop Work or Terminate* 44

ARTICLE 16 - DISPUTE RESOLUTION 44
16.01 *Methods and Procedures* 44

ARTICLE 17 - MISCELLANEOUS 45
17.01 *Giving Notice* 45
17.02 *Computation of Times* 45
17.03 *Cumulative Remedies* 45
17.04 *Survival of Obligations* 45
17.05 *Controlling Law* 45

GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Contract Documents and printed with initial or all capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof.

1. *Addenda*--Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the Contract Documents.

2. *Agreement*--The written instrument which is evidence of the agreement between OWNER and CONTRACTOR covering the Work.

3. *Application for Payment*--The form acceptable to ENGINEER which is to be used by CONTRACTOR during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Asbestos*--Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*--The offer or proposal of a bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidding Documents*--The Bidding Requirements and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

7. *Bidding Requirements*--The Advertisement or Invitation to Bid, Instructions to Bidders, Bid security form, if any, and the Bid form with any supplements.

8. *Bonds*--Performance and payment bonds and other instruments of security.

9. *Change Order*--A document recommended by ENGINEER which is signed by CONTRACTOR and OWNER and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*--A demand or assertion by OWNER or CONTRACTOR seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*--The entire and integrated written agreement between the OWNER and CONTRACTOR concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*--The Contract Documents establish the rights and obligations of the parties and include the Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR's Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Notice to Proceed, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders, and ENGINEER's written interpretations and clarifications issued on or after the Effective Date of the Agreement. Approved Shop Drawings and the reports and drawings of subsurface and physical conditions are not Contract Documents. Only printed or hard copies of the items listed in this paragraph are Contract Documents. Files in electronic media format of text, data, graphics, and the like that may be furnished by OWNER to CONTRACTOR are not Contract Documents.

13. *Contract Price*--The moneys payable by OWNER to CONTRACTOR for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*--The number of days or the dates stated in the Agreement to: (i) achieve Substantial Completion; and (ii) complete the Work so that it is ready for final payment as evidenced by ENGINEER's written recommendation of final payment.

15. *CONTRACTOR*--The individual or entity with whom OWNER has entered into the Agreement.

16. *Cost of the Work*--See paragraph 11.01.A for definition.

17. *Drawings*--That part of the Contract Documents prepared or approved by ENGINEER which graphically shows the scope, extent, and character of the Work to be performed by CONTRACTOR. Shop Drawings and other CONTRACTOR submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*--The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *ENGINEER*--The individual or entity named as such in the Agreement.

20. *ENGINEER's Consultant*--An individual or entity having a contract with ENGINEER to furnish services as ENGINEER's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.

21. *Field Order*--A written order issued by ENGINEER which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

22. *General Requirements*--Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

23. *Hazardous Environmental Condition*--The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

24. *Hazardous Waste*--The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

25. *Laws and Regulations; Laws or Regulations*--Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

26. *Liens*--Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

27. *Milestone*--A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

28. *Notice of Award*--The written notice by OWNER to the apparent successful bidder stating that upon timely compliance by the apparent successful bidder with the conditions precedent listed therein, OWNER will sign and deliver the Agreement.

29. *Notice to Proceed*--A written notice given by OWNER to CONTRACTOR fixing the date on which the Contract Times will commence to run and on which CONTRACTOR shall start to perform the Work under the Contract Documents.

30. *OWNER*--The individual, entity, public body, or authority with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be performed.

31. *Partial Utilization*--Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.

32. *PCBs*--Polychlorinated biphenyls.

33. *Petroleum*--Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

34. *Project*--The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part as may be indicated elsewhere in the Contract Documents.

35. *Project Manual*--The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

36. *Radioactive Material*--Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

37. *Resident Project Representative*--The authorized representative of ENGINEER who may be assigned to the Site or any part thereof.

38. *Samples*--Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

39. *Shop Drawings*--All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR to illustrate some portion of the Work.

40. *Site*--Lands or areas indicated in the Contract Documents as being furnished by OWNER upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by OWNER which are designated for the use of CONTRACTOR.

41. *Specifications*--That part of the Contract Documents consisting of written technical descriptions of materials, equipment, systems, standards, and workmanship as applied to the Work and certain administrative details applicable thereto.

42. *Subcontractor*--An individual or entity having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the Site.

43. *Substantial Completion*--The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of ENGINEER, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.

44. *Supplementary Conditions*--That part of the Contract Documents which amends or supplements these General Conditions.

45. *Supplier*--A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with CONTRACTOR or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by CONTRACTOR or any Subcontractor.

46. *Underground Facilities*--All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

47. *Unit Price Work*--Work to be paid for on the basis of unit prices.

48. *Work*--The entire completed construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

49. *Work Change Directive*--A written statement to CONTRACTOR issued on or after the Effective Date of the Agreement and signed by OWNER and recommended by ENGINEER ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

50. *Written Amendment*--A written statement modifying the Contract Documents, signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the nonengineering or nontechnical rather than strictly construction-related aspects of the Contract Documents.

1.02 *Terminology*

A. *Intent of Certain Terms or Adjectives*

1. Whenever in the Contract Documents the terms “as allowed,” “as approved,” or terms of like effect or import are used, or the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of ENGINEER as to the Work, it is intended that such action or determination will be solely to evaluate, in

general, the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign to ENGINEER any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.10 or any other provision of the Contract Documents.

B. *Day*

1. The word "day" shall constitute a calendar day of 24 hours measured from midnight to the next midnight.

C. *Defective*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it does not conform to the Contract Documents or does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents, or has been damaged prior to ENGINEER's recommendation of final payment (unless responsibility for the protection thereof has been assumed by OWNER at Substantial Completion in accordance with paragraph 14.04 or 14.05).

D. *Furnish, Install, Perform, Provide*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of CONTRACTOR, "provide" is implied.

E. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 - PRELIMINARY MATTERS

_

2.01 *Delivery of Bonds*

A. When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER such Bonds as CONTRACTOR may be required to furnish.

2.02 *Copies of Documents*

A. OWNER shall furnish to CONTRACTOR up to ten copies of the Contract Documents. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

A. CONTRACTOR shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

A. CONTRACTOR's Review of Contract Docu*ments:* Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the

Contract Documents and check and verify pertinent figures therein and all applicable field measurements. CONTRACTOR shall promptly report in writing to ENGINEER any conflict, error, ambiguity, or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from ENGINEER before proceeding with any Work affected thereby; however, CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless CONTRACTOR knew or reasonably should have known thereof.

B. *Preliminary Schedules:* Within ten days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), CONTRACTOR shall submit to ENGINEER for its timely review:

1. a preliminary progress schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2. a preliminary schedule of Shop Drawing and Sample submittals which will list each required submittal and the times for submitting, reviewing, and processing such submittal; and

3. a preliminary schedule of values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

C. *Evidence of Insurance:* Before any Work at the Site is started, CONTRACTOR and OWNER shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which CONTRACTOR and OWNER respectively are required to purchase and maintain in accordance with Article 5.

2.06 *Preconstruction Conference*

A. Within 20 days after the Contract Times start to run, but before any Work at the Site is started, a conference attended by CONTRACTOR, ENGINEER, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in paragraph 2.05.B, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.07 *Initial Acceptance of Schedules*

A. Unless otherwise provided in the Contract Documents, at least ten days before submission of the first Application for Payment a conference attended by CONTRACTOR, ENGINEER, and others as appropriate will be held to review for acceptability to ENGINEER as provided below the schedules submitted in accordance with paragraph 2.05.B. CONTRACTOR shall have an additional ten days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to CONTRACTOR until acceptable schedules are submitted to ENGINEER.

1. The progress schedule will be acceptable to ENGINEER if it provides an orderly progression of the Work to completion within any specified Milestones and the Contract Times. Such acceptance will not impose on ENGINEER responsibility for the progress schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve CONTRACTOR from CONTRACTOR's full responsibility therefor.

2. CONTRACTOR's schedule of Shop Drawing and Sample submittals will be acceptable to ENGINEER if it provides a workable arrangement for reviewing and processing the required submittals.

3. CONTRACTOR's schedule of values will be acceptable to ENGINEER as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof)

to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to OWNER.

C. Clarifications and interpretations of the Contract Documents shall be issued by ENGINEER as provided in Article 9.

3.02 *Reference Standards*

A. *Standards, Specifications, Codes, Laws, and Regulations*

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of OWNER, CONTRACTOR, or ENGINEER, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor shall any such provision or instruction be effective to assign to OWNER, ENGINEER, or any of ENGINEER's Consultants, agents, or employees any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. If, during the performance of the Work, CONTRACTOR discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, CONTRACTOR shall report it to ENGINEER in writing at once.

CONTRACTOR shall not proceed with the Work affected thereby (except in an emergency as required by paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in paragraph 3.04; provided, however, that CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any such conflict, error, ambiguity, or discrepancy unless CONTRACTOR knew or reasonably should have known thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways: (i) a Written Amendment; (ii) a Change Order; or (iii) a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways: (i) a Field Order; (ii) ENGINEER's approval of a Shop Drawing or Sample; or
(iii) ENGINEER's written interpretation or clarification.

3.05 *Reuse of Documents*

A. CONTRACTOR and any Subcontractor or Supplier or other individual or entity performing or furnishing any of the Work under a direct or indirect contract with OWNER: (i) shall not have or acquire any title to or ownership rights in any of the Drawings,

Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of ENGINEER or ENGINEER's Consultant, including electronic media editions; and (ii) shall not reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of OWNER and ENGINEER and specific written verification or adaption by ENGINEER. This prohibition will survive final payment, completion, and acceptance of the Work, or termination or completion of the Contract. Nothing herein shall preclude CONTRACTOR from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

A. OWNER shall furnish the Site. OWNER shall notify CONTRACTOR of any encumbrances or restrictions not of general application but specifically related to use of the Site with which CONTRACTOR must comply in performing the Work. OWNER will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If CONTRACTOR and OWNER are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in OWNER's furnishing the Site, CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

B. Upon reasonable written request, OWNER shall furnish CONTRACTOR with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and OWNER's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that ENGINEER has used in preparing the Contract Documents; and

2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that ENGINEER has used in preparing the Contract Documents.

B. *Limited Reliance by CONTRACTOR on Technical Data Authorized:* CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any Claim against OWNER, ENGINEER, or any of ENGINEER's Consultants with respect to:

1. the completeness of such reports and drawings for CONTRACTOR's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by CONTRACTOR, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any CONTRACTOR interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If CONTRACTOR believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which CONTRACTOR is entitled to rely as provided in paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by paragraph 6.16.A), notify OWNER and ENGINEER in writing about such condition. CONTRACTOR shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *ENGINEER's Review:* After receipt of written notice as required by paragraph 4.03.A, ENGINEER will promptly review the pertinent condition, determine the necessity of OWNER's obtaining additional exploration or tests with respect thereto, and advise OWNER in writing (with a copy to CONTRACTOR) of ENGINEER's findings and conclusions.

C. *Possible Price and Times Adjustments*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in CONTRACTOR's cost of, or time required for, performance of the Work; subject, however, to the following:

such condition must meet any one or more of the categories described in paragraph 4.03.A; and

with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of paragraphs 9.08 and 11.03.

2. CONTRACTOR shall not be entitled to any adjustment in the Contract Price or Contract Times if:

CONTRACTOR knew of the existence of such conditions at the time CONTRACTOR made a final commitment to OWNER in respect of Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for CONTRACTOR prior to CONTRACTOR's making such final commitment; or

c. CONTRACTOR failed to give the written notice within the time and as required by paragraph 4.03.A.

3. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in paragraph 10.05. However, OWNER, ENGINEER, and ENGINEER's Consultants shall not be liable to CONTRACTOR for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by CONTRACTOR on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to OWNER or ENGINEER by the owners of such Underground Facilities, including OWNER, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. OWNER and ENGINEER shall not be responsible for the accuracy or completeness of any such information or data; and

2. the cost of all of the following will be included in the Contract Price, and CONTRACTOR shall have full responsibility for:

reviewing and checking all such information and data,

locating all Underground Facilities shown or indicated in the Contract Documents,

coordination of the Work with the owners of such Underground Facilities, including OWNER, during construction, and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to OWNER and ENGINEER. ENGINEER will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, CONTRACTOR shall be responsible for the safety and protection of such Underground Facility.

2. If ENGINEER concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences.

An equitable adjustment shall be made in the Contract Price of Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that CONTRACTOR did not know of and could not reasonably have been expected to be aware of or to have anticipated. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, OWNER or CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

4.05 *Reference Points*

A. OWNER shall provide engineering surveys to establish reference points for construction which in ENGINEER's judgment are necessary to enable CONTRACTOR to proceed with the Work. CONTRACTOR shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of OWNER. CONTRACTOR shall report to ENGINEER whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the ENGINEER in the preparation of the Contract Documents.

B. *Limited Reliance by CONTRACTOR on Technical Data Authorized:* CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any Claim against OWNER, ENGINEER or any of ENGINEER's Consultants with respect to:

1. the completeness of such reports and drawings for CONTRACTOR's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by CONTRACTOR and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any CONTRACTOR interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. CONTRACTOR shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. CONTRACTOR shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by CONTRACTOR, Subcontractors, Suppliers, or anyone else for whom CONTRACTOR is responsible.

D. If CONTRACTOR encounters a Hazardous Environmental Condition or if CONTRACTOR or anyone for whom CONTRACTOR is responsible creates a Hazardous Environmental Condition, CONTRACTOR shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by paragraph 6.16); and (iii) notify OWNER and ENGINEER (and promptly thereafter confirm such notice in writing). OWNER shall promptly consult with ENGINEER concerning the necessity for OWNER to retain a qualified expert to evaluate such condition or take corrective action, if any.

E. CONTRACTOR shall not be required to resume Work in connection with such condition or in any affected area until after OWNER has obtained any required permits related thereto and delivered to CONTRACTOR written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If OWNER and CONTRACTOR cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by CONTRACTOR, either party may make a Claim therefor as provided in paragraph 10.05.

F. If after receipt of such written notice CONTRACTOR does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then OWNER may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If OWNER and CONTRACTOR cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in paragraph 10.05. OWNER may have such deleted portion of the Work performed by OWNER's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, OWNER shall indemnify and hold harmless CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and the officers, directors, partners, employees, agents, other consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition:

(i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by CONTRACTOR or by anyone for whom CONTRACTOR is responsible. Nothing in this paragraph 4.06.E shall obligate OWNER to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, other consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by CONTRACTOR or by anyone for whom CONTRACTOR is responsible. Nothing in this paragraph 4.06.F shall obligate CONTRACTOR to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of paragraphs 4.02, 4.03, and 4.04 are not intended to apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 - BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. CONTRACTOR shall furnish performance and payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all CONTRACTOR's obligations under the Contract Documents. These Bonds shall remain in effect at least until one year after the date when final payment becomes due, except as provided otherwise by Laws or Regulations or by the Contract Documents. CONTRACTOR shall also furnish such other Bonds as are required by the Contract Documents.

B. All Bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies

Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch,

Department of the Treasury. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

If the surety on any Bond furnished by CONTRACTOR is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of paragraph 5.01.B, CONTRACTOR shall within 20 days thereafter substitute another Bond and surety, both of which shall comply with the requirements of paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All Bonds and insurance required by the Contract Documents to be purchased and maintained by OWNER or CONTRACTOR shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue Bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

A. CONTRACTOR shall deliver to OWNER, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by OWNER or any other additional insured) which CONTRACTOR is required to purchase and maintain. OWNER shall deliver to CONTRACTOR, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by CONTRACTOR or any other additional insured) which OWNER is required to purchase and maintain.

5.04 *CONTRACTOR's Liability Insurance*

A. CONTRACTOR shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from CONTRACTOR's performance of the Work and CONTRACTOR's other obligations under the Contract Documents, whether it is to be performed by CONTRACTOR, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of CONTRACTOR's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than CONTRACTOR's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained: (i) by any person as a result of an offense directly or indirectly related to the employment of such person by CONTRACTOR, or (ii) by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance so required by this paragraph 5.04 to be purchased and maintained shall:

1. with respect to insurance required by paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insureds (subject to any customary exclusion in respect of professional liability) OWNER, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include completed operations insurance;

4. include contractual liability insurance covering CONTRACTOR's indemnity obligations under paragraphs 6.07, 6.11, and 6.20;

5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least thirty days prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the CONTRACTOR pursuant to paragraph 5.03 will so provide);

6. remain in effect at least until final payment and at all times thereafter when CONTRACTOR may be correcting, removing, or replacing defective Work in accordance with paragraph 13.07; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment (and CONTRACTOR shall furnish OWNER and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to OWNER and any such additional insured of continuation of such insurance at final payment and one year thereafter).

5.05 *OWNER's Liability Insurance*

A. In addition to the insurance required to be provided by CONTRACTOR under paragraph 5.04, OWNER, at OWNER's option, may purchase and maintain at OWNER's expense OWNER's own liability insurance as will protect OWNER against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, OWNER shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an additional insured;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, 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 and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by OWNER prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by ENGINEER;

5. allow for partial utilization of the Work by OWNER;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by OWNER, CONTRACTOR, and ENGINEER with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

B. OWNER shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and any

other individuals or entities identified in the Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with paragraph 5.07.

D. OWNER shall not be responsible for purchasing and maintaining any property insurance specified in this paragraph 5.06 to protect the interests of CONTRACTOR, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by CONTRACTOR, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

E. If CONTRACTOR requests in writing that other special insurance be included in the property insurance policies provided under paragraph 5.06, OWNER shall, if possible, include such insurance, and the cost thereof will be charged to CONTRACTOR by appropriate Change Order or Written Amendment. Prior to commencement of the Work at the Site, OWNER shall in writing advise CONTRACTOR whether or not such other insurance has been procured by OWNER.

5.07 *Waiver of Rights*

A. OWNER and CONTRACTOR intend that all policies purchased in accordance with paragraph 5.06 will protect OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. OWNER and CONTRACTOR waive all rights against each other and their respective officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by OWNER as trustee or otherwise payable under any policy so issued.

B. OWNER waives all rights against CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to OWNER's property or the Work caused by, arising out of, or resulting from fire or other peril whether or not insured by OWNER; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by OWNER during partial utilization pursuant to paragraph 14.05, after Substantial Completion pursuant to paragraph 14.04, or after final payment pursuant to paragraph 14.07.

C. Any insurance policy maintained by OWNER covering any loss, damage or consequential loss referred to in paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against CONTRACTOR, Subcontractors, ENGINEER, or ENGINEER's Consultants and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by paragraph 5.06 will be adjusted with OWNER and made payable to OWNER as fiduciary for

the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of paragraph 5.08.B. OWNER shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order or Written Amendment.

B. OWNER as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to OWNER's exercise of this power. If such objection be made, OWNER as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach.
If no such agreement among the parties in interest is reached, OWNER as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, OWNER as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

A. If either OWNER or CONTRACTOR has any objection to the coverage afforded by or other provisions of the Bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by paragraph 2.05.C. OWNER and CONTRACTOR shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the Bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent Bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If OWNER finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

_

6.01 *Supervision and Superintendence*

A. CONTRACTOR shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction, but CONTRACTOR shall not be responsible for the negligence of OWNER or ENGINEER in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents. CONTRACTOR shall be responsible to see that the completed Work complies accurately with the Contract Documents.

B. At all times during the progress of the Work, CONTRACTOR shall assign a competent resident superintendent thereto who shall not be replaced without written notice to OWNER and ENGINEER except under extraordinary circumstances. The superintendent will be CONTRACTOR's representative at the Site and shall have authority to act on behalf of CONTRACTOR. All communications given to or received from the superintendent shall be binding on CONTRACTOR.

6.02 *Labor; Working Hours*

A. CONTRACTOR shall provide competent, suitably qualified personnel to survey, lay out, and construct the Work as required by the Contract Documents. CONTRACTOR shall at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, and CON-

TRACTOR will not permit overtime work or the performance of Work on Saturday, Sunday, or any legal holiday without OWNER's written consent (which will not be unreasonably withheld) given after prior written notice to ENGINEER.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the General Requirements, CONTRACTOR shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties and guarantees specifically called for by the Specifications shall expressly run to the benefit of OWNER. If required by ENGINEER, CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

A. CONTRACTOR shall adhere to the progress schedule established in accordance with paragraph 2.07 as it may be adjusted from time to time as provided below.

1. CONTRACTOR shall submit to ENGINEER for acceptance (to the extent indicated in paragraph 2.07) proposed adjustments in the progress schedule that will not result in changing the Contract Times (or Milestones). Such adjustments will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the progress schedule that will change the Contract Times (or Milestones) shall be submitted in accordance with the requirements of Article 12. Such adjustments may only be made by a Change Order or Written Amendment in accordance with Article 12.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to ENGINEER for review under the circumstances described below.

1. *"Or-Equal" Items:* If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by ENGINEER as an "or-equal" item, in which case review and approval of the proposed item may, in ENGINEER's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

in the exercise of reasonable judgment ENGINEER determines that: (i) it is at least equal in quality, durability, appearance, strength, and design characteristics; (ii) it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole, and;

CONTRACTOR certifies that: (i) there is no increase in cost to the OWNER; and (ii) it will conform substantially, even with deviations, to the detailed requirements of the item named in the Contract Documents.

2. Substitute Items

a. If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR does not qualify as an "or-equal" item under paragraph 6.05.A.1, it will be considered a proposed substitute item.

CONTRACTOR shall submit sufficient information as provided below to allow ENGINEER to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by ENGINEER from anyone other than CONTRACTOR.

The procedure for review by ENGINEER will be as set forth in paragraph 6.05.A.2.d, as supplemented in the General Requirements and as ENGINEER may decide is appropriate under the circumstances.

CONTRACTOR shall first make written application to ENGINEER for review of a proposed substitute item of material or equipment that CONTRACTOR seeks to furnish or use. The application shall certify that the proposed substitute item will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified, and be suited to the same use as that specified. The application will state the extent, if any, to which the use of the proposed substitute item will prejudice CONTRACTOR's achievement of Substantial Completion on time, whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) to adapt the design to the proposed substitute item and whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute item from that specified will be identified in the application, and available engineering, sales, maintenance, repair, and replacement services will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change, all of which will be considered by ENGINEER in evaluating the proposed substitute item. ENGINEER may require CONTRACTOR to furnish additional data about the proposed substitute item.

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is shown or indicated in and expressly required by the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by ENGINEER. CONTRACTOR shall submit sufficient information to allow ENGINEER, in ENGINEER's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by ENGINEER will be similar to that provided in subparagraph 6.05.A.2.

C. *Engineer's Evaluation:* ENGINEER will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to paragraphs

1 and 6.05.B. ENGINEER will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized until ENGINEER's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." ENGINEER will advise CONTRACTOR in writing of any negative determination.

2 *Special Guarantee:* OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any substitute.

3 *ENGINEER's Cost Reimbursement:* ENGINEER will record time required by ENGINEER and ENGINEER's Consultants in evaluating substitute proposed or submitted by CONTRACTOR pursuant to paragraphs 6.05.A.2 and 6.05.B and in making changes in the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) occasioned thereby. Whether or not ENGINEER approves a substitute item so proposed or submitted by CONTRACTOR, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's Consultants for evaluating each such proposed substitute.

4 *CONTRACTOR's Expense:* CONTRACTOR shall provide all data in support of any proposed substitute or "or-equal" at CONTRACTOR's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. CONTRACTOR shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to OWNER as indicated in paragraph 6.06.B), whether initially or as a replacement, against whom OWNER may have reasonable objection. CON-

TRACTOR shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom CONTRACTOR has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to OWNER in advance for acceptance by OWNER by a specified date prior to the Effective Date of the Agreement, and if CONTRACTOR has submitted a list thereof in accordance with the Supplementary Conditions, OWNER's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. CONTRACTOR shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by OWNER of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of OWNER or ENGINEER to reject defective Work.

C. CONTRACTOR shall be fully responsible to OWNER and ENGINEER for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as CONTRACTOR is responsible for CONTRACTOR's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between OWNER or ENGINEER and any such Subcontractor, Supplier or other individual or entity, nor shall it create any obligation on the part of OWNER or ENGINEER to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. CONTRACTOR shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR.

E. CONTRACTOR shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with ENGINEER through CONTRACTOR.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control CONTRACTOR in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for CONTRACTOR by a Subcontractor or Supplier will be pursuant to an appropriate agreement between CONTRACTOR and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of OWNER and ENGINEER. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in paragraph 5.06, the agreement between the CONTRACTOR and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against OWNER, CONTRACTOR, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, CONTRACTOR will obtain the same.

6.07 *Patent Fees and Royalties*

A. CONTRACTOR shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of OWNER or ENGINEER its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by OWNER in the Contract Documents. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees or agents, and other consultants of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringe-

ment of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, CONTRACTOR shall obtain and pay for all construction permits and licenses. OWNER shall assist CONTRACTOR, when necessary, in obtaining such permits and licenses. CONTRACTOR shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. CONTRACTOR shall pay all charges of utility owners for connections to the Work, and OWNER shall pay all charges of such utility owners for capital costs related thereto, such as plant investment fees.

6.09 *Laws and Regulations*

A. CONTRACTOR shall give all notices and comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither OWNER nor ENGINEER shall be responsible for monitoring CONTRACTOR's compliance with any Laws or Regulations.

B. If CONTRACTOR performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, CONTRACTOR shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work; however, it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve CONTRACTOR of CONTRACTOR's obligations under paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work may be the subject of an adjustment in Contract Price or Contract Times. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in paragraph 10.05.

6.10 *Taxes*

A. CONTRACTOR shall pay all sales, consumer, use, and other similar taxes required to be paid by CONTRACTOR in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*

1. CONTRACTOR shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, CONTRACTOR shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultant, and the officers, directors, partners, employees, agents, and other consultants of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against OWNER, ENGINEER, or any other party indemnified hereunder to the extent caused by or based upon CONTRACTOR's performance of the Work.

B. *Removal of Debris During Performance of the Work:* During the progress of the Work CONTRACTOR shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning:* Prior to Substantial Completion of the Work CONTRACTOR shall clean the Site and make it ready for utilization by OWNER. At the completion of the Work CONTRACTOR shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading Structures:* CONTRACTOR shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall CONTRACTOR subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

A. CONTRACTOR shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to ENGINEER for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to ENGINEER for OWNER.

6.13 *Safety and Protection*

A. CONTRACTOR shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. CONTRACTOR shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property. All damage, injury, or loss to any property referred to in paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of OWNER or ENGINEER or ENGINEER's Consultant, or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of CONTRACTOR or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them). CONTRACTOR's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and ENGINEER has issued a notice to OWNER and CONTRACTOR in accordance with paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

A. CONTRACTOR shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

A. CONTRACTOR shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, CONTRACTOR is obligated to act to prevent threatened damage, injury, or loss. CONTRACTOR shall give ENGINEER prompt written notice if

CONTRACTOR believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If ENGINEER determines that a change in the Contract Documents is required because of the action taken by CONTRACTOR in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

A. CONTRACTOR shall submit Shop Drawings to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals. All submittals will be identified as ENGINEER may require and in the number of copies specified in the General Requirements. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show ENGINEER the services, materials, and equipment CONTRACTOR proposes to provide and to enable ENGINEER to review the information for the limited purposes required by paragraph 6.17.E.

B. CONTRACTOR shall also submit Samples to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals. Each Sample will be identified clearly as to material, Supplier, pertinent data such as catalog numbers, and the use for which intended and otherwise as ENGINEER may require to enable ENGINEER to review the submittal for the limited purposes required by paragraph 6.17.E. The numbers of each Sample to be submitted will be as specified in the Specifications.

C. Where a Shop Drawing or Sample is required by the Contract Documents or the schedule of Shop Drawings and Sample submittals acceptable to ENGINEER as required by paragraph 2.07, any related Work performed prior to ENGINEER's review and approval of the pertinent submittal will be at the sole expense and responsibility of CONTRACTOR.

D. *Submittal Procedures*

1. Before submitting each Shop Drawing or Sample, CONTRACTOR shall have determined and verified:

a. all field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

all information relative to means, methods, techniques, sequences, and procedures of construction and safety precautions and programs incident thereto; and

CONTRACTOR shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

2. Each submittal shall bear a stamp or specific written indication that CONTRACTOR has satisfied CONTRACTOR's obligations under the Contract Documents with respect to CONTRACTOR's review and approval of that submittal.

3. At the time of each submittal, CONTRACTOR shall give ENGINEER specific written notice of such variations, if any, that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents, such notice to be in a written communication separate from the submittal; and, in addition, shall cause a specific notation to be made on each Shop Drawing and Sample submitted to ENGINEER for review and approval of each such variation.

E. *ENGINEER's Review*

1. ENGINEER will timely review and approve Shop Drawings and Samples in accordance with the schedule of Shop Drawings and Sample submittals acceptable to ENGINEER.

ENGINEER's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. ENGINEER's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or

programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. ENGINEER's review and approval of Shop Drawings or Samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents unless CONTRACTOR has in writing called ENGINEER's attention to each such variation at the time of each submittal as required by paragraph 6.17.D.3 and ENGINEER has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample approval; nor will any approval by ENGINEER relieve CONTRACTOR from responsibility for complying with the requirements of paragraph
6.17.D.1.

F. *Resubmittal Procedures*

1. CONTRACTOR shall make corrections required by ENGINEER and shall return the required number of corrected copies of Shop Drawings and submit as required new Samples for review and approval. CONTRACTOR shall direct specific attention in writing to revisions other than the corrections called for by ENGINEER on previous submittals.

6.18 *Continuing the Work*

A. CONTRACTOR shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with OWNER. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by paragraph 15.04 or as OWNER and CONTRACTOR may otherwise agree in writing.

6.19 *CONTRACTOR's General Warranty and Guarantee*

A. CONTRACTOR warrants and guarantees to OWNER, ENGINEER, and ENGINEER's Consultants that all Work will be in accordance with the Contract Documents and will not be defective. CONTRACTOR's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than CONTRACTOR, Subcontractors, Suppliers, or any other individual or entity for whom CONTRACTOR is responsible; or

2. normal wear and tear under normal usage.

B. CONTRACTOR's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of CONTRACTOR's obligation to perform the Work in accordance with the Contract Documents:

1. observations by ENGINEER;

2. recommendation by ENGINEER or payment by OWNER of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by ENGINEER or any payment related thereto by OWNER;

4. use or occupancy of the Work or any part thereof by OWNER;

5. any acceptance by OWNER or any failure to do so;

6. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by ENGINEER;

7. any inspection, test, or approval by others; or

8. any correction of defective Work by OWNER.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage:

1. is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom; and

2. is caused in whole or in part by any negligent act or omission of CONTRACTOR, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not caused in part by any negligence or omission of an individual or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such individual or entity.

B. In any and all claims against OWNER or ENGINEER or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of CONTRACTOR, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for CONTRACTOR or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of CONTRACTOR under paragraph 6.20.A shall not extend to the liability of ENGINEER and ENGINEER's Consultants or to the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them arising out of:

1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

ARTICLE 7 - OTHER WORK

_

7.01 *Related Work at Site*

A. OWNER may perform other work related to the Project at the Site by OWNER's employees, or let other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to CONTRACTOR prior to starting any such other work; and

2. if OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in paragraph 10.05.

B. CONTRACTOR shall afford each other contractor who is a party to such a direct contract and each utility owner (and OWNER, if OWNER is performing the other work with OWNER's employees) proper and safe access to the Site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and shall properly coordinate the Work with theirs. Unless otherwise provided in the Contract Documents, CONTRACTOR shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. CONTRACTOR shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of ENGINEER and the others whose work will be affected. The duties and responsibilities of CONTRACTOR under this paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of CONTRACTOR in said direct contracts between OWNER and such utility owners and other contractors.

C. If the proper execution or results of any part of CONTRACTOR's Work depends upon work performed by others under this Article 7, CONTRACTOR shall inspect such other work and promptly report to ENGINEER in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of CONTRACTOR's Work. CONTRACTOR's failure to so report will constitute an acceptance of such other work as fit and

proper for integration with CONTRACTOR's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

A. If OWNER intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

B. Unless otherwise provided in the Supplementary Conditions, OWNER shall have sole authority and responsibility for such coordination.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

–

8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, OWNER shall issue all communications to CONTRACTOR through ENGINEER.

8.02 *Replacement of ENGINEER*

A. In case of termination of the employment of ENGINEER, OWNER shall appoint an engineer to whom CONTRACTOR makes no reasonable objection, whose status under the Contract Documents shall be that of the former ENGINEER.

8.03 *Furnish Data*

A. OWNER shall promptly furnish the data required of OWNER under the Contract Documents.

8.04 *Pay Promptly When Due*

A. OWNER shall make payments to CONTRACTOR promptly when they are due as provided in paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. OWNER's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.01 and 4.05. Paragraph 4.02 refers to OWNER's identifying and making available to CONTRACTOR copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by ENGINEER in preparing the Contract Documents.

8.06 *Insurance*

A. OWNER's responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. OWNER is obligated to execute Change Orders as indicated in paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. OWNER's responsibility in respect to certain inspections, tests, and approvals is set forth in paragraph 13.03.B.

8.09 *Limitations on OWNER's Responsibilities*

A. The OWNER shall not supervise, direct, or have control or authority over, nor be responsible for, CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work. OWNER will not be responsible for CONTRACTOR's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. OWNER's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. If and to the extent OWNER has agreed to furnish CONTRACTOR reasonable evidence that financial arrangements have been made to satisfy

OWNER's obligations under the Contract Documents, OWNER's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

_

9.01 *OWNER'S Representative*

A. ENGINEER will be OWNER's representative during the construction period. The duties and responsibilities and the limitations of authority of ENGINEER as OWNER's representative during construction are set forth in the Contract Documents and will not be changed without written consent of OWNER and ENGINEER.

9.02 *Visits to Site*

A. ENGINEER will make visits to the Site at intervals appropriate to the various stages of construction as ENGINEER deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of CONTRACTOR's executed Work. Based on information obtained during such visits and observations, ENGINEER, for the benefit of OWNER, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. ENGINEER will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. ENGINEER's efforts will be directed toward providing for OWNER a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, ENGINEER will keep OWNER informed of the progress of the Work and will endeavor to guard OWNER against defective Work.

B. ENGINEER's visits and observations are subject to all the limitations on ENGINEER's authority and responsibility set forth in paragraph 9.10, and particularly, but without limitation, during or as a result of ENGINEER's visits or observations of CONTRACTOR's Work ENGINEER will not supervise, direct, control, or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

A. If OWNER and ENGINEER agree, ENGINEER will furnish a Resident Project Representative to assist ENGINEER in providing more extensive observation of the Work. The responsibilities and authority and limitations thereon of any such Resident Project Representative and assistants will be as provided in paragraph 9.10 and in the Supplementary Conditions. If OWNER designates another representative or agent to represent OWNER at the Site who is not ENGINEER's Consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Clarifications and Interpretations*

A. ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents as ENGINEER may determine necessary, which shall be consistent with the intent of and reasonably inferable from the Contract Documents. Such written clarifications and interpretations will be binding on OWNER and CONTRACTOR. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a written clarification or interpretation, a Claim may be made therefor as provided in paragraph 10.05.

9.05 *Authorized Variations in Work*

A. ENGINEER may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on OWNER and also on CONTRACTOR, who shall perform the Work involved promptly. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of a Field Order, a Claim may be made therefor as provided in paragraph 10.05.

9.06 *Rejecting Defective Work*

A. ENGINEER will have authority to disapprove or reject Work which ENGINEER believes to be defective, or that ENGINEER believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. ENGINEER will also have authority to require special inspec-

tion or testing of the Work as provided in paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.07 *Shop Drawings, Change Orders and Payments*

A. In connection with ENGINEER's authority as to Shop Drawings and Samples, see paragraph 6.17.

B. In connection with ENGINEER's authority as to Change Orders, see Articles 10, 11, and 12.

C. In connection with ENGINEER's authority as to Applications for Payment, see Article 14.

9.08 *Determinations for Unit Price Work*

A. ENGINEER will determine the actual quantities and classifications of Unit Price Work performed by CONTRACTOR. ENGINEER will review with CONTRACTOR the ENGINEER's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). ENGINEER's written decision thereon will be final and binding (except as modified by ENGINEER to reflect changed factual conditions or more accurate data) upon OWNER and CONTRACTOR, subject to the provisions of paragraph 10.05.

9.09 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. ENGINEER will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes and other matters relating to the acceptability of the Work, the quantities and classifications of Unit Price Work, the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, and Claims seeking changes in the Contract Price or Contract Times will be referred initially to ENGINEER in writing, in accordance with the provisions of paragraph 10.05, with a request for a formal decision.

B. When functioning as interpreter and judge under this paragraph 9.09, ENGINEER will not show partiality to OWNER or CONTRACTOR and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. The rendering of a decision by ENGINEER pursuant to this paragraph 9.09 with respect to any such Claim, dispute, or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.07) will be a condition precedent to any exercise by OWNER or CONTRACTOR of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such Claim, dispute, or other matter.

9.10 *Limitations on ENGINEER's Authority and Responsibilities*

A. Neither ENGINEER's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by ENGINEER in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by ENGINEER shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by ENGINEER to CONTRACTOR, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. ENGINEER will not supervise, direct, control, or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work. ENGINEER will not be responsible for CONTRACTOR's failure to perform the Work in accordance with the Contract Documents.

C. ENGINEER will not be responsible for the acts or omissions of CONTRACTOR or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. ENGINEER's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

E. The limitations upon authority and responsibility set forth in this paragraph 9.10 shall also apply to ENGINEER's Consultants, Resident Project Representative, and assistants.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Agreement and without notice to any surety, OWNER may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Written Amendment, a Change Order, or a Work Change Directive. Upon receipt of any such document, CONTRACTOR shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If OWNER and CONTRACTOR are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

A. CONTRACTOR shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in paragraph 3.04, except in the case of an emergency as provided in paragraph 6.16 or in the case of uncovering Work as provided in paragraph 13.04.B.

10.03 *Execution of Change Orders*

A. OWNER and CONTRACTOR shall execute appropriate Change Orders recommended by ENGINEER (or Written Amendments) covering:

1. changes in the Work which are: (i) ordered by OWNER pursuant to paragraph 10.01.A, (ii) required because of acceptance of defective Work under paragraph 13.08.A or OWNER's correction of defective Work under paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by ENGINEER pursuant to paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, CONTRACTOR shall carry on the Work and adhere to the progress schedule as provided in paragraph 6.18.A.

10.04 *Notification to Surety*

A. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be CONTRACTOR's responsibility. The amount of each applicable Bond will be adjusted to reflect the effect of any such change.

10.05 *Claims and Disputes*

A. *Notice:* Written notice stating the general nature of each Claim, dispute, or other matter shall be delivered by the claimant to ENGINEER and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. Notice of the amount or extent of the Claim, dispute, or other matter with supporting data shall be delivered to the ENGINEER and the other party to the Contract within 60 days after the start of such event (unless ENGINEER allows additional time for claimant to submit additional or more accurate data in support of such Claim, dispute, or other matter). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of paragraph

12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to ENGINEER and the claimant within 30 days after receipt of the claimant's last submittal (unless ENGINEER allows additional time).

B. *ENGINEER's Decision:* ENGINEER will render a formal decision in writing within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any. ENGINEER's written decision on such Claim, dispute, or other matter will be final and binding upon OWNER and CONTRACTOR unless:

1. an appeal from ENGINEER's decision is taken within the time limits and in accordance with the dispute resolution procedures set forth in Article 16; or

2. if no such dispute resolution procedures have been set forth in Article 16, a written notice of intention to appeal from ENGINEER's written decision is delivered by OWNER or CONTRACTOR to the other and to ENGINEER within 30 days after the date of such decision, and a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction within 60 days after the date of such decision or within 60 days after Substantial Completion, whichever is later (unless otherwise agreed in writing by OWNER and CONTRACTOR), to exercise such rights or remedies as the appealing party may have with respect to such Claim, dispute, or other matter in accordance with applicable Laws and Regulations.

C. If ENGINEER does not render a formal decision in writing within the time stated in paragraph 10.05.B, a decision denying the Claim in its entirety shall be deemed to have been issued 31 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any.

D. No Claim for an adjustment in Contract Price or Contract Times (or Milestones) will be valid if not submitted in accordance with this paragraph 10.05.

ARTICLE 11 - COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK

_

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to CONTRACTOR will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by OWNER, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in paragraph
11.01.B.

1. Payroll costs for employees in the direct employ of CONTRACTOR in the performance of the Work under schedules of job classifications agreed upon by OWNER and CONTRACTOR. Such employees shall include without limitation superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by OWNER.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to CONTRACTOR unless OWNER deposits funds with CONTRACTOR with which to make payments, in which case the cash discounts shall accrue to OWNER. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to OWNER, and CONTRACTOR shall make provisions so that they may be obtained.

3. Payments made by CONTRACTOR to Subcontractors for Work performed by Subcontractors. If required by OWNER, CONTRACTOR shall obtain competitive bids from subcontractors acceptable to OWNER and CONTRACTOR and shall deliver such bids to OWNER, who will then determine, with the advice of ENGINEER, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as CONTRACTOR's Cost of the Work and fee as provided in this paragraph 11.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

The proportion of necessary transportation, travel, and subsistence expenses of CONTRACTOR's employees incurred in discharge of duties connected with the Work.

Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of CONTRACTOR.

Rentals of all construction equipment and machinery, and the parts thereof whether rented from CONTRACTOR or others in accordance with rental agreements approved by OWNER with the advice of ENGINEER, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which CONTRACTOR is liable, imposed by Laws and Regulations.

e . Deposits lost for causes other than negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by CONTRACTOR in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of OWNER. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining CONTRACTOR's fee.

The cost of utilities, fuel, and sanitary facilities at the Site.

Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expressage, and similar petty cash items in connection with the Work.

When the Cost of the Work is used to determine the value of a Change Order or of a Claim, the cost of premiums for additional Bonds and insurance required because of the changes in the Work or caused by the event giving rise to the Claim.

j. When all the Work is performed on the basis of cost-plus, the costs of premiums for all Bonds and insurance CONTRACTOR is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnerships and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by CONTRACTOR, whether at the Site or in CONTRACTOR's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph

11.01.A.1 or specifically covered by paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the CONTRACTOR's fee.

2. Expenses of CONTRACTOR's principal and branch offices other than CONTRACTOR's office at the Site.

3. Any part of CONTRACTOR's capital expenses, including interest on CONTRACTOR's capital employed for the Work and charges against CONTRACTOR for delinquent payments.

4. Costs due to the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraphs

11.01.A and 11.01.B.

C. *CONTRACTOR's Fee:* When all the Work is performed on the basis of cost-plus, CONTRACTOR's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, CONTRACTOR's fee shall be determined as set forth in paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to paragraphs 11.01.A and 11.01.B, CONTRACTOR will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to ENGINEER an itemized cost breakdown together with supporting data.

11.02 *Cash Allowances*

A. It is understood that CONTRACTOR has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums as may be acceptable to OWNER and ENGINEER. CONTRACTOR agrees that:

1. the allowances include the cost to CONTRACTOR (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

2. CONTRACTOR's costs for unloading and handling on the Site, labor, installation costs, overhead, profit, and other expenses contemplated for the allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

B. Prior to final payment, an appropriate Change Order will be issued as recommended by ENGINEER to reflect actual amounts due CONTRACTOR on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by CONTRACTOR will be made by ENGINEER subject to the provisions of paragraph 9.08.

B. Each unit price will be deemed to include an amount considered by CONTRACTOR to be adequate to cover CONTRACTOR's overhead and profit for each separately identified item.

C. OWNER or CONTRACTOR may make a Claim for an adjustment in the Contract Price in accordance with paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by CONTRACTOR differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect any other item of Work; and

3. if CONTRACTOR believes that CONTRACTOR is entitled to an increase in Contract Price as a result of having incurred additional expense or OWNER believes that OWNER is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

–

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the ENGINEER and the other party to the Contract in accordance with the provisions of paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in paragraph 11.01) plus a CONTRACTOR's fee for overhead and profit (determined as provided in paragraph 12.01.C).

C. *CONTRACTOR's Fee:* The CONTRACTOR's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under paragraphs and 11.01.A.2, the CONTRACTOR's fee shall be 15 percent;

for costs incurred under paragraph 11.01.A.3, the CONTRACTOR's fee shall be five percent;

where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under paragraphs 11.01.A.1 and

and that any higher tier Subcontractor and CONTRACTOR will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

no fee shall be payable on the basis of costs itemized under paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

the amount of credit to be allowed by CONTRACTOR to OWNER for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in CONTRACTOR's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in CONTRACTOR's fee shall be computed on the basis of the net change in accordance with paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times (or Milestones) may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Times (or Milestones) shall be based on written notice submitted by the party making the claim to the ENGINEER and the other party to the Contract in accordance with the provisions of paragraph 10.05.

B. Any adjustment of the Contract Times (or Milestones) covered by a Change Order or of any Claim for an adjustment in the Contract Times (or Milestones) will be determined in accordance with the provisions of this Article 12.

12.03 *Delays Beyond CONTRACTOR's Control*

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of CONTRACTOR, the Contract Times (or Milestones) will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in paragraph 12.02.A. Delays beyond the control of CONTRACTOR shall include, but not be limited to, acts or neglect by OWNER, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

12.04 *Delays Within CONTRACTOR's Control*

A. The Contract Times (or Milestones) will not be extended due to delays within the control of CONTRACTOR. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of CONTRACTOR.

12.05 *Delays Beyond OWNER's and CONTRACTOR's Control*

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both OWNER and CONTRACTOR, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay shall be CONTRACTOR's sole and exclusive remedy for such delay.

12.06 *Delay Damages*

A. In no event shall OWNER or ENGINEER be liable to CONTRACTOR, any Subcontractor, any Supplier, or any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from:

1. delays caused by or within the control of CONTRACTOR; or

2. delays beyond the control of both OWNER and CONTRACTOR including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God, or acts or neglect by utility owners or other contractors performing other work as contemplated by Article 7.

B. Nothing in this paragraph 12.06 bars a change in Contract Price pursuant to this Article 12 to compensate CONTRACTOR due to delay, interference, or disruption directly attributable to actions or inactions of OWNER or anyone for whom OWNER is responsible.

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

_

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which OWNER or ENGINEER has actual knowledge will be given to CONTRACTOR. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

A. OWNER, ENGINEER, ENGINEER's Consultants, other representatives and personnel of OWNER, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. CONTRACTOR shall provide them proper and safe conditions for such access and advise them of CONTRACTOR's Site safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. CONTRACTOR shall give ENGINEER timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. OWNER shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to paragraph 13.04.B shall be paid as provided in said paragraph 13.04.B; and

3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, CONTRACTOR shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish ENGINEER the required certificates of inspection or approval.

D. CONTRACTOR shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for OWNER's and ENGINEER's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to CONTRACTOR's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to OWNER and ENGINEER.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by CONTRACTOR without written concurrence of ENGINEER, it must, if requested by ENGINEER, be uncovered for observation.

F. Uncovering Work as provided in paragraph 13.03.E shall be at CONTRACTOR's expense unless CONTRACTOR has given ENGINEER timely notice of CONTRACTOR's intention to cover the same and ENGINEER has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of ENGINEER, it must, if requested by ENGINEER, be uncovered for ENGINEER's observation and replaced at CONTRACTOR's expense.

B. If ENGINEER considers it necessary or advisable that covered Work be observed by ENGINEER or inspected or tested by others, CONTRACTOR, at ENGINEER's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as ENGINEER may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment. If it is found that such Work is defective, CONTRACTOR shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and OWNER shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, OWNER may make a Claim therefor as provided in paragraph 10.05. If, however, such Work is not found to be defective, CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Times (or Milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

13.05 *OWNER May Stop the Work*

A. If the Work is defective, or CONTRACTOR fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, OWNER may order CONTRACTOR to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of OWNER to stop the Work shall not give rise to any duty on the part of OWNER to exercise this right for the benefit of CONTRACTOR, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

A. CONTRACTOR shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by ENGINEER, remove it from the Project and replace it with Work that is not defective. CONTRACTOR shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for CONTRACTOR's use by OWNER or permitted by Laws and Regulations as contemplated in paragraph 1 is found to be defective, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions: (i) repair such defective land or areas, or (ii) correct such defective Work or, if the defective Work has been rejected by OWNER, remove it from the Project and replace it with Work that is not defective, and (iii) satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom. If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the defective Work corrected or repaired or may have the rejected Work removed and replaced, and all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by CONTRACTOR.

2 In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications or by Written Amendment.

C. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

D. CONTRACTOR's obligations under this paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, OWNER (and, prior to ENGINEER's recommendation of final payment, ENGINEER) prefers to accept it, OWNER may do so. CONTRACTOR shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to OWNER's evaluation of and determination to accept such defective Work (such costs to be approved by ENGINEER as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by CONTRACTOR pursuant to this sentence. If any such acceptance occurs prior to ENGINEER's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and OWNER shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, OWNER may make a Claim therefor as provided in paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by CONTRACTOR to OWNER.

13.09 *OWNER May Correct Defective Work*

A. If CONTRACTOR fails within a reasonable time after written notice from ENGINEER to correct defective Work or to remove and replace rejected Work as required by ENGINEER in accordance with paragraph 13.06.A, or if CONTRACTOR fails to perform the Work in accordance with the Contract Documents, or if CONTRACTOR fails to comply with any other provision of the Contract Documents, OWNER may, after seven days written notice to CONTRACTOR, correct and remedy any such deficiency.

B. In exercising the rights and remedies under this paragraph, OWNER shall proceed expeditiously. In connection with such corrective and remedial action, OWNER may exclude CONTRACTOR from all or part of the Site, take possession of all or part of the Work and suspend CONTRACTOR's services related thereto, take possession of CONTRACTOR's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which OWNER has paid CONTRACTOR but which are stored elsewhere. CONTRACTOR shall allow OWNER, OWNER's representatives, agents and employees, OWNER's other contractors, and ENGINEER and ENGINEER's Consultants access to the Site to enable OWNER to exercise the rights and remedies under this paragraph.

C. All Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by OWNER in exercising the rights and remedies under this paragraph 13.09 will be charged against CONTRACTOR, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, OWNER may make a Claim therefor as provided in paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of CONTRACTOR's defective Work.

D. CONTRACTOR shall not be allowed an extension of the Contract Times (or Milestones) because of any delay in the performance of the Work attributable to the exercise by OWNER of OWNER's rights and remedies under this paragraph 13.09.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

–

14.01 *Schedule of Values*

A. The schedule of values established as provided in paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to ENGINEER. Progress payments on account of Unit Price Work will be based on the number of units completed.

A. *Applications for Payments*

1. At least 20 days before the date established for each progress payment (but not more often than once a month), CONTRACTOR shall submit to ENGINEER for review an Application for Payment filled out and signed by CONTRACTOR covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that OWNER has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect OWNER's interest therein, all of which must be satisfactory to OWNER.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of CONTRACTOR stating that all previous progress payments received on account of the Work have been applied on account to discharge CONTRACTOR's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to pro-gress payments will be as stipulated in the Agreement.

B. *Review of Applications*

1. ENGINEER will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to OWNER or return the Application to CONTRACTOR indicating in writing ENGINEER's reasons for refusing to recommend payment. In the latter case, CONTRACTOR may make the necessary corrections and resubmit the Application.

2. ENGINEER's recommendation of any payment requested in an Application for Payment will constitute a representation by ENGINEER to OWNER, based on ENGINEER's observations on the Site of the executed Work as an experienced

and qualified design professional and on ENGINEER's review of the Application for Payment and the accompanying data and schedules, that to the best of ENGINEER's knowledge, information and belief:

the Work has progressed to the point indicated;

the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under paragraph 9.08, and to any other qualifications stated in the recommendation); and

the conditions precedent to CONTRACTOR's being entitled to such payment appear to have been fulfilled in so far as it is ENGINEER's responsibility to observe the Work.

3. By recommending any such payment ENGINEER will not thereby be deemed to have represented that: (i) inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to ENGINEER in the Contract Documents; or (ii) that there may not be other matters or issues between the parties that might entitle CONTRACTOR to be paid additionally by OWNER or entitle OWNER to withhold payment to CONTRACTOR.

4. Neither ENGINEER's review of CONTRACTOR's Work for the purposes of recommending payments nor ENGINEER's recommendation of any payment, including final payment, will impose responsibility on ENGINEER to supervise, direct, or control the Work or for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for CONTRACTOR's failure to comply with Laws and Regulations applicable to CONTRACTOR's performance of the Work. Additionally, said review or recommendation will not impose responsibility on ENGINEER to make any examination to ascertain how or for what purposes CONTRACTOR has used the moneys paid on account of the Contract Price, or to determine that title to any of the Work, materials, or equipment has passed to OWNER free and clear of any Liens.

5. ENGINEER may refuse to recommend the whole or any part of any payment if, in ENGINEER's opinion, it would be incorrect to make the representations to OWNER referred to in paragraph 14.02.B.2. ENGINEER may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in ENGINEER's opinion to protect OWNER from loss because:

the Work is defective, or completed Work has been damaged, requiring correction or replacement;

the Contract Price has been reduced by Written Amendment or Change Orders;

OWNER has been required to correct defective Work or complete Work in accordance with paragraph 13.09; or

ENGINEER has actual knowledge of the occurrence of any of the events enumerated in paragraph 15.02.A.

C. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to OWNER with ENGINEER's recommendation, the amount recommended will (subject to the provisions of paragraph 14.02.D) become due, and when due will be paid by OWNER to CONTRACTOR.

D. *Reduction in Payment*

1. OWNER may refuse to make payment of the full amount recommended by ENGINEER because:

claims have been made against OWNER on account of CONTRACTOR's performance or furnishing of the Work;

Liens have been filed in connection with the Work, except where CONTRACTOR has delivered a specific Bond satisfactory to

OWNER to secure the satisfaction and discharge of such Liens;

there are other items entitling OWNER to a set-off against the amount recommended; or

OWNER has actual knowledge of the occurrence of any of the events enumerated in paragraphs 14.02.B.5.a through 14.02.B.5.c or paragraph 15.02.A.

2. If OWNER refuses to make payment of the full amount recommended by ENGINEER, OWNER must give CONTRACTOR immediate written notice (with a copy to ENGINEER) stating the reasons for such action and promptly pay CONTRACTOR any amount remaining after deduction of the amount so withheld. OWNER shall promptly pay CONTRACTOR the amount so withheld, or any adjustment thereto agreed to by OWNER and CONTRACTOR, when CONTRACTOR corrects to OWNER's satisfaction the reasons for such action.

3. If it is subsequently determined that OWNER's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by paragraph 14.02.C.1.

14.03 *CONTRACTOR's Warranty of Title*

A. CONTRACTOR warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to OWNER no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

A. When CONTRACTOR considers the entire Work ready for its intended use CONTRACTOR shall notify OWNER and ENGINEER in writing that the entire Work is substantially complete (except for items specifically listed by CONTRACTOR as incomplete) and request that ENGINEER issue a certificate of Substantial Completion. Promptly thereafter, OWNER, CONTRACTOR, and ENGINEER shall make an inspection of the Work to determine the status of completion. If ENGINEER does not consider the Work substantially complete, ENGINEER will notify CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers the Work substantially complete, ENGINEER will prepare and deliver to OWNER a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. OWNER shall have seven days after receipt of the tentative certificate during which to make written objection to ENGINEER as to any provisions of the certificate or attached list. If, after considering such objections, ENGINEER concludes that the Work is not substantially complete, ENGINEER will within 14 days after submission of the tentative certificate to OWNER notify CONTRACTOR in writing, stating the reasons therefor. If, after consideration of OWNER's objections, ENGINEER considers the Work substantially complete, ENGINEER will within said 14 days execute and deliver to OWNER and CONTRACTOR a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as ENGINEER believes justified after consideration of any objections from OWNER. At the time of delivery of the tentative certificate of Substantial Completion ENGINEER will deliver to OWNER and CONTRACTOR a written recommendation as to division of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless OWNER and CONTRACTOR agree otherwise in writing and so inform ENGINEER in writing prior to ENGINEER's issuing the definitive certificate of Substantial Completion, ENGINEER's aforesaid recommendation will be binding on OWNER and CONTRACTOR until final payment.

B. OWNER shall have the right to exclude CONTRACTOR from the Site after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Use by OWNER at OWNER's option of any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which OWNER, ENGINEER, and CONTRACTOR agree constitutes a separately functioning and usable part of the Work that can be used by OWNER for its intended purpose without significant interference with CONTRACTOR's performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work subject to the following conditions.

1. OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER

believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees that such part of the Work is substantially complete, CONTRACTOR will certify to OWNER and ENGINEER that such part of the Work is substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. CONTRACTOR at any time may notify OWNER and ENGINEER in writing that CONTRACTOR considers any such part of the Work ready for its intended use and substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after either such request, OWNER, CONTRACTOR, and ENGINEER shall make an inspection of that part of the Work to determine its status of completion. If ENGINEER does not consider that part of the Work to be substantially complete, ENGINEER will notify OWNER and CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers that part of the Work to be substantially complete, the provisions of paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

2. No occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

A. Upon written notice from CONTRACTOR that the entire Work or an agreed portion thereof is complete, ENGINEER will promptly make a final inspection with OWNER and CONTRACTOR and will notify CONTRACTOR in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. CONTRACTOR shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. *Application for Payment*

1. After CONTRACTOR has, in the opinion of ENGINEER, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, Bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in paragraph 6.12), and other documents, CONTRACTOR may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by: (i) all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by subparagraph 5.04.B.7; (ii) consent of the surety, if any, to final payment; and (iii) complete and legally effective releases or waivers (satisfactory to OWNER) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in paragraph 14.07.A.2 and as approved by OWNER, CONTRACTOR may furnish receipts or releases in full and an affidavit of CONTRACTOR that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and

(ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which OWNER or OWNER's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, CONTRACTOR may furnish a Bond or other collateral satisfactory to OWNER to indemnify OWNER against any Lien.

B. *Review of Application and Acceptance*

1. If, on the basis of ENGINEER's observation of the Work during construction and final inspection, and ENGINEER's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, ENGINEER is satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been fulfilled, ENGINEER will, within ten days after receipt of the final Application for Payment, indicate in writing ENGINEER's recommendation of payment and present the Application for Payment to OWNER for payment. At the same time ENGINEER will also give written notice to OWNER and CONTRACTOR that the Work is acceptable subject to the provisions of paragraph

14.09. Otherwise, ENGINEER will return the Application for Payment to CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case CON-

TRACTOR shall make the necessary corrections and resubmit the Application for Payment.

C. *Payment Becomes Due*

1. Thirty days after the presentation to OWNER of the Application for Payment and accompanying documentation, the amount recommended by ENGINEER will become due and, when due, will be paid by OWNER to CONTRACTOR.

14.08 *Final Completion Delayed*

A. If, through no fault of CONTRACTOR, final completion of the Work is significantly delayed, and if ENGINEER so confirms, OWNER shall, upon receipt of CONTRACTOR's final Application for Payment and recommendation of ENGINEER, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by OWNER for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by CONTRACTOR to ENGINEER with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by OWNER against CONTRACTOR, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from CONTRACTOR's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by CONTRACTOR against OWNER other than those previously made in writing which are still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

_

15.01 OWNER May Suspend Work

A. At any time and without cause, OWNER may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to CONTRACTOR and ENGINEER which will fix the date on which Work will be resumed. CONTRACTOR shall resume the Work on the date so fixed. CONTRACTOR shall be allowed an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if CONTRACTOR makes a Claim therefor as provided in paragraph 10.05.

15.02 *OWNER May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. CONTRACTOR's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established under paragraph 2.07 as adjusted from time to time pursuant to paragraph 6.04);

2. CONTRACTOR's disregard of Laws or Regulations of any public body having jurisdiction;

3. CONTRACTOR's disregard of the authority of ENGINEER; or

4. CONTRACTOR's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in paragraph 15.02.A occur, OWNER may, after giving CONTRACTOR (and the surety, if any) seven days written notice, terminate the services of CONTRACTOR, exclude CONTRACTOR from the Site, and take possession of the Work and of all CONTRACTOR's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by CONTRACTOR (without liability to CONTRACTOR for trespass or conversion), incorporate in the Work all materials and equipment stored at the Site or for which OWNER has paid CONTRACTOR but which are stored elsewhere, and finish the Work as

OWNER may deem expedient. In such case, CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by OWNER arising out of or relating to completing the Work, such excess will be paid to CONTRACTOR. If such claims, costs, losses, and damages exceed such unpaid balance, CONTRACTOR shall pay the difference to OWNER. Such claims, costs, losses, and damages incurred by OWNER will be reviewed by ENGINEER as to their reasonableness and, when so approved by ENGINEER, incorporated in a Change Order. When exercising any rights or remedies under this paragraph OWNER shall not be required to obtain the lowest price for the Work performed.

C. Where CONTRACTOR's services have been so terminated by OWNER, the termination will not affect any rights or remedies of OWNER against CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of moneys due CONTRACTOR by OWNER will not release CONTRACTOR from liability.

15.03 *OWNER May Terminate For Convenience*

A. Upon seven days written notice to CONTRACTOR and ENGINEER, OWNER may, without cause and without prejudice to any other right or remedy of OWNER, elect to terminate the Contract. In such case, CONTRACTOR shall be paid (without duplication of any items):

1. for completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. for expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. for all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. for reasonable expenses directly attributable to termination.

B. CONTRACTOR shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *CONTRACTOR May Stop Work or Terminate*

A. If, through no act or fault of CONTRACTOR, the Work is suspended for more than 90 consecutive days by OWNER or under an order of court or other public authority, or ENGINEER fails to act on any Application for Payment within 30 days after it is submitted, or OWNER fails for 30 days to pay CONTRACTOR any sum finally determined to be due, then CONTRACTOR may, upon seven days written notice to OWNER and ENGINEER, and provided OWNER or ENGINEER do not remedy such suspension or failure within that time, terminate the Contract and recover from OWNER payment on the same terms as provided in paragraph
15.03. In lieu of terminating the Contract and without prejudice to any other right or remedy, if ENGINEER has failed to act on an Application for Payment within 30 days after it is submitted, or OWNER has failed for 30 days to pay CONTRACTOR any sum finally determined to be due, CONTRACTOR may, seven days after written notice to OWNER and ENGINEER, stop the Work until payment is made of all such amounts due CONTRACTOR, including interest thereon. The provisions of this paragraph 15.04 are not intended to preclude CONTRACTOR from making a Claim under paragraph
10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to CONTRACTOR's stopping the Work as permitted by this paragraph.

ARTICLE 16 - DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Dispute resolution methods and procedures, if any, shall be as set forth in the Supplementary Conditions. If no method and procedure has been set forth, and subject to the provisions of paragraphs 9.09 and 10.05, OWNER and CONTRACTOR may exercise such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any dispute.

ARTICLE 17 - MISCELLANEOUS

–

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents, and the provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Agreement.

17.05 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

NOTICE OF AWARD

To:_____ DATE: _____

Project: UPGRADES TO THE ETOWAH RAW WATER PUMP STATION FOR THE CITY OF ROME WATER SYSTEM.

The **OWNER** has considered the **BID** submitted by you for the above-described **WORK** in response to its Advertisement for Bids dated_____, 20_____and Information for Bidders.

You are hereby notified that your **BID** has been accepted in the amount of $_____.

You are required by the Information for Bidders to execute the Agreement and furnish the required **CONTRACTOR'S** Performance **BOND**, Payment **BOND** and Certificates of Insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said **BONDS** within ten (10) days from the date of this Notice, said **OWNER** will be entitled to consider all your rights arising out of the **OWNER'S** acceptance of your **BID** as abandoned and as a forfeiture of your **BID BOND**. The **OWNER** will be entitles to such other rights as may be granted by law.

You are required to return an acknowledged copy of this **NOTICE OF AWARD** to the **OWNER**.

Dated this _____day of _____, 20___.

_____.
(Owner)

By:_____

Title:_____

ACCEPTANCE OF NOTICE

Receipt of the above **NOTICE OF AWARD** is hereby acknowledged by_____this _____day of _____, 20____.

By:_____ Title:_____

NOTICE TO PROCEED

To:_____ DATE:_____

Project: UPGRADES TO THE ETOWAH RAW WATER PUMP STATION FOR THE CITY OF ROME WATER SYSTEM.

YOU ARE HEREBY NOTIFIED TO COMMENCE **WORK** IN ACCORDANCE WITH THE **AGREEMENT** DATED _____. 20____, ON OR BEFORE_____, 20____, AND YOU ARE TO COMPLETE THE **WORK** WITHIN _____180_____ CONSECUTIVE DAYS THEREAFTER. THE DATE OF COMPLETION OF ALL **WORK** IS THEREFORE_____, 20____.

_____City of Rome, Georgia_____
(OWNER)

By:_____

Title:_____

ACCEPTANCE OF NOTICE

Receipt of the above **NOTICE TO PROCEED** is hereby acknowledged by:

_____.

this _____day of _____, 2016.

By:_____

Title:_____

F.E.I. No._____

SUPPLEMENTAL GENERAL CONDITIONS

(SPECIAL CONDITIONS)

1. CONTRACT DOCUMENTS:

The work shall conform to the following drawings, all of which form a part of these specifications, and are available at the office of Southern Engineering & Surveying, Inc., in Rome, Georgia.

UPGRADES TO THE ETOWAH RAW WATER PUMP STATION
FOR THE
CITY OF ROME, GEORGIA WATER & SEWER DIVISION

(See Drawings E-361-0 through E-361-S.6, dated February 18, 2016)

2. TOOLS, PLANT AND EQUIPMENT:

If at any time before the commencement or during the progress of the work, tools, plant or equipment appear to the Engineer to be insufficient, inefficient or inappropriate to secure the quality of the work required or the proper rate of progress, the Engineer may order the Contractor to increase their efficiency, to improve their character, to augment their number, or to substitute new tools, plant or equipment as the case may be, and the Contractor must conform to such order; but the failure of the Engineer to demand such increase of efficiency, number or improvement shall not relieve the Contractor of his obligation to secure the quality of work and the rate of progress necessary to complete the work within the time required by this Contract to the satisfaction of the Owner.

3. INSPECTION AND TESTING OF MATERIALS:

(Add the following to Article 13.4 “Tests and Inspections” of the General Conditions).

The Owner “will pay for all Job Control Testing” (such as concrete cylinders, soil compaction, etc.). This does not include the normal samples and tests as specified in Section 1 (1-02) of these specifications.

4. INSPECTION AND RESIDENT PROJECT REPRESENTATIVE:

Add the following to Article 9 “Engineer’s Status During Construction” of the General Conditions).

The Engineer's inspector and the Owner shall have access to the work wherever it is in progress, and the Contractor shall provide proper facilities for such access and inspection.

The Contractor shall furnish the Engineer with every reasonable facility for ascertaining whether or not the work performed and materials used are in accordance with the requirements and intent of the Specifications and Contract. No work shall be done or materials used without suitable review and observations by the Engineer or his representative. Failure to reject any defective work or materials shall not in any way prevent later rejection when such defect is discovered, or obligate the Owner to final acceptance.

(Duties, Responsibilities and Limitations of the Authority of the Resident Project Representative)

A. General

The Resident Project Representative is the ENGINEER's agent and shall act under the supervision and direction of the ENGINEER. He shall confer with the ENGINEER regarding his actions, and shall generally communicate with the Owner only through the ENGINEER.

B. Duties and Responsibilities

The Resident Project Representative shall:

1. Schedule: Review the progress schedule prepared by the CONTRACTOR for compliance with the contract and give written advice to the ENGINEER concerning its acceptability.

2. Conferences: Attend pre-construction conferences. Arrange a schedule of progress meetings and other job conferences as required in consultation with the ENGINEER and notify those expected to attend in advance. Maintain and circulate copies of records of the meetings.

3. Liaison:

a. Serve as the ENGINEER's liaison with the CONTRACTOR working principally through the CONTRACTOR's superintendent. Alert the CONTRACTOR, through his superintendent, to the hazards involved in accepting and acting upon instructions from the OWNER or others, except such instructions transmitted through the ENGINEER.

b. Cooperate with the CONTRACTOR in his dealings with the various local agencies having jurisdiction over the Project in order to complete service connections to public utilities and facilities.

c. Assist the ENGINEER in obtaining from the OWNER additional details or information, when required at the job site for proper execution of the work.

4. Approvals: When required, assist the ENGINEER in obtaining from the CONTRACTOR a list of his proposed suppliers and subcontractors.

5. Samples: Assist the ENGINEER in obtaining field samples of materials delivered to the site which are required to be furnished, and keep record of actions taken by the ENGINEER.

6. Shop Drawings:

a. Receive approved shop drawings and other submissions from the ENGINEER; record data received, maintain a file of the drawings and submissions, and check construction for compliance with them.

b. Alert the CONTRACTOR's superintendent when he observes materials or equipment being installed before approval of shop drawings or samples, where such are required, and advise the ENGINEER when he believes it is necessary to disapprove work as failing to conform to the Contract Documents.

7. Review of Work, Inspections, and Tests:

a. Conduct on-site observations of the work in progress for the ENGINEER as a basis for determining that the Project is proceeding in accordance with the Contract Documents, and report to the ENGINEER whenever he believes that any work should be rejected or specially tested, or that the work should be stopped to insure that the completed project will comply with the requirements of the Contract Documents.

b. Verify that tests, including equipment and systems startup, which are required by the Contract Documents are conducted and that the CONTRACTOR maintains adequate records thereof; observe, record and report to the ENGINEER appropriate details relative to the test procedures and startups.

c. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Project, record the outcome of these inspections and report to the ENGINEER.

8. Interpretation of Contract Document: Transmit to the CONTRACTOR the ENGINEER's interpretations of the Contract Documents.

9. Modifications: Consider and evaluate the CONTRACTOR's suggestions for modifications in drawings or specifications and report them with recommendations to the ENGINEER.

10. Records:

a. Maintain at the job site orderly files for correspondence, reports of job conferences, shop drawings and other submissions, reproductions of original contract documents including all addenda, change orders, field orders, and additional drawings issued subsequent to the award of the contract, the ENGINEER's interpretations of the Contract Documents, progress reports, and other project related documents.

b. Keep a diary or log book, recording hours on the job site, weather conditions, list of visiting officials, daily activities, decisions, observations in general and specific observations in more detail as in the case of observing test procedures.

c. Record names, addresses and telephone numbers of all CONTRACTORS, subcontractors, and major material suppliers.

d. Maintain a set of drawings on which authorized changes are noted, and deliver to the ENGINEER at the completion of the project.

11. Reports:

a. Furnish the ENGINEER periodic reports, as required, of progress of the project and the CONTRACTOR's compliance with the approved progress schedule.

b. Consult with the ENGINEER in advance of scheduled major tests, inspections, or start of important phases of the project.

12. Payment Requisitions: Review applications for payment with the CONTRACTOR for compliance with the established procedure for their submission and forward them with recommendations to the ENGINEER, noting particularly their relation to the work completed and materials and equipment delivered at the site.

13. Guarantees, Certificates, Maintenance and Operation Manuals: During the course of the work, assemble guarantees, certificates, maintenance and operation manuals, and other required data to the furnished by the CONTRACTOR and upon acceptance of the project, deliver this material to the ENGINEER for his review and forwarding to the Owner.

14. Completion:

a. Prior to inspection for substantial completion, submit to the CONTRACTOR a list of observed items requiring correction.

b. Conduct final inspection in the company of the ENGINEER and the OWNER and prepare a final list of items to be corrected.

c. Verify that all items on final list have been corrected and make recommendations to the ENGINEER concerning acceptance.

C. Limitations of Authority

Except upon written instructions of the ENGINEER, the Resident Project Representative:

1. Shall not authorize any deviation from the Contract Documents.

2. Shall not undertake any of the responsibilities of the CONTRACTOR, the subcontractors, or the CONTRACTOR's superintendent.

3. Shall not expedite the work for the CONTRACTOR.

4. Shall not advise on or issue directions relative to any aspect of the means, methods, techniques, sequences or procedures of construction unless such is specifically called for in the Contract Documents.

5. Shall not authorize the OWNER to occupy the project in whole or in part.

5. EXTRAS:

(Add the following to Article 10 "Changes in the Work" of the General Conditions).

The Contractor shall consider the itemized quantities, as the quantities required completing the work for the purpose of bidding. Should actual quantities required in the construction of the work be greater or less than the quantities shown on the items, an amount equal to the difference in quantities at the unit prices bid for the items will be added to or deducted from the contract prices.

6. TIME FOR COMPLETION AND LIQUIDATED DAMAGES:

The Contractor shall not commence work under this contract until the Owner has issued him a written Notice to Proceed. The Contractor shall commence work within the ten calendar days after the date set in the Notice to Proceed and shall prosecute said work with faithfulness and energy to complete the entire work ready for use not later than the number of calendar days stipulated in the Proposal. In no case shall the time for completion exceed the following calendar days after the date set in the Notice to Proceed.

CONTRACT	CALENDAR DAYS
1	180

The Bidder further agrees to pay liquidated damages the sum of $100.00 for each consecutive calendar day thereafter as hereinafter provided in the General Conditions. The parties understand and agree that a determination of the damages which could be incurred by the Owner is difficult to measure, and that the amount of damages is fixed and agreed upon by the parties, not as a penalty, but as an amount which reflects the probable and foreseeable damage due to late performance by the Bidder. Payment of such damages shall not constitute a limitation or waiver of any rights or remedies of the Owner.

7. PAYMENTS AND COMPLETION:

(Add the following to Article 14, "Payments to Contractor and Completion" of the General Conditions).

To insure the proper performance of this contract, the Owner shall retain ten percent (10%) of the amount of each estimate until final completion and acceptance of all work covered by this contract.

8. BONDS AND INSURANCE:

(Article 5 of the General Conditions is hereby amended by the provision that:)

(a) Contractor's Public Liability Coverage shall be as follows:

Bodily Injury Liability	-	$2,000,000 single limit per occurrence
Property Damage Liability	-	$100,000 each accident

By endorsement, coverage shall include liability arising as a result of explosion, collapse or underground hazards.

(b) Automobile Public Liability Coverage shall be as follows:

Bodily Injury	-	$200,000 each person
	-	$600,000 each accident
Property Damage Liability	-	$100,000 each accident

(c) Builder's Risk Insurance Coverage shall be as follows:

Fire and extended coverage on a 100 percent basis (completed value form) on insurable portions of both structures and machinery and equipment located therein for the benefit of the Applicant, the prime contractor, and all subcontractors, as their interest may appear.

Coverage shall include vandalism and malicious mischief.

(d) Contractor shall furnish Statutory Workmen's Compensation.

(e) The Contractor shall either (1) require each of his subcontractors to procure and to maintain during the life of his subcontract, Subcontractors Public Liability and Property Damage of the type and in the same amounts as specified herein, or (2) insure the activities of his subcontractors in his own policy.

(f) The Contractor shall furnish a performance bond at least equal to one hundred percent (100%) of the contract price as a security for the faithful performance of this contract and also a payment bond in an amount not less than one hundred percent (100%) of the contract price …. (Bonds must be valid for one year beyond the date of acceptance of the completed project).

9. COPIES OF DOCUMENTS:

(Article 2.2 "Copies of Documents" of the General Conditions shall be revised to read as follows:)

OWNER shall furnish to CONTRACTOR up to five copies of the Contract Documents as are reasonably necessary for the execution of the work. Additional copies will be furnished, upon request, at the cost of reproduction.

10. EQUAL EMPLOYMENT OPPORTUNITY:

The Contractor and Subcontractors agree to comply with provisions of Executive Order 11246. In addition, all Contractors and Subcontractors must comply with Executive Order No. 11375 which amends Executive order 11246 to provide for equal employment under Federally assisted contracts regardless of race, creed, color, religion, sex, or national origin.

11. "ANTI-KICKBACK ACT":

All contracts for construction shall include a provision for compliance with the Copeland "Anti-Kickback" Act (18 U.S.C. 874) as supplemented in the Department of Labor regulations (29 CFR, Part 3). This Act provides that each Contractor shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he is otherwise entitled.

12. SAFETY AND HEALTH REGULATIONS:

The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL 91-54).

13. TABLE OF CONTENTS:

The table of contents and index is for the convenience of the users of the specifications. Whether the elements are properly placed, and the fact that any part of the work is not in the applicable section, shall not relieve the Contractor of his responsibility.

14. SILTATION:

The Contractor shall conduct his work so as to minimize siltation and bank erosion during construction.

15. USE AND DISPOSAL OF CHEMICALS:

All chemicals used during project construction or furnished for project operations, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with instructions.

16. "OR EQUAL" CLAUSE:

Whenever a material, article or piece of equipment is identified on the Plans or in the Specifications by reference to manufacturers' or vendors' names, trade names, catalogue numbers, etc., it is intended merely to establish a standard, and any material, article, or piece of equipment of other manufacturers and vendors which corresponds in quality and kind, in the opinion of the Engineer, will be equally acceptable.

Manufacturers' or vendors' materials, articles or pieces of equipment not specifically mentioned will be considered by the Engineer if full technical information and installation history is submitted to the Engineer two weeks prior to opening of bids. All prospective bidders will be notified by addendum listing additional acceptable materials, articles, or pieces of equipment, which are approved.

17. CONTRACTOR'S AVAILABILITY:

The Contractor shall have a responsible representative on call at all times. The Contractor will also maintain a crew with necessary tools and equipment available on call after normal working hours, on weekends, during inclement weather, and other times when work is not in progress to perform any necessary emergency repair work which may occur as a result of the work under this Contract.

Negligence on the part of the Contractor, in the opinion of the Engineer, to satisfy such situations will be just cause for the Engineer to take whatever action necessary to remedy the situation at the expense of the Contractor.

18. MODIFICATION OF QUANTITIES:

The itemized quantities shall be considered by the Contractor as the quantities required to complete the work for the purpose of bidding. Should actual quantities required in the construction work be greater or less than the quantities shown on the items, an amount equal to the difference in quantities at the unit prices bid for the items will be added to or deducted from the contract price.

19. BROKEN MAINS:

If water mains under pressure are accidentally broken or ruptured due to the negligence or carelessness on the part of the Contractor, resulting in interrupted service to any customer, the Contractor shall immediately notify the Owner and proceed to make the necessary repairs at no additional cost to the Owner.

20. D.O.T. SPECIFICATIONS:

Any reference to D.O.T. Specifications on the plans or in these specifications, refer to the latest revision of the Georgia Department of Transportation Standard Specifications.

21. WATER SERVICE INTERRUPTION:

The Contractor shall not interrupt water service to any residential or commercial water customer for a period exceeding four (4) consecutive hours for any reason whatsoever while performing the work under this contract. Under any circumstances where water service will be interrupted for greater periods, the Contractor shall provide temporary water service in a manner approved by the Engineer or Owner. The work should be scheduled in such a manner that temporary service will not be required except in an emergency.

If the requirements of this section of the specifications are not met by the Contractor, the Owner reserves the right to take whatever steps are necessary to restore interrupted service and deduct the cost thereof from the payment due the Contractor provided the Engineer shall approve the amount charged to the Contractor.

22. WORK ON OR NEAR HIGHWAY:

Whenever work under this contract is performed on or near highway or road open to traffic, the Contractor shall use proper care and vigilance to avoid injury to persons or property. This shall

include warning signs or signals and flagmen where necessary, and as required by the Standard Specifications, Section 104, Paragraph 104.05.

23. ERRORS AND DISCREPANCEIS:

The Contractor shall promptly report to the Engineer any discrepancy or error which he may discover during the course of the work in the plans, specifications or contract. The location, size and type of existing utilities shown on the plans represent the best available information, but are not guaranteed to be correct.

24. ACCIDENTS:

The Contractor shall provide, at the site, such equipment and medical facilities as are necessary to supply first aid service to anyone who may be injured in connection with the work. The Contractor must report in writing to the Engineer all accidents whatsoever arising out of, or in connection with, the performance of the work, whether on or adjacent to the site which causes death, personal injury, or property damages, giving full details and statement of witnesses. In addition, if death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both Owner and the Engineer, if any claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts to the Engineer, giving full details in writing of the claim.

25. SHANTIES:

Should the Contractor so desire, he may build shanties or other structures for housing men, tools, machinery, and supplies, but they will be permitted only at approved places, and their surroundings shall be maintained at all times in a sanitary and satisfactory manner. On or before the completion of the work, all such structures shall be removed, together with all rubbish and trash, at the expense of the Contractor.

26. GUARANTEE:

The Contractor guarantees that the work to be done under this contract and the workmanship performed and the materials used in the construction of the same shall be free from defects or flaws and that the performance test requirements of the specifications shall be fulfilled. This guarantee shall be for a period of one year from and after the date of completion of the work as stated in the final estimate. The Contractor shall repair or replace, as required, promptly and without charge, all work and materials, or parts thereof, which fail to meet the above guarantee during the one-year period. It is hereby, however, especially agreed and understood that this guarantee shall not include any repairs or replacements made necessary by any cause or causes other than improper, inadequate, or defective work, workmanship, materials or design by the Contractor or those employed directly or indirectly by him.

27. CIVIL RIGHTS:

The Contractor shall conform to all provisions of Title VI of the civil Rights Act of 1964.

28. USE AND POSSESSION PRIOR TO COMPLETION:

The Owner shall have the right to take possession of or use any completed or partially completed part of the work. Such possession or use shall not be deemed an acceptance of any work not completed in accordance with the Contract. While the Owner is in such possession, he shall be responsible for all loss or damage to the work except that resulting from the Contractor'' fault, negligence, or delay.

29. PAYMENT:

Payment shall be made at the unit prices submitted in the proposal. These prices shall include the cost of all labor, material, equipment and services necessary to complete these units.

30. DISTURBED AREAS:

All areas disturbed by the operations of the Contractor will be restored by the Contractor to present or better conditions.

31. ENGINEER'S AUTHORITY:

The intent of Article 9 of the General Conditions is to specify the Engineer's authority and not to confer upon the Engineer the capacity of foreman or superintendent, which is a part of the Contractor's responsibility.

32. RIGHT OF ENTRY:

The Engineer's representative(s), Owner, and representatives from the Department of Natural Resources shall have access to the work wherever it is in progress, and the Contractor shall provide proper facilities for such access and inspection. The Contractor shall provide access to all records by State personnel.

33. SHOP AND SETTING DRAWINGS:

The Contractor shall furnish to the Engineer shop and erection drawings for approval. These drawings shall include those prepared on structural and reinforcing steel, fabricated metal items,

piping, layout drawings of equipment and machinery, and all other drawings required by the Specifications or required in the prosecution of the work. Shop drawings shall be submitted in sufficient numbers to enable the Engineer to retain two copies for field and office reference.

The Engineer will check shop drawings for conformance with the design concept of the project and compliance with the information given in the Contract Documents. Contractor is responsible for dimensions to be confirmed and correlated at the job site; for information that pertains solely to the fabrication processes, or to techniques of construction, and for coordination of the work of all trades.

INFORMATION REQUIRED FOR APPROVAL: Each manufacturer furnishing equipment shall submit the following information for the Engineer's approval:

(a) Shop Drawings: Six(6), unless otherwise specified, sets of certified drawings, guaranteed performance curves, wiring diagrams, lists of electrical controls, including manufacturer's name and catalog number, horsepower of motors, normal full load and maximum load ampere rating for each motor.

(b) Weight: Estimated weight of each unit of equipment.

34. ORDER OF WORK:

Requests may be made by the Owner at the Preconstruction Conference.

35. LITIGATIONS:

Arbitration in accordance with General Conditions, Article 16 will not be allowed on this project. The Contractor should be apprised that he would have to use other legal remedies if problems, or disputes, arise on this project.

36. COORDINATION OF PLANS AND SPECIFICATIONS:

In resolving conflicts, errors, and discrepancies between the plans and specifications, the documents shall be given precedence in the following order:

Change Order
Addenda
Agreement
Special Conditions
Information for Bidders
Project Plans
Standard General Conditions
Standard Plan Details

37. POLICY AND PROCEDURE FOR ACCOMMODATION OF UTILITIES:

The Georgia Department of Transportation "Policy and Procedure for Accommodation of Utilities" will be considered a part of these specifications and will be adhered to at all times.

38. UTILITY LICENSURE REQUIREMENTS:

Utility contractors are required to hold a state utility contractor license. A certified utility manager or certified foreman must be present at the utility job site.

39. EROSION AND SEDIMENT CONTROL:

The Contractor shall be required to observe all local laws and ordinances in relation to erosion and sediment control as it pertains to this project. All erosion and sediment control plans and construction shall be completed in accordance with the publication entitled "Manual for Erosion and Sediment Control in Georgia" as amended in 1996 and published by the State Soil and Water Conservation Committee of Georgia, the State of Georgia Erosion and Sedimentation Control Act of 1975 as amended in 1995, and Best Management Practices. The Contractor shall construct and maintain all required erosion control measures throughout the duration of this project as part of the total job. All erosion and sediment control measures shall be designed for a 25-year storm event.

Prior to construction, all erosion and sediment control measures are to be in place.

The cost of additional erosion and sediment control measures and devices that may be required due to the negligence of the Contractor and/or his failure to adhere to Best Management Practices in a timely manner shall be borne by the Contractor.

The Engineer, Owner, Georgia Department of Transportation, and the governing authority who has jurisdiction over the work shall have the right to stop work when erosion and sediment control measures are not being implemented in accordance with Best management Practices. No claim will be allowed by the Contractor for cost of downtime of men and equipment associated with any shutdown of the Contractor's operations.

40. COMPLIANCE WITH HIGHWAY REQUIREMENTS:

The Contractor shall comply with all requirements of the State Highway Department when work he is performing is within the limits of the highway right-of-way. No additional compensation shall be paid the Contractor for conforming to these requirements. The Contractor shall familiarize himself with all requirements and expenses associated with work within the highway rights-of-way, and shall bear the cost of all insurance, inspection, and other requirements specifically related to work within those rights-of-way. The Department of Transportation "Utility Accommodation Policy and Standards" will be considered a part of these specifications and will be adhered to at all times.

DETAILED SPECIFICATIONS

SECTION 1

QUALITY CONTROL OF MATERIALS

1-01 SOURCE OF SUPPLY:

Prior to shipments of any materials to the job site, the Contractor shall submit to the Engineer for approval a list showing the source of supply of all materials.

If requested by the Engineer, representative samples shall be submitted to the Engineer for examination and testing. Only materials conforming to the requirements of these specifications and approved by the Engineer shall be used in the work.

The Engineer shall have the right to sample, test and inspect materials at any time and place during their manufacture, preparation, or use. If sources of supply, which have previously been approved, do not furnish materials or products of uniform quality, the Engineer may order the Contractor to discontinue use of material or product from that source. Any materials found to be unfit for use shall be removed from the site of the work.

1-02 SAMPLES AND TESTS:

The following schedule of testing will be required for approval. All tests shall be made in accordance with specifications of the American Society for Testing Materials, hereinafter referred to as A.S.T.M., by commercial testing laboratories approved by the Engineer.

Material	Tests Required for Approval
CEMENT	Mill certification that all specified tests have been made and results comply with ASTM C-150
SAND	(a) ASTM C40-test for organic impurities (b) ASTM C117-decantation test for silt (c) ASTM C136-sieve analysis
AGGREGATE	As required by ASTM C-33
CONCRETE	(a) Submit proposed design mix for concrete (b) Compression tests as required by the Engineer

Materials	Tests Required for Approval
BRICK AND CONCRETE BLOCK	Visual inspection for slope, color, soundness, freedom from cracks, clay or particles of lime
REINFORCEMENT STEEL, STRUCTURAL STEEL, AND METALS	(a) Mill certification that all specific tests have been made and results comply with applicable ASTM Specifications (b)Visual inspection for rust, shape, and dimensions
CAST IRON PIPE	(a) Mill certification that all specified tests have been made and all results comply with ASA Standard A21.6, A21.8, or A21.51 (b) Field tests for dimensions, coating, and soundness
CAST IRON FITTINGS	(a) Mill certification that all specified tests have been made and all results comply with ASA Standard A21.10 (b) Field tests for dimensions, coating, and soundness
IRON CASTINGS	Visual inspection for dimensions, uniformity, holes, defects
VITRIFIED CLAY PIPE AND FITTINGS	(a) Factory certification that pipe complies with ASTM Specification C-200 (b) Visual inspection for dimensions, straightness, blisters, fractures, and cracks, finish of ends, and marking (c) Factory certification that pipe joint complies with ASTM Specification C-425
CONCRETE PIPE	(a) Factory certification that pipe complies with ASTM Specification C-76 (b) Visual inspection for dimensions, fractures, or cracks, blisters, defects, marking, and damaged ends
ASBESTOS CEMENT PIPE	(a) Mill certification that all specified tests have been made and all results comply with ASTM C-296, C-644, or C-428 (b) Visual inspection for dimensions, soundness, defects and marking

PVC PIPE AND FITTINGS	(a) Mill certification that all specified tests have been made and that all results comply with ASTM-D-2241 (b) Visual inspection for dimensions, uniformity, color, dents, shape, and marking
DUCTILE IRON PIPE	(a) Mill certification that all specified tests have been made and all results comply with ASA A21.51 and A21.4 (b) Visual inspection for dimensions, soundness, defects, and marking
DUCTILE IRON FITTINGS	(a) Mill certification that all specified tests have been made and all results comply with ASA Standard A21.53 (b) Field tests for dimensions, coating and soundness

1-03 PAYMENT:

No separate payment will be made for work under this section of the Specifications. The cost of sampling, testing and all costs incidental thereto shall be included in the price bid by the Contractor, and shall be paid for by the Contractor.

SECTION 2

WATERLINES AND APPURTENANCES

2-01 SCOPE:

The work covered by this section of the specifications consists of furnishing all labor, supplies, equipment and materials and in performing all operations in connection with the construction of the various portions of the Water System in strict accordance with this section of the specifications and the applicable drawings, and subject to the terms and conditions of the contract.

All work, including labor and materials, is to comply with the Occupational Safety and Health Act of 1970 (PL 91-596), latest revision, in accordance with Paragraph 12 of the Supplemental General Conditions of these Specifications.

2-02 EXCAVATION, TRENCHING AND BACKFILLING:

(a) Excavation: The Contractor shall do all excavation, including rock, or whatever substances encountered to a depth sufficient to permit minimum cover over all pipes as specified herein. Except where rock is encountered, excavation shall not be carried below the required level. Excess excavation below the required level shall be backfilled and tamped at the Contractor's expense.

Ground adjacent to the excavation shall be graded to prevent water running in. The Contractor shall remove, by pumping or other means approved by the Engineer, any water accumulated in the excavation.

(b) Pipe Cover: For pipes not located within the "Roadbed Structure" of State Highway rights-of-way, minimum cover over the top of the pipe shall be 36".

For pipes located within the "Roadbed Structure" of State Highway rights-of-way, minimum cover over the top of the pipe shall be as follows:

In Shoulder	-	48"
Ditch Bottom	-	36"
Under Pavement	-	48"

Roadbed structure is defined as the area encompassed from the toe of slope (fill section) to the center of the roadside ditch (cut section) or combination of either.

Where possible, all pipes within State Highway rights-of-way are to be installed between the ditch line or toe of slope (fill section) and right-of-way line.

(c) Trenching: Trenches shall be made by open cut. The width of trench shall be not less than 6" on each side of pipe. The bottom of the trenches shall be accurately graded to provide uniform bearing and support for the pipe barrel.

The trench bottom shall be excavated to accommodate joints of pipe. All pipes shall be laid in accordance with the manufacturer's recommendations.

Where necessary to protect labor, the work, or adjacent property, the Contractor shall provide and install sufficient sheeting, shoring and bracing. Such shoring shall remain in place until the backfill has proceeded to a point where it can be removed safely, except that if damage is liable to result from withdrawing shoring, it shall remain in place. Sheeting, shoring and bracing shall be considered as an integral part of the excavation work and no extra payment will be allowed thereunder.

If it becomes necessary to reduce the earth load on the trench banks to prevent sliding and caving, it will be permissible to cut the trench banks back on the slope above an elevation two feet above the outside top of the pipe.

(d) Backfilling: Backfilling shall be done with suitable material and compacted to a density equal to that of adjacent original material, except that within the roadbed structure the backfill shall be compacted to 100%. Within the roadbed structure of a road under the jurisdiction of the Georgia Department of Transportation, backfill shall be compacted to 100% for the full depth of the trench. Backfill material shall be placed symmetrically on all sides of the pipe and compacted in lifts with a maximum compacted lift thickness of 6". Moisture shall be added, if required, to obtain the required compaction.

Mechanical tamping equipment approved by the Engineer shall be used in compacting backfill within the roadbed structure. Compaction of trenches outside the roadbed structure shall be by methods approved by the Engineer subject to the minimum allowable compaction.

Prior to beginning construction, the Contractor shall submit for approval the proposed equipment and methods that he proposes to use in obtaining the required compaction of the backfill within the waterline trenches.

The degree of compaction specified above is expressed as a percentage of the maximum laboratory dry density obtained by the Standard Proctor Compaction Test (ASTM D-698). Field density tests may be performed in sufficient number to insure that the specified density is being obtained. Tests shall be performed at the Owner's expense. Additional testing required in areas where initial testing showed inadequate compaction shall be charged to and deducted from the Contractor's payment.

(e) Maintaining Traffic: Traffic is to be maintained on all roads and streets where pipeline construction is being performed. If an open cut method is used, two separate cuts must be made and one lane must be open to traffic at all times.

(1) Control of Traffic – Traffic controls for utility construction operations shall conform with the Manual of Uniform Traffic Control Devices for Streets and Highways. All construction operations are to be planned with full regard to safety and to keep interference with traffic to an absolute minimum. On heavily traveled highways, construction operations interfering with traffic shall not be allowed during periods of peak traffic flow. All work shall be planned so that closure of intersecting streets, road approaches, or other access points is held to a minimum. It shall be the responsibility of the Contractor to notify property owners when private driveways are to be cut and to provide temporary measures to maintain access during construction. Stone or cold mix may be used temporarily. Steel running plates may also be required on commercial driveways and main roadways.

(2) Closing of Trenches – Whenever open trenching is required for the installation of facilities within the right-of-way, the work shall be so scheduled that not more that 500 feet of trench shall be open at any one time. More restrictive controls may be imposed where conditions warrant. Insofar as possible, work shall be scheduled so that open excavations will not be left overnight. Where trenches or pits are within the clear roadside areas and cannot be backfilled before leaving the job site, they shall be covered by timbers or metal plates and protected by reflectorized or lighted barricades as appropriate and as directed by the Engineer.

(3) Payment – No additional payment will be made for maintaining traffic as described above.

2-03 SELECT BEDDING:

In areas of rock excavation, and in other areas of poor trench conditions, as authorized by the Engineer, the pipe will be bedded in select material. Material shall be sand, chert, or other approved granular type soil placed 6” deep and 6” wider than the pipe at the barrel.

Where possible, material shall be secured from the trench walls or from the site. Where satisfactory material is not available at the site, the Contractor shall furnish it from an approved source.

2-04 CRUSHED STONE BACKFILL:

At certain open cut road crossings and in other circumstances where the Engineer deems it necessary, he may direct the Contractor to backfill the trench with crushed stone. The stone so placed shall be compacted and brought to proper grade. The crushed stone shall have a maximum size of ¾”.

This item does not include stone that must be placed on driveways and around mailbox approaches that are disturbed during construction. Payment for stone placed on driveways and mailbox approaches is to be included in the price bid for the pipe.

2-05 MATERIALS:

The Contractor shall furnish all pipe fittings, valves, valve boxes, concrete for blocking and other materials for completion of the work.

(a) Ductile Iron Pipe: Ductile iron waterline pipe shall be designed in accordance with ANSI Specification A21.50 (AWWA C-150), latest revision.

Pipe shall be manufactured in accordance with ANSI Specification A21.51 (AWWA C-151), latest revision. Pipe shall be Class 50.

Pipe shall be standard cement lined and seal coated with an approved bituminous seal coat in accordance with ANSI Specification S21.4 (AWWA C-104), latest revision.

Joints shall be push-on, conforming to ANSI Specification A21.11 (AWWA C-111), latest revision. Push-on joints shall be equal to the Tyton joints, as manufactured by U.S. Pipe. At highway crossings where ductile iron pipe is called for, joints shall be push-on joints fitted with Field Lok Gaskets by U.S. Pipe or equal.

Where mechanical joints are shown or specified, joints shall be standard mechanical joints, conforming to ANSI Specifications A21.11 (AWWA C-111), latest revision. All mechanical joints shall be fitted with megalug restrained joints by EBBA Iron, Inc. or equal.

The Contractor shall provide an adequate means of detecting the ductile iron pipe (such as detector tape or wire) so that the Owner may locate the pipeline, after construction is completed, using a standard pipeline detection device.

(b) Fittings: Fittings for 4” through 16” sizes shall be ductile iron compact bodied fittings in accordance with ANSI/AWWA C-153/A21.53 with mechanical joints. Joint accessories shall be in accordance with requirements of ANSI/AWWA C-153/A21.53. ALL MECHANICAL JOINTS SHALL BE FITTED WITH MEGALUG RESTRAINED JOINTS BY EBBA IRON, INC. OR EQUAL. The working pressure rating shall be 350 psi. Fittings shall have an asphaltic outside coating in accordance with ANSI/AWWA C-153/A21.53.

Fittings shall be cement lined and seal coated with an asphaltic material in accordance with ANSI/AWWA C-104/A21.4, or fusion bonded epoxy. Tees at fire hydrants shall be approved anchor tees.

(c) Butterfly Valves: Valves 10” or larger shall be butterfly valves designed for underground service. Valves shall be manufactured with a 250-psi rating. The valves shall be capable of operating at pressures of 250-psi and will comply with the following details:

Valve Bodies shall be constructed of cast iron ASTM A-126 Class B and conform to AWWA C-504 in terms of laying lengths and minimum body shell thickness.

Valve Discs shall also be made from cast iron ASTM A-126 Class B or ductile iron in conformance to ASTM A-536. Disc shall be furnished with 316 stainless steel seating edge to mate with the rubber seat on the body.

Valve Seat shall be Buna-N rubber located on the valve body.

Valve Shafts shall be stainless steel conforming to ASTM A-564, Type 630, Condition H-1100. Stub shafts or through shafts are acceptable. Shaft seals shall be standard self-adjusting split V packing. Shaft seals shall be of a design allowing replacement without removing the valve shaft.

Valve Bearings shall be sleeve type that are corrosion resistant and self-lubricating.

Valve Actuators shall be fully grease packed and have stops in the open/close position. The actuator shall have a mechanical stop, which will withstand an input torque of 450-ft. lbs. against the stop. The traveling nut shall engage alignment grooves in the housing. The actuators shall have a built in packing leak bypass to eliminate possible packing leakage into the actuator housing.

The valve interior and exterior surfaces, except for seating, shall be coated with fusion bonded epoxy.

The valve operators and end covers shall be permanently sealed against ground-water infiltration, with interior mechanism permanently lubricated. All critical bearing and sealing surfaces and parts shall be stainless steel, Teflon, or rubber.

Valve operators will be suitable for use with standard "tee" wrenches. Valve ends shall be suitable for connection to the type of water pipe used and shall be mechanical joint (fitted with megalug restrained joint glands).

All valves shall be hydrostatic and leak tested. The leak test shall be performed at a differential pressure of 250 psig with the disc in a closed position. In a slightly open position, internal hydrostatic pressure equal to 500 psi shall be applied to the inside of the valve body for five minutes.

Valves shall be Pratt HP-250 (Class 250) or Mueller Line Seal XP (Class 250B) butterfly valves, for buried service.

(d) Gate Valves: Gate valves shall be cast iron AWWA Standard C500 type, which shall be the standard product of a recognized valve manufacturer such as Mueller, Clow, U.S. or approved equal. Valves shall be constructed with an interchangeable parts system, with parts readily available, and shall meet the following requirements:

Iron body
Rubber encapsulated solid iron gate
"O" ring seal

200 psi minimum working pressure
Counterclockwise (left) opening
2" operating nut or handwheel
Non-rising stem
Mechanical joint ends (fitted with megalug restrained joint glands)

Valves shall be resilient seated gate valves meeting AWWA C-509-87, with fusion bonded epoxy coating on all inside and outside surfaces of body and bonnet.

(e) Tapping Sleeves and Valves: Tapping sleeves and tapping valves used to make "wet" taps into existing mains shall be provided and installed at locations as shown on the drawings. Tapping sleeves shall be split cast iron units and rated at 250 psi working pressure. Steel units will not be acceptable. The Contractor shall determine the outside diameter of the existing main before ordering the sleeve. Valves shall be of the non-rising stem type with o-ring seals and applicable to requirements, as specified above, for gate valves.

(f) Valve Boxes: Underground valves shall be installed in standard cast iron valve boxes. Boxes shall be of the two-piece screw type, adjustable to suit the depth of bury and type of valve, with a minimum shaft diameter of 5¼".

(g) Fire Hydrants: Fire Hydrants shall be of the improved AWWA type of construction with a minimum valve opening of 4½ inches. The hydrants shall meet all requirements of AWWA Specification C-502-54 and shall be equipped as follows: Two hose nozzles – 2½"; one pump nozzle – 4½"; Packing – "O" ring; groundline to centerline hose nozzles – 18"; groundline to bottom of connecting pipe – minimum 36". Operating nut size and nozzle threads shall match City of Rome standards. Hydrants shall be a traffic model, utilizing a breakable feature at the groundline consisting of a "frangible" flange of breakable bolts, and safety stem coupling. Hydrants of the "wet top" type will not be acceptable. Hydrants shall be Dresser M&H Style 129 Traffice Model, Mueller Centurion A421, Smith 100 (Traffic), American Darling Mark 73, Traffic Model or approved equal.

Direction of opening shall be left (counterclockwise).

Hydrants shall be shop painted bright yellow above the ground line. After installation, hydrants shall be field painted one coat of bright yellow.

Hydrants shall have MJ ends with Megalug Restrained Joint Glands and shall be installed with approved anchor tees and blocking as shown on the drawings. A 6" gate valve with M.J. ends and Megalug Restrained Joint Glands will be included in the service lateral to the hydrant. The service laterals leading to the hydrant will be 6" ductile iron.

(h) 1" and ¾" Service Pipe: Service pipe shall be 1" and ¾" Type K copper tubing, soft temper.

(i) Galvanized Steel Pipe and Fittings: Pipe and fittings shall be hot-dip galvanized in accordance with ASTM A-120. Fittings shall be malleable iron conforming to ANSI B-16.3 except the nipples and couplings shall be the same material as the pipe.

(j) Pipe Casing: Where the waterline is to be placed in a casing, the casing shall meet the following requirements:

(1) Casing shall be shop bituminous coated inside and out (field coating of the casing will not be allowed), and shall be of the size and nominal wall thickness as designated on the drawings, and as set forth in the proposal. Where wall thickness of casing is not designated, the minimum wall thickness shall be 0.250 inches. Casing pipe shall be new. No used pipe will be allowed.

(2) Casing shall be seamless steel, with welded joints; steel shall have a yield point not less than 35,000 psi.

Stainless steel casing spaces as manufactured by Cascade Waterworks Manufacturing Company, shall be strapped to the water pipe to keep the pipe centered in the casing and to prevent damage during installation. One spacer shall be placed not more than two feet from each end of the casing. Additional spacers shall be placed at maximum 10 feet intervals within the casing.

(3) Each end of the casing shall be sealed with Cascade Model CCES rubber end seals with stainless steel bands to provide a barrier to backfill debris and seepage.

(k) SDR 21 Plastic Pipe: Plastic pipe to be used as water main, shall be PVC and shall meet the requirements as set forth in Product Standard PS 22-70 for Type 1, Grade 1 only, with standard dimension ratio SDR 21, and bearing the National Sanitation Foundation Testing Laboratories, Inc., seal for potable water.

Provisions must be made for contraction and expansion of each joint with a rubber ring, tapered barrel end and a joint as specifically approved. Pipe must be assembled with a non-toxic lubricant.

Fittings shall be Schedule 40 PVC, solvent weld fittings.

Forty-foot lengths will not be permitted.

PVC pipe shall be manufactured by one of the following manufacturers:

Cement Asbestos Products Company
Certain-Teed
Johns-Manville
Can-Tex
Glamorgan
Marathon Plastic Pipe Company

The Contractor shall provide an adequate means of detecting the PVC pipe (such as detector tape or wire) so that the Owner may locate the pipeline, after construction is completed, using a standard pipeline detection device.

(l) Schedule 40 PVC Pipe and Fittings:

(1) Materials:

Pipe and fittings shall be manufactured from a PVC compound, which meets the requirements of cell Classification 1254-B, Polyvinyl Chloride as outlined in ASTM D-1784, PVC shall be white in color. Pipe and fitting materials shall be specially formulated with sufficient UV screeners to provide for long term outdoor exposure with no deleterious effects.

Materials from which fittings and pipe are manufactured shall have been tested and listed for conveying potable water by the National Sanitation Foundation (NSF).

(2) Dimensions (IPS Size):

Fitting components with socket type solvent cement connections shall have socket diameters, lengths, and wall thickness as prescribed by ASTM D-2466. Components with tapered pipe thread connections shall have thread lengths, diameters, and configurations as prescribed by ASTM D-2464.

Pipe shall have diameters and wall thickness as prescribed by ASTM D-1785.

(3) Pressure Ratings:

Solvent cemented pipe and fittings shall be pressure rated in accordance with the requirements of ASTM D-1785 and ASTM D-2466, respectively.

(4) Markings:

Pipe and fittings shall be clearly marked in accordance with the requirements of ASTM D-1785 and D-2466, respectively.

(5) Installation:

Installation shall be as specified by the manufacturer's printed instructions.

2-06 INSTALLATION OF PIPING:

(a) General: Materials used for piping shall be as specified herein. Pipe and accessories shall be new and unused materials. The full length of each section of the pipe shall rest solidly upon the bed

of undisturbed earth, with recesses only to accommodate pipe bells and joints. Any pipe which has its alignment, grade, or joints disturbed after laying shall be taken up and re-laid. The interior of the pipe shall be thoroughly cleaned of all foreign matter before being lowered into the trench, and shall be kept clean during laying operations by means of plugs or other approved methods. The pipe shall not be laid in water, or when trench or weather conditions are unsuitable for the work. Water shall be kept out of the trench until jointing is completed. When the work is not in progress, open ends of pipe and fittings shall be securely closed so that no trench water, earth or other foreign substance can enter the line. Any section of pipe found to be defective either before or after laying shall be replaced with new pipe at no additional expense to the Owner.

(1) Handling – In the transportation, unloading, and handling of pipe and fittings, they shall not be dropped, let roll and collide, or be subjected to any unnecessary jar, impact, or other treatment that might crack or otherwise damage the pipe or appurtenances.

(2) Cutting – Cutting of pipe shall be done in a neat and workmanlike manner without damage to the pipe or its coating. Cutting shall be done by means of an approved type of mechanical cutter.

(3) Placing and Laying: All pipes shall be placed in the locations indicated on the drawings, and shall be within the road right-of-way unless otherwise noted or authorized. Pipe located on all State Highway rights-of-way, shall be placed no closer than three feet from the pavement, but in most cases on the extreme edge of the shoulder, or off the shoulder, as indicated on the drawings. Field relocation will be only upon specific authorization by the Engineer.

The pipe shall be examined for defects before lowering into the trench. All damaged, defective, or unsound pipe will be rejected and removed from the work site. Deflections from a straight line and grade shall not exceed the allowance for the type of joint employed. Pipe shall be placed, bedded and jointed as specified herein, and in accordance with the manufacturer's instructions.

(4) Stream, Ditch, and Culvert Crossings: Where indicated on the drawings, the pipe will be placed beneath the bed of certain streams or ditches, or around or over culverts and other drainage features. Pipes will not be passed through culverts. Ductile iron pipe shall be placed at certain locations as indicated on the drawings, or as directed by the Engineer. Pipe shall have standard push-on joints and shall be fitted with Field Lok Gaskets by U.S. Pipe.

Pipes shall have a minimum cover of thirty-six inches (36") under streambeds except where rock is encountered. When in rock, the cover shall be eighteen inches (18"), and the trench filled with Class "B" concrete.

No extra payment will be made for passing of pipes under, over, or around drainage features.

(5) Pipe Placed by Boring (Without Casing): Bored holes to accommodate pipe without casing shall have a diameter not more than two inches (2") greater than the largest outside diameter of the pipe joint or coupling.

(6) Service Pipe: Where service pipe is to be installed under paved areas, installation shall be accomplished by the jacking or boring method so as not to disturb the paved area where practical. Where cutting of the pavement is necessary the pavement shall be replaced in a workmanlike manner. No extra payment will be made for pavement replacement for service pipe installation.

2-07 SETTING VALVES:

Valves and valve boxes shall be installed on the lines as shown on the drawings or as directed by the Engineer. Valves and valve boxes shall be plumb, and valve boxes shall be centered and placed directly over the valve operators. Earth fill shall be carefully tamped around valve boxes to three feet on all sides or to the undisturbed face of the trench if less than that distance. Valves shall have the interiors cleaned of all foreign matter before installation. Valves shall be inspected in both open and closed positions to see that all parts are in working condition.

New valve boxes shall be adjusted to finish grade, including finish pavement grade.

2-08 REACTION BLOCKING:

Pipe shall be restrained by thrust blocking in event of the following piping conditions:

(a) A change in direction with the use of a tee or bend.

(b) Reduction in the size of the line by use of a reducer.

(c) Termination of line (dead end).

(d) Where valve and hydrant connections are made.

Thrust blocking shall be made of 2500# plain concrete, and shall bear directly against the undisturbed trench wall.

2-09 TESTING:

When a section of pipe of a length deemed adequate by the Engineer is ready for testing, the line shall be thoroughly blown free from air and a pressure test made. The Contractor shall furnish all labor, materials and equipment for carrying out these tests. The Contractor shall furnish a test pump, and means for accurate measurement of water introduced into the line during testing, and shall furnish and install corporation stops at all high points on the line for blowing lines free from air. Corporation stops shall be furnished and installed at test pump locations.

Test pressures shall be 200 psi for all pipes. This pressure shall be maintained for the duration of the test.

Duration of the test pressure shall be at least two (2) hours during which the leakage shall not exceed 13.44 gallons per inch diameter of pipe per mile per day. If, in the opinion of the Engineer, leakage is excessive, the Contractor shall take corrective measures, and the pipe re-tested.

No separate payment will be made for the above work. All costs incidental thereto shall be included in the price bid for the items to which the work relates.

NOTE: Table 6 (Allowable leakage per 1,000 feet of Pipeline-GPH) of AWWA C-600, Section 4, has been reproduced for informational purposes and included as page 2-21 of the Specifications.

2-10 STERILIZATION OF COMPLETED LINE:

Before being placed in service, all lines shall be sterilized by chlorinating in accordance with AWWA C-651. Either liquid chlorine or hypochlorite may be used in such amounts as to provide a dosage of 50 PPM. The sterilizing agent may be introduced in any manner, approved by the Engineer, which will insure a uniform distribution. Following a contact period of no less than twenty-four (24) hours, the chlorinated water shall be flushed from the lines. All valves in the lines being sterilized shall be closed and opened several times during the sterilizing period.

After the lines have been sterilized and flushed out, the Contractor shall have the City of Rome Water Department take proper samples and a copy of the test report shall be forwarded to the Engineer. A certified laboratory shall test the samples. If lines tested fail to pass, the disinfecting process shall be repeated as necessary to provide satisfactory bacteriological results.

2-11 CONNECTION TO EXISTING MAINS:

Where indicated on the drawings, or instructed by the Engineer, connections between the new construction and existing mains shall be made.

The Contractor shall coordinate with officials of the City of Rome Water Department concerning the connections.

Standard fittings and connections will be utilized in every case to provide a permanent, workmanlike connection.

After hydrostatic testing and sterilization has been completed and approved for any section of the work, connections between the new construction and existing mains shall be made.

The Contractor shall coordinate with the Owner, as required by the Special Conditions, to insure minimum interruption of water service to residential and commercial customers.

2-12 STATE HIGHWAY ENCROACHMENTS:

The crossings of roadbed structures of highways under the jurisdiction of the Georgia Department of Transportation, and all installations on such rights-of-way shall be made in accordance with the details shown on the plans and in conformance with applicable sections of "Utility Accommodation Policy and Standards", dated 1988 (or the latest revision), by the Georgia State Department of Transportation.

Cutting of the pavement will be allowed only as approved by the D.O.T.

2-13 CUT, PLUG AND ABANDON EXISTING MAIN:

Where indicated on the drawings, or instructed by the Engineer, the existing main shall be cut, the portion of the main to remain under pressure shall be plugged and the remaining portion of the main shall be abandoned.

2-14 SERVICE TAPS:

Connections to water mains shall be made by tapping the main line and installing a corporation stop of the same size as the lateral. The Contractor may make connections with tees and reducers to the size of the lateral.

Service connections to the main, depending upon the pipe material utilized, shall be made with the following listed items (or equal):

Pipe Size and Material	Type of Connection
24", 16", 12", 8" & 6" Ductile Iron	Mueller H-15008 w/Comp. Outlet

Service taps on 2" mains will be made in accordance with the City of Rome Water Department standards.

2-15 RESET METERS AND METER BOXES:

The Contractor shall locate meters and meter boxes as shown on the plans, designated in the specifications, or directed by the Owner. Unless otherwise specified, the Owner will indicate the location of the water meters. Each meter shall be properly connected to both the service lateral and the house lateral. Meter boxes shall be set with the top edge not more than one inch (1") above the surface of the ground, and shall be thoroughly backfilled and tamped.

The new meter setting shall include a new meter, meter box, meter valve, dual check valve, brass nipple, pack joint coupling installation of remote reading device and connections to the service tubing from the main and to the customer service pipe.

2-16 NEW BALL VALVE SETTING:

At existing meter settings, the existing meter and curb stop (or meter valve) shall be removed and stored for collection by the City of Rome. A new Nibco Bronze Ball Valve shall be placed inside the existing meter box and connected to the new customer service pipe with a brass nipple and pack joint coupling and to the existing customer service pipe with a brass nipple and a dresser coupling. Where necessary, the location of the existing meter box shall be adjusted to a new location (as directed by the Engineer) to receive the new ball valve and then shall be connected to the customer pipe with a brass nipple and a dresser coupling.

2-17 NEW FIRE HYDRANTS:

Fire hydrants shall be placed where shown on the plans and as shown by the hydrant setting detail. The hydrant shall be adjusted so that the ground line of the hydrant is matched to the finished grade line.

2-18 PAVED ROADS OR DRIVEWAYS BORED IN PLACE WITHOUT CASING:

Concrete and asphalt paved roads or driveways will not be cut unless directed by the Engineer. Crossing concrete and paved roads or driveways will be done by boring under these structures. Each end of the bored hole shall be sealed with a minimum of ¼ cubic yard of Class "B" concrete.

Where it is not possible or practical to bore under roads or driveways, then the Engineer shall direct that the crossing be made by the "open cut" method and replacement of the paved surfaces will be as described in other portions of these specifications.

2-19 CUTTING AND REPLACING PAVEMENT AND OTHER SPECIAL SURFACES:

Wherever it becomes necessary in excavation to disturb special surfaces such as concrete, bituminous or gravel roadways, drives, walks, or parking areas, the original surface and/or base shall be restored after completion of the backfill. Cutting of pavement (surface treatment, plant mix or concrete) shall be by means of pavement saws.

No State Highway pavement will be cut without authorization of the D.O.T. Resident Engineer. Any D.O.T. pavement cut will be replaced, as shown on the drawings.

Payment for pavement replacement will be made on a linear foot basis, measured along the line of pipe and payment will not be made for pavement damaged or destroyed not over trenches excavated for installation of water mains.

(a) Methods of Construction: Where surfaces are to be restored, care shall be used in making the backfill to eliminate future settlement.

In gravel surfaces after the backfill has been so placed that no further appreciable settlement will occur, gravel over the trench shall be replaced to the same compacted thickness as the original surfacing. During construction also, the surface of the remainder of the street not occupied by the trench shall be protected from the excavated material.

After completion of the backfill, any such excavated material shall be removed as far as possible and additional gravel shall be placed on the street until the surface is as weather-resistant and traffic resistant as the original surface. No extra payment will be made for gravel placed to replace existing gravel surfaces or to maintain streets, driveways, etc.

Concrete and bituminous surfaces and base course shall be placed in a workmanlike manner, in accordance with the details shown on the drawings and as specified.

Before replacement of pavement (surface treatment, plant mix or concrete), the existing pavement along ditch shall be cut back from the top edges of ditch lines for a distance of at least nine inches (9") on each side of the ditch to allow for solid bearing edges for pavement to be replaced. Class "A" Portland cement concrete shall be placed to a depth as shown on the pavement replacement details.

(b) Timely Repairs: After the Contractor has finished as much as 2,500 L.F. of waterline within areas to be paved including valves, fire hydrants, backfill compaction and all other related work, he will request an inspection from the Engineers. After acceptance of the work, the area will be paved with the permanent paving.

In the event that the Contractor elects to continue to work beyond the 2,500 L.F. limit as mentioned above, the Contractor shall place a temporary single surface treatment pavement for control of dust, etc., until the permanent paving is constructed. The Contractor will do the temporary paving, at no additional expense to the Owner. The price of this temporary paving, if required, should be included in the price of the pipe.

Acceptance for the paving as mentioned above will in no way release the Contractor from responsibility for faulty work that may show up later including backfill settlement, line leaks, breaks or other faulty work.

(c) D.O.T. Pavement Replacement: D.O.T. pavement replacement will be in accordance with the details shown on plans and will be paid for in accordance with the Proposal. This item will include Class "A" concrete, base, pavement, cutting, backfill, compaction, and all other related work.

(d) Acceptance: Acceptance for paving, as mentioned above, will in no way release the Contractor from responsibility for faulty work that may appear later, including backfill settlement, line leaks, breaks or other faulty work.

2-20 RESTORATION OF DISTURBED ITEMS AND SURFACES:

Whenever it becomes necessary in excavating to cut or disturb fences, gravel surface, lawns, shrubbery, signs, mailboxes, paved surfaces (disturbed by service pipe installation) and similar obstructions, the items disturbed shall in every case be restored to their original condition, as closely as possible, after completion of the construction.

2-21 CLEARING, GRUBBING, AND GRASSING:

Clearing along the line of waterline construction shall be done only as required for the safety of the pipe and operation of equipment. The required area, as directed by the Engineer, shall be cleared, grubbed, and grassed in accordance with these specifications and the Georgia D.O.T. Standard Specifications. All downed trees, brush, etc., shall be disposed of or removed from the site. Clearing, grubbing, and grassing are considered integral parts of the construction, and not extra payment will be made for such work.

Grassing work shall consist of preparing the ground surface, furnishing and applying lime and fertilizer, furnishing and sowing seed, mulching, compacting, establishing, and repairing in accordance with these specifications, in all graded areas, a stand of grass as defined in the Section 700 of the State Highway Department of Georgia Standard Specifications. All work shall be in accordance with said specifications.

If seasonal limitation permits, the grass seed will be Bermuda, and shall be 82% pure live seed having a germination of 85%, and shall be hulled. Maximum percentage of weed seed allowed shall be 3%. The Engineer shall select the seed if Bermuda is out of season at the time seeding is required. The minimum quantity of lime applied shall be not less than 2,000 pounds per acre.

2-22 CLEAN-UP:

Before the work shall be considered complete, all material not used, and rubbish of every character, must be removed from the job site. All fences and other private or public facilities and structures disturbed must be in essentially as good condition as existed before the work was done. The Contractor shall replace any subsequent settlement of backfill or pavement over trenches and the surface brought to grade.

2-23 EXPLORATORY EXCAVATION:

Exploratory excavation for highway crossings will be performed as directed by the Engineer.

The excavations will be performed only if the site for the crossing shown on the plans proves to be unsatisfactory.

2-24 SALVAGE EXISTING FIRE HYDRANTS:

Where indicated on the drawings and as directed by the Engineer, certain existing fire hydrants are to be replaced with new fire hydrants including new 6" D.I. pipe and 6" valve and box. Where indicated on the drawings, the new hydrant is to be set near the existing fire hydrant.

The Contractor shall excavate and disconnect the existing fire hydrant. The existing fire hydrant shall be stockpiled by the Contractor to be collected later by the City of Rome.

2-25 REPLACE STORM DRAINS (If Required):

Where storm drains are destroyed when removed to facilitate construction, they will be replaced with reinforced concrete pipe, minimum Class III, meeting the requirements as set forth in applicable sections of the Standard Specifications. Pipe size shall be that equal to pipe removed except sizes smaller than 12", which shall be replaced with 12" culvert pipe.

2-26 LARGE STONE RIP-RAP:

Large stone riprap, minimum 6" and larger stone shall be dumped and handled into place where indicated on the plans or as directed by the Engineer. All stone for riprap shall be sound, durable pieces of limestone or other approved material, resistant to the action of air and water. Flat, slabby and shaley pieces are not acceptable. Stone riprap shall be placed to a thickness of not less than twelve inches (12") and not more than 24".

2-27 PAYMENT:

All work under this section shall not be paid for separately, but shall be included in the appropriate bid items on the Bid Schedule.

SECTION 3

CLEARING AND GRUBBING

3-01 SCOPE:

The work covered by this section consists of furnishing all labor and equipment necessary for the clearing and grubbing of areas to be graded, or designated on the plans and required herein, and for the removal and disposal of all materials resulting from this operation. All work, including work and materials, is to comply with the Occupational Safety and Health Act of 1970 (PL 91-596), latest revision, in accordance with Paragraph 12 of the Supplemental General Conditions of these Specifications.

3-02 SITE CONDITIONS:

The Contractor shall visit the site and become familiar with the conditions of the sites to be cleared and grubbed.

3-03 PROTECTION OF EXISTING FACILITIES:

All existing trees and other facilities, which are to remain, shall be protected from damage as a result of these operations.

3-04 EQUIPMENT:

Bulldozers, power saws, and other approved equipment necessary to accomplish the work specified herein may be used as required, subject to approval of the Engineer before the work is started.

3-05 STAKING:

Attention is called to the section on staking in the General Conditions, Article No. 4-4.

3-06 CLEARING:

All areas within the construction and all other areas shown on the plans where clearing operations will be performed shall be cleared of all obstructions that interfere with the construction. The areas shall be cleared of trees, stumps, roots, brush, rubbish, fences and other such materials.

Contractor shall clear only those areas in which grading operations or special clearing is required. The remaining areas shall be protected from any damage as a result of these operations, including damage from any burning operations that may be permitted.

3-07 GRUBBING:

The Contractor shall grub the entire cleared area. Stumps and roots larger than ¾" in diameter shall be grubbed to the following depths:

(a) In fill areas where subgrades for roads are to be placed, the grubbing will be carried to a minimum depth of 3 feet below the finished subgrade.

(b) In all areas of excavation the grubbing shall be carried to the depth of the excavation.

(c) In areas outside of subgrades where fill is to be placed, the grubbing shall be carried a minimum of 12" below the existing grade.

(d) In areas where no grading is required, the grubbing shall be carried a minimum of 12" below the existing grade.

(e) All stumps shall be removed to a minimum depth of 2 feet below the ground line.

3-08 DISPOSAL OF MATERIAL:

All material resulting from the clearing and grubbing operations shall be removed from the site and disposed of by the Contractor.

Burning, if elected by the Contractor, shall be done in a manner that will avoid all damage to adjoining property, and shall be in strict accordance with all state and local regulations relative to the building of fires. All refuse from burning operations shall be removed from the site.

3-09 MEASUREMENT AND PAYMENT:

All work done under this section shall not be paid for separately but shall be included in the appropriate items on the bid Schedule.

SECTION 4

EXCAVATION AND EMBANKMENT

4-01 SCOPE AND DEFINITIONS:

The work covered by this item shall consist of loosening, loading, removing and disposing, in the specified manner, of all wet or dry materials which are necessary to be removed for construction purposes; performing all pumping, draining, bailing; the backfilling and tamping of trenches, the preparation of fills; the removal of unsuitable materials from below the normal limits of excavation and the replacement of same with suitable materials; and all other grading or excavation work incidental to or necessary for the construction of the work. All work, including labor and materials, is to comply with the Occupational Safety and Health Act of 1970 (PL 91-596), latest revision, in accordance with Paragraph 12 of the Supplemental General Conditions of these Specifications.

4-02 SITE CONDITIONS:

The Contractor shall visit the site and become familiar with the existing ground conditions.

4-03 BENCHMARKS:

The Contractor will be required to preserve benchmarks, monuments and reference points.

4-04 PROTECTION:

Contractor shall provide drainage during the period of construction in a manner to prevent damage to the work and adjoining property.

The Contractor shall be responsible for establishing and implementing an approved erosion and sedimentation control plan if required by the various local-governing agencies. Hay bales and/or silt fences shall be used as required to control erosion.

4-05 PREPARATION:

Stripping of Topsoil – Topsoil and other materials unsuitable for use in the road subgrade shall be stripped to a depth of at least 6” from all areas within the roadbed (shoulder line to shoulder line). This topsoil may be used in making fills beyond the limits of the roadbed or shall be disposed of as surplus material in such locations as designated by the Engineer.

4-06 EXCAVATION:

Excavation of whatever material encountered within the grading limits shall be performed to the lines and grades shown on the plans.

The Engineer shall be contacted immediately when unsuitable material is encountered below the limits of excavation shown on the plans or specified herein. The material so encountered shall be removed to such depths as directed by the Engineer. Such excavated areas shall be backfilled in the manner hereinafter specified.

Rock shall be excavated to a minimum depth of 12" below the contemplated surface of the subgrade of the roadbed for the full width of such subgrade. Such undercut shall be backfilled with suitable material as designated on the plans and in these specifications.

Drilling and blasting operations shall be conducted with due regard for the safety of persons and property in the vicinity and in strict conformity with all ordinances and regulations governing blasting and the use of explosives. Rock excavation near existing pipe or other facilities shall be conducted with the utmost care so as to avoid damage. The Contractor at his own expense shall promptly repair injury or damage to other structures and properties, to the satisfaction of the Owner.

4-07 DISPOSAL OF MATERIALS:

All materials removed by excavation which are suitable for the purposed shall be used whenever practicable for embankments, backfilling trenches, and for such other purposes as may be shown on the drawings or directed by the Engineer. All materials not used for such purposes shall be considered as surplus materials and shall be disposed of in such locations as designated by the Engineer.

4-08 EMBANKMENT:

General – All vegetation, such as roots, brush, heavy sods, heavy growth of grass and all decayed vegetation matter, rubbish and other unsuitable material within the area upon which embankment is to be placed shall be removed before the embankment is started. Sloped ground surfaces steeper than one vertical to four horizontal on which embankment is to be placed shall be plowed, stepped (benched) or broken up in such manner that the embankment material will bond with the existing surface.

The embankment to within 2 feet of the finish subgrade shall contain no rock over 2 feet in its greatest dimension. Each layer shall be constructed so that all rock voids are filled with earth or rock spalls, rock fines and earth. The rock shall be placed and manipulated as herein indicated so that the voids are filled. Rock shall not be end dumped over the edges of the layer being constructed, but shall be deposited on the layer and moved ahead so as to advance the layer with a mixture of rock, rock spalls, rock fines, and earth. The 2 feet of the embankment immediately below the finish subgrade shall be composed of materials which can be placed in layers not exceeding 6" in compacted thickness

as hereinafter specified. Rock over 4" in its greatest dimension shall not be placed within 12" of the finish subgrade.

4-09 PREPARATION AND COMPACTION:

Ground surfaces on which fill is to be placed shall be stripped of live, dead, or decayed vegetation, rubbish, debris, and other unsatisfactory material: Plowed, disked, or otherwise broken up; pulverized; moistened or aerated as necessary; thoroughly mixed; and compacted as specified herein. A heavy sheepsfoot roller or other approved equipment shall accomplish compaction. The prepared ground surface shall be scarified and moistened or aerated as required just prior to placement of embankment materials to assure adequate bond between embankment material and the prepared ground surface.

Prior to replacing embankment greater than 3 feet in depth below subgrade level, the existing ground shall be plowed and scarified to a depth of at least 6" and recompacted to the approximate density of the surrounding undisturbed soil. Where depth of embankment below subgrade is less than 3 feet, the original ground shall be plowed, scarified and compacted a minimum of 12" deep to at least 95% compaction. Additional fill shall be placed in lifts with a maximum compacted lift thickness of 6" at a compaction of at least 95%. The upper foot of fill or at grade residual soils which make up the subgrade shall be compacted to 100% of the maximum dry density.

Control – The degree of compaction specified above is expressed as a percentage of the maximum laboratory dry density obtained by the Standard Proctor Compaction Test (ASTM D-698). Field density tests may be performed in sufficient number to insure that the specified density is being obtained. Tests shall be performed at the Owner's expense. Additional testing required in areas where initial testing showed inadequate compaction shall be charged to and deducted from the Contractor's payment.

Proofrolling Site – After rough finished subgrade has been achieved and before footing has been started, the area is to be proofrolled. Proofrolling should be performed using a loaded dump truck weighing at least 20 tons. Proofrolling should be accomplished by performing at least three passes in each of two perpendicular directions within the entire construction area, and ten feet beyond. If low consistency soils are encountered which cannot be adequately densified in place, such soils should be removed and replaced with well compacted fill material placed in accordance with Section 4, Excavation and Embankment of these specifications. Proofrolling should be performed in the presence of the Engineer to determine if remedial measures are necessary.

4-10 PREPARATION AND PROTECTION OF SUBGRADE:

After all drains, structures and other utilities under the pavements have been completed and all adjustments to existing utilities have been completed, the subgrade shall be compacted to the depth specified at not less than the specified percent density. Any irregularities or depressions that develop under rolling shall be corrected by loosening the material at these places and adding, removing or

replacing material until the surface is smooth and uniform. The material shall be sprinkled with water during rolling if needed to obtain optimum moisture content.

All soft and yielding material and material which will not compact readily when rolled, shall be removed, as directed by the Engineer, and replaced with suitable material from the site.

At all times, the top of the subgrade shall be kept so that it will drain. The subgrade shall be protected from damage from materials, tools, and equipment.

Until the subgrade has been checked and approved by the Engineer, no base course shall be applied.

4-11 SLOPES:

All open slopes shall be trimmed and finished to finished to conform to the slope lines shown on the plans or as directed by the Engineer. The finished surfaces shall be left in smooth and uniform planes such as obtainable from the used of hand tools, but if the Contractor is able to obtain the required degree of evenness by means of mechanical equipment, he will not be required to use hand labor methods. Grading operations shall be so conducted that material shall not be removed or loosened beyond the slope called for.

4-12 GRADING TOLERANCES:

The grading work in all areas shall be brought to a neat and smooth finish to the grades shown on the plans and specified herein to a tolerance of ± 0.05 foot for roadways and ± 0.1 foot for all other areas. All graded areas shall be sloped or ditched to drain.

4-13 YARD FILLS AND BACKFILLING AROUND STRUCTURES:

All yard fills and backfills around structures shall be selected materials placed in 6” layers. The layers shall be thoroughly compacted by use of heavy, tracked vehicles or other equipment suitable for compacting the material utilized. Compaction around structures shall be by use of heavy power tamping equipment. Selected materials shall also be used for backfill around pipe trenches.

4-14 MEASUREMENT AND PAYMENT:

All work done under this section shall not be paid for separately, but shall be included in the appropriate items on the Bid Schedule.

SECTION 5

BASE AND PAVEMENT

5-01 SCOPE:

The work includes the preparation of the subgrades, and the placement of a fiber reinforced concrete surface for all roads and parking areas where shown on the plans. All work, including labor and materials, is to comply with the Occupational Safety and Health Act of 1970 (PL 91-596), latest revision, in accordance with Paragraph 12 of the Supplemental General Conditions of these Specifications.

5-02 COORDINATION WITH OTHER CONSTRUCTION:

Prior to placing of base and pavements, the construction of all utility lines (water, sewer, power, gas, etc.) which are to be placed under the pavements shall have been completed and approved by the Engineer.

The Contractor shall coordinate his work with that of other Contractors or municipalities engaged in construction on the project, and shall allow such other Contractors access to the site. The Contractor shall not be required to assume responsibility for any work performed by other Contractors, except as may be provided in the general conditions to these documents.

5-03 PROTECTION OF EXISTING FACILITIES:

All existing trees, grades, drainage systems and other facilities shall be protected from damage by these operations. Any damage that may occur shall be repaired and corrected to the satisfaction of the Owner.

5-04 MATERIALS AND METHODS:

All materials and methods for the work under this section shall be in strict accordance with applicable sections of the Department of Transportation, State of Georgia Standard Specifications, Construction of Roads and Bridges, 1993 Edition and subsequent amendments unless specifically amended herein.

5-05 PREPARATION OF SUBGRADE:

The base shall not be placed until the Engineer has inspected and approved the subgrade. Such approval of the subgrade for the purpose of placing the base shall not relieve the Contractor of his responsibility for the subgrade.

5-06 GRADED AGGREGATE BASE:

This item consists of a base composed of mineral aggregates constructed on a prepared subgrade in accordance with Section 310, Graded Aggregate Construction, of the GDOT Standard Specifications.

The minimum acceptable finished thickness of graded aggregate base shall be 6".

5-07 PRIME AND TACK COAT (ASPHALT PAVEMENT):

The prime shall conform to the requirements of Section 412, Bituminous Prime, of the GDOT Standard Specifications.

Prime coat shall be RC-70 applied at a rate of 0.20 gallons per square yard.

The tack coat, if required, shall conform to the requirements of Section 413, Bituminous Tack Coat.

5-08 SURFACE COURSE – ASPHALT PLANT MIX:

Where shown on the plans, the surface courses shall conform to the applicable requirements of Section 400, Hot Mix Asphaltic Concrete Construction, of the GDOT Standard Specifications.

Type "E" Asphaltic Concrete shall be used.

Minimum acceptable finished thickness will be 2″, unless otherwise shown on the drawings.

The Contractor shall submit to the Engineer, for his approval, a tentative "Job Mix Formula".

.

5-09 SURFACE COURSE – FIBERED REINFORCED CONCRETE:

Concrete Engineered Reinforcing Fibers shall be 100% virgin polypropylene, collated, fibrillated fibers from Fibermesh Co., 4019 Industry Drive, Chattanooga, Tennessee 37416. Fibermesh fibers shall be used in all concrete as indicated on the drawings or as specified and in strict accordance with the manufacturer's recommendations as to type and amount. The fiber manufacturer or approved distributor shall provide the services of a qualified employee for a pre job meeting and initial job start-up. Only fibrillated fibers designed and manufactured specifically for use in concrete from 100% virgin polypropylene and so certified by the manufacturer shall be acceptable.

5-10 MEASUREMENT AND PAYMENT:

All work done under this section shall not be paid for separately but shall be included in the appropriate items on the Bid Schedule.

SECTION 6

PUMP HOUSE CONSTRUCTION

6-01 SCOPE:

The section includes certain specifications and instructions for construction of the elevated pump house/enclosure. Refer to other sections of the specifications for work included in the pump house construction.

Inspection of structural components of the project must be provided by the contractor at the contractor's expense, in accordance with documents and requirements specified herein.

6-02 MEASUREMENT AND PAYMENT:

All work done under this section shall not be paid for separately but shall be included in the appropriate items on the Bid Schedule.

ATAS INTERNATIONAL, INC.

SPECIFICATION DATA SHEET

1.PRODUCT NAME

GRAND SERIES
Grand C - Grand V
BWF324, BWF291 – BWF320

2. MANUFACTURER

ATAS INTERNATIONAL, INC.
Website: www.atas.com
Email: info@atas.com
Corporate Headquarters:
Allentown, PA 18106
Phone: (610) 395-8445
Fax: (610) 395-9342
Western Facility:
Mesa, AZ 85204
Phone: (480) 558-7210
Fax: (480) 558-7217
Southern Facility:
Maryville, TN 37801
Phone: (800) 468-1441

3. PRODUCT DESCRIPTION

Basic Uses:

The Grand Series panels provide an economical solution to the metal roofing and metal siding needs of today. Panels are designed for use over solid substrates or open framing with support members spaced a maximum of 24 inches on center.

Composition & Materials:

Standard Offerings: Grand C is available in .032 Aluminum (BWF324; smooth only) (BWF91; smooth only). Grand V is available in .032 Aluminum (BWV320)

Sizes and Profiles:

Grand C (BWF324) has a ½" high profile and is 32 ¼" wide. Grand C (BWF291) has a ½" high profile and is 29 ⅛". Grand V has a ½" high profile and is 32" wide. Panel lengths are cut to customer specifications with a minimum 6'-0" and maximum to 20'-0".

Colors & Finishes:

A choice of over 30 standard colors is available in a KYNAR 500® PVDF or HYLAR 5000® PVDF finish. (Request color chart or chips). Custom colors available. An anodized finish is available in Clear or Dark Bronze. (Subject to minimum quantities and lead time.) Texture may be smooth or embossed, depending on gauge and profile. Perforations are available.

4. TECHNICAL DATA

KYNAR 500® PVDF or HYLAR 5000® PVDF based finishes tested by paint supplier for:

Dry Film Thickness: ASTM D 1005, ASTM D 1400, ASTM D 4138 or ASTM D 5796
Specular Gloss: ASTM D 523
Pencil Hardness: ASTM D 3363
T-Bend Flexibility: ASTM D 4145
Mandrel Bend Flexibility: ASTM D 522
Impact Resistance: ASTM D 2794
Adhesion: ASTM D 3359
Water Immersion Resistance: ASTM D 870
Abrasion Resistance: ASTM D 968
Acid Resistance: ASTM D 1308
Acid Rain Resistance (Kesternich): ASTM G 87 or DIN 50018
Salt Spray: ASTM B 117
Cyclic Salt Spray: ASTM D 5894 and ASTM D 5487
Humidity Resistance: ASTM D 2247
Accelerated Weathering: ASTM D 822 and ASTM G 23, ASTM G 151 or ASTM G 153
Color Retention, Florida Exposure: ASTM D 2244
Chalking Resistance – ASTM D 4214
Cleveland Condensing Cabinet: ASTM D 4585
Cure Test, MEK Resistance: ASTM D 5402
Alkali Resistance, Sodium Hydroxide: ASTM D 1308, Procedure 7.2
Flame Spread Rating: ASTM E 84
Organic coatings meet requirements of AAMA 2605 when applied to aluminum.
Panel testing/ratings:
UL Fire resistance rating design numbers: See www.ul.com, File R12113, or contact ATAS for current listing.
Galvanized Steel: ASTM A 653
Aluminum: ASTM B 209
Coil Coating: ASTM A 755
Field Tested and Approved
Load Tables available upon request.

5. INSTALLATION

Installation manuals or hands-on training via seminars are available through ATAS. Visit www.atas.com for more information.

6. AVAILABILITY & COST

Availability:

Grand Series panels are available through ATAS product distributors. A complete line of related components and trim accessories is available to complete the wall system. In addition, a complete line of rainware and perimeter roof edge trims can be supplied by ATAS to complement the wall system. Flat sheet and/or coil stock is available in matching color for fabrication of related components by the installing contractor.

Cost:

Contact ATAS product distributors for current pricing.

7. WARRANTY

Products coated with a fluoropolymer, KYNAR 500® PVDF or HYLAR 5000® PVDF finish carry a limited warranty against chalking and fading.

8. MAINTENANCE

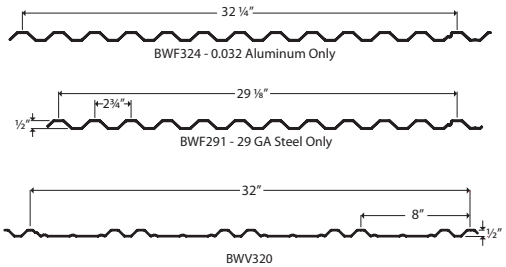
Grand Series panels are virtually maintenance free. Surface residue may be easily removed by conventional cleaning methods. Minor scratches may be touched up with a matching paint, available from the manufacturer.

9. TECHNICAL SERVICES

Complete technical information and literature are available at www.atas.com. ATAS will assist with design ideas and shop drawings.

10. FILING SYSTEM

- www.atas.com
- Additional product information is available from the manufacturer upon request.



Belvedere™ is a trademark of ATAS International, Inc.
KYNAR 500® is a registered trademark of Arkema.
HYLAR 5000® is a registered trademark of Solvay Solexis, Inc.
© 2012 ATAS International, Inc.

SECTION 05 40 00 - COLD-FORMED METAL

FRAMING PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Exterior non-load-bearing wall framing.

1.3 PREINSTALLATION MEETINGS

A. Pre-installation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of cold-formed steel framing product and accessory.

B. Shop Drawings:

   1. Include layout, spacing, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
   2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

C. Delegated-Design Submittal: For cold-formed steel framing.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product Test Reports: For each listed product, for tests performed by a qualified testing agency.

   1. Steel sheet.
   2. Expansion anchors.
   3. Power-actuated anchors.
   4. Mechanical fasteners.
   5. Vertical deflection clips.
   6. Horizontal drift deflection clips

7. Miscellaneous structural clips and accessories.

D. Research Reports: For non-standard cold-formed steel framing, from ICC-ES.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a) Dietrich Metal Framing: a Worthington Industries Company, www.dietrichindustries.com
   b) MarinoWARE, www.marinoware.com.
   c) SCAFCO Corporation, www.scafco.com.
   d) Substitutions: See Section 01 25 00 - Substitution Procedures.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design cold-formed steel framing.

B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated.
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
   a. Select deflection ratios to suit finish material(s) to be used on the specific project. Exterior Non-Load-Bearing Framing: Horizontal deflection of **1/360** of the wall height.

3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.

4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

   a. Upward and downward movement of 3/4 inch.

5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

C. Cold-Formed Steel Framing Design Standards:

1. Wall Studs: AISI S211.
2. Headers: AISI S212.
3. Lateral Design: AISI S213.

D. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

E. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.3 COLD-FORMED STEEL FRAMING, GENERAL

A. Recycled Content of Steel Products: Post-consumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.

B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: As required by structural performance.
2. Coating: G90 or equivalent.

C. Steel Sheet for Vertical Deflection and Drift Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: As required by structural performance.
2. Coating: G90.

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch.

2. Flange Width: 1-5/8 inches.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: Matching steel
2. Flange Width: 1-1/4 inches.

C. Vertical Deflection Clips: Manufacturer's standard bypass or head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Dietrich Metal Framing; a Worthington Industries

   b. MarinoWARE, www.marinoware.com.
   c. SCAFCO Corporation, www.scafco.com.
   d. Substitutions: See Section 01 25 00 - Substitution Procedures.

D. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.5 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Joist hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

2.6 ANCHORS, CLIPS, AND FASTENERS

A. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load

or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.

B. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

C. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

D. Welding Electrodes: Comply with AWS standards.

2.7 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A 780.

B. Nonmetallic, Non-shrink Grout: Premixed, nonmetallic, noncorrosive, non-staining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, with fluid consistency and 30-minute working time.

C. Shims: Load bearing, high-density multi-monomer plastic, and non-leaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

D. Sealer Gaskets: Closed-cell neoprene foam, ¼ inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire- resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

A. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.

B. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

    a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

C. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

D. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

E. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

F. Install insulation, specified in Section 07 21 00 "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

G. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

H. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely

anchor to supporting structure as indicated.

B. Fasten both flanges of studs to bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: As indicated.

C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support, as detailed on drawings.

1. Install single deep-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to **infill** studs and anchor to building structure.
4. Connect drift clips to cold-formed metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

a. Install solid blocking at centers indicated.

2. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall- framing system.

3.5 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain, in a manner acceptable to manufacturer and Installer, conditions that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 40 00

SDI Specifications and Commentary

FOR COMPOSITE STEEL FLOOR DECK

1. Scope

This specification pertains to composite steel floor deck. Composite steel floor deck is cold formed steel deck which acts as a permanent form and as the positive bending reinforcement for the structural concrete. When suitably fastened, the steel deck also acts as a working platform for the various trades. After the concrete cures, the steel deck and the concrete are interlocked by the shape of the deck, mechanical means, surface bond, or by a combination of these means.

2. Materials

2.1 Composite Steel Deck: Composite steel floor deck shall be fabricated from steel conforming to Section A3 of the 1996 edition of the American Iron and Steel Institute, *Specification for the Design of Cold Formed Steel Structural Members*, (AISI Specifications). The steel used shall have a minimum yield point of 33 ksi (230 MPa).

2.1a Tolerances:
Panel length: Plus or minus 1/2 inch (12 mm).
Thickness: Shall not be less than 95% of the design thickness.
Panel cover width: minus 3/8 inch (10 mm), plus 3/4 inch (20 mm).
Panel camber and/or sweep: 1/4 inch in 10 foot length (6 mm in 3 m).
Panel end out of square: 1/8 inch per foot of panel width (10 mm per m).

Commentary: Most composite steel floor deck is manufactured from steel conforming to ASTM Designation A1008-00, Grades C and D, or from A653-00, Structural Steel. If the published product literature does not show the uncoated steel thickness in decimal inches (or millimeters), but lists gage or type numbers, then the thickness of steel before coating with paint or metal shall be in conformance with the following table:

TYPE NO.	DESIGN THICKNESS		MINIMUM THICKNESS	
	in.	mm	in.	mm
22	0.0295	0.75	0.028	0.71
21	0.0329	0.84	0.031	0.79
20	0.0358	0.91	0.034	0.86
19	0.0418	1.06	0.040	1.01
18	0.0474	1.20	0.045	1.14
17	0.0538	1.37	0.051	1.30
16	0.0598	1.52	0.057	1.44

The tolerances reflect fabrication processes for steel deck products. Variation in cover width may be from trucking, storage or handling.

2.1b Finish: The finish on the steel composite deck shall be as specified by the designer and be suitable for the environment of the structure.

Commentary: Since the composite deck is the positive bending reinforcement for the slab, it must be designed to last the life of the structure; a minimum of recommended finish is a galvanized coating as defined in ASTM A653-00, G30 (Z090).

3. Design (Deck as a Form)

3.1: The section properties for the steel floor deck (as a form in bending) shall be computed in accordance with the AISI Specifications.

3.2a: Allowable Stress Design (ASD): The interaction of shear and bending shall be considered in the calculations. Bending stress in the deck shall not exceed 0.6 times the yield strength with a maximum of 36 ksi (250 MPa) under the combined loads of wet concrete, deck, and the following construction live loads: 20 pounds per square foot uniform load (1 kPa) or 150 pound concentrated load on a 1'0" wide section of deck (2.2 kN per m). *See Figure 1.*

3.2b: Load and Resistance Factor Design (LRFD): The load factors for the construction shown in Figure 1 and the resistance factors for bending, shear, and interior bearing shall be as required in the 1996 AISI Specification.

continued on next page

FOR COMPOSITE STEEL FLOOR DECK *continued*

Commentary: The loading shown in Figure 1 is representative of the sequential loading of wet concrete on the form. The 150 pound load (per foot of width) is the result of distributing a 300 pound man over a 2 foot width. Experience has shown this to be a conservative distribution and, if welded wire reinforcing is present the distribution is greater than 2 feet. The metric equivalent of the 150 pound load is 2.2 kN per meter of width. For single span deck conditions, the ability to control the concrete placement may be restricted and a factor of 1.5 is applied to the concrete load to address this condition; however, in order to keep this 50% load increase within a reasonable limit, the increase is not to exceed 30 psf (1.44 kPa).

3.3 Calculated theoretical deflections of the deck, as a form, shall be based on the load of the wet concrete (as determined by the design slab thickness) and the load from the steel deck, uniformly loaded on all spans, and shall be limited to L/180 or 3/4 inch (20 mm), whichever is smaller. Deflections shall be relative to supporting members. *See Figure 2.*

Commentary: The deflection calculations do not take into account construction loads since these are considered as temporary loads. The deck is designed to always be in the elastic range so removal of temporary loads should allow the deck to recover. The structural steel also deflects under the loading of the wet concrete. The design professional is urged to check the deflection of the total system especially if composite beams and girders are being used. If the designer wants to include additional concrete loading on the deck because of frame deflection, the additional load should be shown on the design drawings or stated in the deck section of the job specifications. The deck supplier is not responsible for frame deflection, nor for any cambering.

3.4: Minimum interior bearing lengths shall be determined in accordance with the 1996 AISI Specification; a uniform loading case of wet concrete, plus deck, plus 20 psf (1 kPa) construction load shall be used. *See Figure 3.*

Commentary: In the past, 1-1/2 inches (40 mm) of end bearing was the minimum; this is still a good "rule of thumb" that will, in general, prevent slip off. The deck must be adequately attached to the structure to prevent slip off.

4. Installation & Site Storage

4.1 Site Storage: Steel deck shall be stored off the ground with one end elevated to provide drainage and shall be protected from the elements with a waterproof covering, ventilated to avoid condensation.

4.2 Deck Placement: Place each deck unit on the supporting structural frame. Adjust to final position with accurately aligned side laps and ends bearing on supporting members.

Commentary: Staggering floor deck end joints is not a recommended practice. The deck capacity as a form and the load capacity of the composite deck/slab system are not increased by staggering the ends, yet layout and erection costs are increased.

4.3 Butted Ends: Deck sheets shall be butted over supports. [Standard tolerance for ordered length is plus or minus 1/2 inch (12 mm), - See section 2.1a]

Commentary: Lapping composite deck ends can be difficult because shear lugs (web embossment) or profile shape can prevent a tight metal to metal fit. The space between lapped sheets can make welded attachments more difficult. Gaps are acceptable at butted ends. If taping of butted ends is requested, it is not the responsibility of the deck manufacturer.

4.4 Anchorage: Floor deck units shall be anchored to supporting members including perimeter support steel and/or bearing walls by either welding or by mechanical fastening. This shall be done immediately after alignment. The minimum recommended attachments are defined in Section 4.4a. Do not walk or stand on deck until these minimum attachments are provided at the structural support. Deck units with spans greater than five feet (1.5 m) shall have side laps and perimeter edges (at perimeter support steel) fastened at midspan or 36 inch (1 m) intervals, whichever distance is smaller. Side lap attachment shall progress from the support to midspan.

Commentary: This anchorage may be required to provide lateral stability to the top flange of the supporting structural members. The

minimum attachment is to prevent slip off from supports and to provide stability to the deck system. The deck must be anchored to act as a working platform and to prevent blow off. Side lap fasteners can be welds, screws, crimps (button punching), or other methods approved by the designer. Welding side laps on thicknesses 0.028 inches (0.7 mm) or less may cause large burn holes, and is not recommended. The objective of side lap fastening is to prevent differential sheet deflection during concrete placing and therefore prevent side joints from opening. The five foot (1.5 m) limit on side lap spacing is based on experience. The deck erector must not leave unattached deck at the end of the day, as the wind may displace the sheets and cause injury to persons or property. The SDI *Diaphragm Design Manual, Second Edition*, should be used to determine fastening requirements if the deck will be designed to resist horizontal loads. The most stringent requirements, of either section 4.4 or, if applicable, the SDI *Diaphragm Design Manual*, *Second Edition*, should be used.

4.4a Welding: All welding of deck shall be in strict accordance with ANSI/AWS D1.3 *Structural Welding Code - Sheet Steel*. Each welder must demonstrate an ability to produce satisfactory welds using a procedure such as shown in the SDI *Manual of Construction with Steel Deck* or as described in ANSI/AWS D1.3. A minimum visible 5/8 inch (15 mm) diameter puddle weld or equivalent is required at all edge ribs, plus a sufficient number of interior ribs to provide a maximum average spacing of 12 inches (300 mm). The maximum spacing between adjacent points of attachment shall not exceed 18 inches (460 mm). Fillet welds, when used, shall be at least 1 inch (25 mm) long. Weld metal shall penetrate all layers of deck material at end laps and shall have good fusion to the supporting members. Welding washers shall be used on all deck units with a metal thickness less than 0.028 inches (0.7 mm, 22gage). Welding washers shall be a minimum thickness of 0.0567 inches (1.5 mm, 16 gage) and have a nominal 3/8 inch (10 mm) diameter hole.

Commentary: The welder may be qualified on plate or pipe under ANSI/AWS D1.1, *Structural Welding Code - Steel*, or under the provisions of other codes governing the welding of specific products, but may not be qualified for welding sheet steel. The layout, design numbering or sizing of shear connectors is not the responsibility of the deck manufacturer. If studs are being applied through the deck onto structural steel, the stud welds can be used to replace the puddle welds. In general, stronger welds are obtained on 0.028 inches (0.7 mm, 22 gage) or thicker deck without weld washers. Welds on deck less than 0.028 inches (0.7 mm, 22 gage) are stronger with washers.

4.4b Mechanical Fasteners: Mechanical fasteners (powder actuated, screws, pneumatically driven fasteners, etc.) are recognized as viable anchoring methods, provided the type and spacing of the fastener satisfies the design criteria. Documentation in the form of test data, design calculations, or design charts should be submitted by the fastener manufacturer as the basis for obtaining approval. The deck manufacturer may recommend additional fasteners to stabilize the given profile against sideslip of unfastened ribs.

Commentary: When the fasteners are powder actuated or pneumatically driven, the load value per fastener used to determine the maximum fastener spacing is based on a minimum structural support thickness of not less than 1/8 inch (3mm) and on the fastener providing a 5/16 inch (8mm) diameter bearing surface (fastener head size). When the structural support thickness is less than 1/8 inch (3mm), powder actuated or pneumatically driven fasteners shall not be used, but screws are acceptable.

5. Design Deck and Concrete As A Composite Unit

5.1 General: The composite slab shall be designed as a reinforced concrete slab with the steel deck acting as the positive reinforcement. Slabs shall be designed as simple or continuous spans under uniform loads.

Commentary: High concentrated loads, diaphragm loads, etc. require additional analysis. Horizontal load capacities can be checked by referring to the *SDI Diaphragm Design Manual, Second Edition*. Concentrated loads may be analyzed by the methods shown in the SDI *Composite Deck Design Handbook, 1997.*

continued on next page

FOR COMPOSITE STEEL FLOOR DECK *continued*

Most published live load tables are based on simple span analysis of the composite system; that is, the slab is assumed to crack over each support. If the designer wants a continuous slab, then negative reinforcing should be designed using conventional reinforced concrete design techniques. The welded wire mesh, chosen for temperature reinforcing (Section 5.5), does not usually supply enough area for continuity. The deck is not considered to be compression reinforcing. Care should be used during the placement of loads on all types of hanger tabs for the support of ceilings so that an approximate uniform loading is maintained. The individual manufacturer should be consulted for allowable loading on single hanger tabs. Improper use of hanger tabs could result in the overstressing of tabs and/or the overloading of the composite deck slab.

5.2 Testing: The deck manufacturer shall have performed, under the supervision of a professional engineer, a sufficient number of tests on the composite deck slab system to have verified composite behavior; or, the deck manufacturer shall have participated in the Steel Deck Institute research program used to establish the design criteria as shown in the SDI *Composite Deck Design Handbook, 1992 or 1997*; or, the deck manufacturer shall have submitted deck drawings and samples to the Steel Deck Institute for certification as composite deck.

5.2a Load Determination: Using standard reinforced concrete design procedures, the allowable superimposed load shall be found by using appropriate load resistance design factors and applicable reduction factors based on the presence, absence, or spacing of shear studs on beams perpendicular to the deck as shown in the SDI *Composite Deck Design Handbook, 1997*.

Commentary: By using the referenced analysis techniques or test results, the deck manufacturer determines the live loads that can be applied to the composite deck slab combination. The results are usually published as uniform load tables. The manufacturer may instead publish loads based on the results of a "shear bond" testing program and these loads would also be appropriate. For most applications, the deck thickness and profile is selected so that shoring is not required; the live load capacity of the composite system is usually more than adequate for the superimposed (live) loads. In calculating the section properties of the deck (under section 3.1 of these specifications), the AISI provisions may require that compression zones in the deck be reduced to an "effective width," but as tensile reinforcement, the total area of the cross section may be used.

Coatings other than those tested may be investigated, and if there is evidence that their performance will be better than that of the tested product, additional testing may not be required. For example, it is well accepted that deck with light tight rust provides better shear bond than galvanized, therefore tested galvanized load capacities may be used for rusted decking.

5.3 Concrete: Concrete shall be in accordance with the applicable sections of Chapters 3, 4 and 5 of the ACI 318 *Building Code Requirements for Reinforced Concrete*. Minimum compressive strength (f' c) shall be 3 ksi (20 MPa) or as required for fire ratings or durability. Admixtures containing chloride salts shall not be used.

Commentary: Load tables are generally calculated by using a concrete strength of 3 ksi (20 MPa). Composite slab capacities are not greatly affected by variations in concrete strength; but, if the strength falls below 3 ksi (20 MPa), it would be advisable to check shear stud strengths. Fire rating requirements may dictate the minimum concrete strength.

The use of admixtures containing chloride salts is not allowed because the salts will corrode the steel deck which has been designed as the slab reinforcement.

5.3a Minimum Cover: The minimum concrete above the top of the floor deck shall be 2 inches (50 mm). When additional (negative bending) reinforcement is placed in the slab, the minimum cover of concrete above the reinforcing shall be 3/4 inch (20 mm).

5.4 Deflection: Deflection of the composite slab shall not exceed L/360 under the superimposed load.

Commentary: Live load deflections are seldom a design factor. The

deflection of the slab/deck combination can best be predicted by using the average of the cracked and uncracked moments of inertia as determined by the transformed section method of analysis.

5.5 Temperature and Shrinkage Reinforcement: Temperature and Shrinkage reinforcement, consisting of welded wire fabric or reinforcing bars, shall have a minimum area of 0.00075 times the area of concrete above the deck (per foot or per meter of width), but shall not be less than the area provided by 6 x 6 - W1.4 x W1.4 welded wire fabric. For those products so manufactured, shear transfer wires welded to the top of the deck may be considered to act as shrinkage or temperature reinforcement.

Commentary: Welded wire fabric with a steel area given by the above formula will generally not be sufficient as the total negative reinforcement; however, the mesh has shown that it does a good job of crack control especially if kept near the top of the slab (3/4 inch to 1 inch cover, 20 to 25 mm).

All deck sheets shall have adequate bearing and fastening to all supports to prevent slip off during construction. Deck areas subject to heavy or repeated traffic, concentrated loads, impact loads, wheel loads, etc. shall be adequately protected by planking or other approved means to avoid overloading and/or damage.

Damaged deck (sheets containing distortions or deformations caused by construction practices) shall be repaired, replaced, or shored to the satisfaction of the design professional before placing concrete. The cost of repairing, replacing, or shoring of damaged units shall be the liability of the trade contractor responsible for the damage.

Commentary: Deck must be selected to support a minimum uniform load of 50 psf (2.4kPa)

6. Construction Practice

6.1 Temporary Shoring: If temporary shoring is required to attain the minimum uniform load of 50 psf (2.4 kpa), the shoring must be securely in place before the floor deck erection begins. The shoring shall be designed and installed in accordance with the applicable ACI code and shall be left in place until the slab attains 75% of its specified compressive strength.

6.2: Prior to concrete placement, the steel deck shall be free of soil, debris, standing water, loose mill scale and all other foreign matter.

6.3: Care must be exercised when placing concrete so that the deck will not be subjected to any impact that exceeds the design capacity of the deck. Concrete shall be placed from a low level to avoid impact, and in a uniform manner over the supporting structure and spread toward the center of the deck span. If buggies are used to place the concrete, runways shall be planked and the buggies shall only operate on planking. Planks shall be of adequate stiffness to transfer loads to the steel deck without damaging the deck. Deck damage caused by roll bars or careless placement must be avoided.

7. Commentary and Information

7.1 Parking Garages: Composite floor deck has been used successfully in many parking structures around the country; however, the following precautions should be observed:

1. Slabs should be designed as continuous spans with negative bending reinforcing over the supports;

2. Additional reinforcing should be included to deter cracking caused by large temperature differences and to provide load distribution; and,

3. In areas where salt water; either brought into the structure by cars in winter or carried by the wind in coastal areas, may deteriorate the deck, protective measures must be taken. The top surface of the slab must be effectively sealed so that the salt water cannot migrate through the slab to the steel deck. A minimum G90 (Z275) galvanizing is recommended, and, the exposed bottom surface of the deck should be protected with a durable paint. The protective measures must be maintained for the life of the building. If the protective measures cannot be assured, the steel deck can be used as a stay in place form and the concrete can be reinforced with mesh or bars as required.

7.2 Cantilevers: When cantilevered slabs are encountered, the deck acts only as a permanent form; top reinforcing steel must be proportioned by the designer.

continued on next page

FOR COMPOSITE STEEL FLOOR DECK *continued*

7.3 Composite Beam and Girders: Most composite floor deck sections are suitable for use with composite beams. The AISC Specification specifically provides for the use of deck in this type of construction.

7.4 Fire Ratings: Many fire rated assemblies that use composite floor decks are available. Consult a SDI member manufacturer for a list of ratings.

In the Underwriters Laboratories *Fire Resistance Directory*, the composite deck constructions show hourly ratings for restrained and unrestrained assemblies. ASTM E119 provides information in appendix X3 called *Guide for Determining Conditions of Restraint for Floor and Roof Assemblies and for Individual Beams*. After a careful review of this guide, the Steel Deck Institute determined that all interior and exterior spans of multispan deck properly attached to bearing walls are restrained. In fact, there is almost no realistic condition that a composite deck-slab could not be considered to be restrained - except perhaps a single span deck system which is unattached to framing or a wall in order to provide a removable slab.

7.5 Fireproofing: The steel deck manufacturer shall not be responsible for ensuring the bonding of fireproofing. The adherence of fireproofing materials is dependent on many variables; the deck manufacturer (supplier) is not responsible for the adhesion or adhesive ability of the fireproofing.

7.6 Concentrated Loads: Concentrated loads can be analyzed and distributed with the methods shown in the SDI *Composite Deck Design Handbook, 1997*.

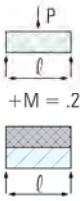
7.7 Conduits: Conduits are permitted in deck slabs subject to local code requirements and fire rating considerations. When conduit sizes are 1" (25.4 mm) or less in diameter, or less than 1/3 the concrete cover, and no crossovers occur, and conduit is spaced at least 18" apart with ¾" (19 mm) minimum cover, conduit may be permitted in the slab unless further restricted by the design documents.

7.8 Other Criteria: Composite steel floor deck may be used in a variety of ways, some of which do not lend themselves to a standard "steel deck" analysis for span and loading. There are, in these cases, other criteria which must be considered besides that given by the Steel Deck Institute. Make sure this investigation starts with a review of the applicable Codes and that any special conditions are included in the design.

FIGURE 1

Loading Diagrams and Bending Moments

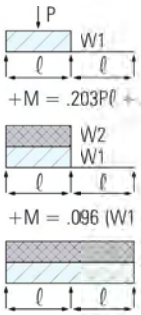
Simple Span Condition



$+M = .25P\ell + 0.125W1_1\ell^2$

$+M = .125\,(W1_1 + W2)\ell^2$

Double Span Condition

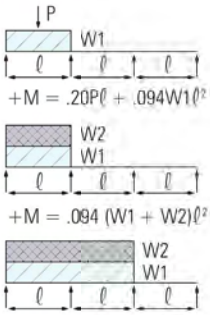


$+M = .203P\ell + .096W1\ell^2$

$+M = .096\,(W1 + W2)\ell^2$

$-M = .125\,(W1 + W2)\ell^2$

Triple Span Condition



$+M = .20P\ell + .094W1\ell^2$

$+M = .094\,(W1 + W2)\ell^2$

$-M = .117\,(W1 + W2)\ell^2$

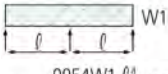
FIGURE 2

Loading Diagrams and Deflections

Simple Span Condition

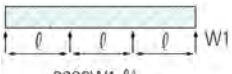
$$\Delta = \frac{.0130W1\,\ell^4}{E\,I}\,(1728)$$

Double Span Condition



$$\Delta = \frac{.0054W1\,\ell^4}{E\,I}\,(1728)$$

Triple Span Condition

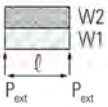


$$\Delta = \frac{.0069W1\,\ell^4}{E\,I}\,(1728)$$

FIGURE 3

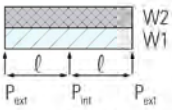
Loading Diagrams and Support Reactions

Simple Span Condition



$P_{ext} = .5\,(W1 + W2)\ell$

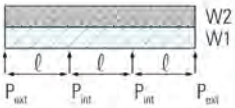
Double Span Condition



$P_{ext} = .375\,(W1 + W2)\ell$

$P_{int} = 1.25\,(W1 + W2)\ell$

Triple Span Condition



$P_{ext} = .4\,(W1 + W2)\ell$

$P_{int} = 1.1\,(W1 + W2)\ell$

Notes for Figures 1, 2, and 3

P = 150 - pound concentrated load

I = in^4/ft. - deck moment of inertia

W1 = slab weight + deck weight, psf

W2 = 20 pounds per square foot construction load

E = 29.5×10^6 psi

ℓ = clear span length (ft.)

$W1_1$ = 1.5 x slab weight + deck weight ≤ slab weight + 30 + deck weight

Dimensional check shows the need for the 1728 factor when calculating deflections using pound inch units.

SDI Specifications and Commentary

FOR NON-COMPOSITE STEEL FLOOR DECK

1. Scope

This specification and commentary pertains to the use of non-composite steel deck as a form for reinforced concrete slabs.

Commentary: This specification is not intended to cover highway bridges (see SDI publication *Bridge Form*, 1996), siding applications, or exposed roofs. In the past, most of the steel decking used in the manner that this specification covers, was referred to as "centering," however, various roof deck units have successfully been used as non-composite forms. The specification is intended to also include these applications.

2. Materials

2.1 Non-Composite Steel Form Deck: The steel deck units shall be manufactured from steel conforming to ASTM designation A1008-00, Grades C, D, or E, or A653-00 Structural Steel with a minimum yield strength of 33 ksi (230 MPa). The unit design stress shall not exceed the yield strength multiplied by 0.60, with a maximum of 36 ksi (250 MPa).

Commentary: Most of the "centering" materials are offered in A653-00 grade 80, steel (galvanized) or ASTM A1008-00 grade E steel, (uncoated); this steel has a minimum yield strength of 80 ksi (550 MPa) and is generally over 90 ksi (620 MPa); the AISI specifications allow a design stress of 36 ksi (250 MPa) for this material.

2.2 Tolerance:
Panel length: Plus or minus 1/2 inch (12 mm).
Thickness: Shall not be less than 95% of the design thickness.
Panel cover width: Minus 3/8 inch. (10 mm), plus 3/4 inch (20 mm).
Panel camber and/or sweep: 1/4 inch in 10 foot length (6 mm in 3 m).
Panels end out of square: 1/8 inch per foot of panel width (10 mm per m).

Commentary: The above tolerances reflect fabrication practices for steel deck products. Cover width tolerances may vary due to trucking, storage, or handling.

TYPE NO.	DESIGN THICKNESS		MINIMUM THICKNESS	
	in.	mm	in.	mm
28	0.0149	0.38	0.014	0.35
26	0.0179	0.45	0.017	0.43
24	0.0238	0.60	0.023	0.57
22	0.0295	0.75	0.028	0.71
20	0.0358	0.91	0.034	0.86
18	0.0474	1.20	0.045	1.14
16	0.0598	1.52	0.057	1.44

Finishes available are:

1) Galvanized (Conforming to ASTM A924-99 and or ASTM A653-00);
2) Uncoated (Black);
3) Painted with a shop coat of primer paint (one or both sides).
The uncoated finish is, by custom, referred to as "black" by some users and manufacturers; the use of the word "black" does not refer to paint color on the product.

Centering materials are usually available galvanized or uncoated. When unshored galvanized material is used to support a reinforced concrete slab, the slab load is considered to be permanently carried by the deck. When uncoated or painted deck is used to support a reinforced concrete slab, the form is considered impermanent and the concrete load should be deducted from the load capacity of the reinforced slab.

For any permanent load carrying function, a minimum galvanized coating conforming to ASTM A653-98a, G30 (Z090) is recommended.

3. Design

3.1 The section properties of the steel deck unit shall be computed in accordance with American Iron and Steel Institute, *Specification for the Design of Cold-Formed Steel Structural Members*, 1996 edition (AISI Specifications).

3.2 Deck used as a form for structural (reinforced) concrete slab:
3.2a Allowable Stress Design (ASD): Stress shall not exceed 0.60 times the yield strength, nor exceed 36 ksi (250 MPa) under the combined loads of wet concrete, deck, and the following construction live loads: 20 pounds per square foot (1 kPa) uniform load or 150 pound concentrated load on a 1'-0" wide section of deck (2.2 kN per m). The interaction of shear and bending shall be considered in the calculations. *See Figure 1*.

3.2b Load and Resistance Factor Design (LRFD) The load factors for the construction shown in Figure 1 and the resistance factors for bending, shear, and interior bearing shall be as required in the 1996 AISI Specification.

Commentary: The loading shown in Figure 1 is representative of the sequential loading of wet concrete on the form. The 150 pound load (per foot of width) is the result of distributing a 300 pound man over a 2 foot width. Experience has shown this to be a conservative distribution and, if welded wire reinforcing is present , the distribution is greater than 2 feet. The metric equivalent of the 150 pound load is 2.2kN per meter of width. For single span deck conditions, the ability to control the concrete placement may be restricted and a factor of 1.5 is applied to the concrete load to address this condition; however, in order to keep this 50% load increase within a reasonable limit the increase is not to exceed 30 psf (1.44 kPa).

3.2c Calculated theorectical deflection of the deck shall be based on the load of the wet concrete (as determined by the design slab thickness) and the steel deck weight, uniformly loaded on all spans, and shall be limited to L/180 or 3/4 inch (20 mm), whichever is smaller. Deflection shall be relative to supporting members. *See Figure 2*.

Commentary: The deflection limits of L/180 and 3/4 inches (20 mm) are intended to be minimum requirements. Architectural or other considerations may influence the design professional to use a more stringent limit.

If the design professional wants to include additional concrete loading on the deck because of frame deflection, the additional load should be shown on the design drawings or stated in the deck section of the job specifications. The deck supplier is not responsible for frame deflection, nor for any cambering.

3.2d The minimum bearing lengths shall be determined in accordance with the 1996 AISI Specification; the uniform loading case of wet concrete plus deck plus 20 pounds per square foot (1 kPa) construction load shall be used. Minimum bearing shall be 1-1/2 inches (40 mm) unless otherwise shown.

Commentary: Form decks made of grade E steel may have a radius to thickness ratio not covered by the AISI Specification. Experience has shown that 1-1/2 inches (40 mm) of bearing is sufficient for these decks. If less than 1-1/2 inches (40 mm) of end bearing is available for any form deck, or if high support reactions are expected, the design professional should check the deck web crippling capacity. The deck must be adequately attached to the structure to prevent slip off.

3.2e Design of the concrete slabs shall be done in accordance with the ACI 318 Building Code. The concrete cover over the top of the deck shall not be less than 1-1/2 inches (40 mm). Randomly distributed fibers or fibrous add mixes shall not be substituted for welded wire fabric tensile reinforcement. Admixtures containing chloride salts shall not be used.

Commentary: In following the ACI 318 requirements for temperature reinforcement, the designer may eliminate the concrete area that is displaced by the deck ribs. For slabs with total depth of 3 inches (75 mm) or less, the reinforcing mesh may be considered to be at the center of the concrete above the deck. *See Figure 3*. If uncoated or painted deck is used as the form, the load of the concrete slab must be deducted from the calculated capacity of the reinforced concrete slab. If galvanized form is used, the load of the slab is considered to be permanently carried by the deck and need not be deducted from the live load. If temporary shoring is used, the load of the slab must be deducted from the calculated capacity of the reinforced slab regardless of the deck finish. Except for some diaphragm values, the deck should not be assumed to act compositely with the concrete even though strong chemical bonds can, and do, develop.

4. Installation & Site Storage

4.1 Site Storage: Steel deck shall be stored off the ground with one end elevated to provide drainage and shall be protected from the elements with a waterproof covering, ventilated to avoid condensation.

4.2 Deck Placement: Place each deck unit on the supporting structural frame. Adjust to final position with accurately aligned side laps and ends bearing on supporting members and attach immediately. On joist framing, be sure the appropriate end joint occurs over a top chord angle for proper anchorage.

continued on next page

FOR NON-COMPOSITE STEEL FLOOR DECK *continued*

Commentary: Staggering deck ends is not a recommended practice. The deck capacity as a form and the load capacity of the non-composite deck/slab system are not increased by staggering the end joints, yet layout and erection costs are increased.

4.3 Lapped or Butted Ends: Deck ends may be either butted or lapped over supports.

Commentary: Gaps are acceptable at butted ends. If taping of butted ends is requested, it is not the responsibility of the deck manufacturer.

4.4 Anchorage: Form deck units shall be anchored to supporting members including perimeter support steel and/or bearing walls by either welding or by mechanical fastening. This shall be done immediately after alignment. The minimun recommended attachment is defined in Section 4.4a. Do not walk or stand on deck until the minimum attachments are accomplished at the structural supports.

Deck units with spans greater than five feet (1.5 m) shall have side laps and perimeter edges (at perimeter support steel) fastened at midspan or 36 inch (1 m) intervals - whichever is smaller.

Commentary: This anchorage may be required to provide lateral stability to the top flange of the supporting structural members. The minimum attachment is to prevent slip off from supports and provide stability of the deck systems. The deck should be anchored to act as a working platform and to prevent blow off. The frame fastening shown in Figure 4 and the side lap fastening of 4.4 ARE MINIMUM REQUIREMENTS. In no case should fasteners to the supports be spaced greater than 36 inches (1 m) on center. The SDI *Diaphragm Design Manual, Second Edition*, should be used to determine fastening requirements when the deck is designed to resist horizontal loads. The most stringent fastening requirements, of this specification or, if applicable, the SDI *Diaphragm Design Manual, Second Edition,* should be used. Side lap fasteners can be welds, screws, crimps (button punching), or other methods approved by the designer. Welding side laps on thickness less than 0.028 inches (0.7 mm) may cause large burn holes, and is not recommended. The objective of side lap fastening is to prevent differential sheet deflection during concrete loading, therefore preventing side joints from opening. The five foot (1.5 m) limit on side lap spacing is based on experience.

The deck contractor should not leave unattached deck at the end of the day as the wind may displace the sheets and cause injury to persons or property. If studs are being welded to the top flange of the beams, deck sheets should be butted over the supports.

4.4a Welding: All welding of deck shall be in strict accordance with ANSI/AWS D1.3, *Structural Welding Code - Sheet Steel*. Each welder must demonstrate an ability to produce satisfactory welds using a procedure such as shown in the SDI *Manual of Construction with Steel Deck*, or as described in ANSI/AWS D1.3. Welding washers shall be used on all deck units with metal thickness less than 0.028 inches (0.7 mm). Welding washers shall be a minimum thickness of 0.0598 inches (16 gage, 1.50 mm) and have a nominal 3/8 inch (12 mm) diameter hole. Where welding washers are not used, a minimum visible 5/8 inch (15 mm) diameter arc puddle weld shall be used. Weld metal shall penetrate all layers of deck material at end laps and shall have good fusion to the supporting members. When used, fillet welds shall be at least 1 inch (25 mm) long.

Commentary: The welder may be qualified under ANSI/AWS D1.1, *Structural Welding Code - Steel*, or under the provisions of other codes governing the welding of specific products, but may not be qualified for welding sheet steel. In general, stronger welds are obtained on 0.028 inches (0.7 mm) or thicker deck without weld washers. Welds on deck less than 0.028 inches (0.7 mm) are stronger with washers. The layout, design, numbering or sizing of shear connectors is not the responsibility of the deck manufacturer. If studs are being applied through the deck onto structural steel, the stud welds can be used to replace the puddle welds.

4.4b Mechanical Fasteners: Mechanical fasteners (powder actuated, screws, pneumatically driven, etc.) are recognized as viable anchoring methods, provided the type and spacing of the fasteners satisfy the design criteria. Documentation in the form of test data, design calculations, or design charts should be submitted by the fastener manufacturer as the bases for obtaining approval. The deck manufacturer may recommend additional fasteners to stabilize the given profile against sideslip of any unfastened ribs.

Commentary: When the fasteners are powder actuated or pneumatically driven, the load value per fastener spacing is based on a minimum structural support thickness of not less than 1/8 inch (3 mm) and on the fastener providing a 5/16 inch (8 mm) diameter bearing surface (fastener head size). When the structural support thickness is less than 1/8 inch (3 mm), powder actuated or pneumatically driven fasteners shall not be used, but screws are acceptable.

4.5 Construction Practice

4.5a All deck sheets shall have adequate bearing and fastening to all supports so as not to lose support during construction. Deck areas subject to heavy or repeated traffic, concentrated loads, impact loads, wheel loads, etc. shall be adequately protected by planking or other approved means to avoid overloading and/or damage.

Damaged deck (sheets containing distortions or deformations caused by construction practices) shall be repaired, replaced, or shored to the satisfaction of the designer before placing concrete. The cost of repairing, replacing, or shoring of damaged units shall be the liability of the trade contractor responsible for the damage.

Commentary: For temporary construction loads prior to concrete placement, it should be safe to assume that the deck will support a minimum uniform load of 50 psf (2.4 kPa) without further investigation.

4.5b The need for temporary shoring shall be investigated and, if required, it shall be designed and installed in accordance with the applicable ACI code and shall be left in place until the slab attains 75% of its specified compressive strength.

4.5c Prior to concrete placement, the steel deck shall be free of soil, debris, standing water, loose mill scale and all other foreign matter.

4.5d Care must be exercised when placing concrete so the deck will not be subjected to any impact that exceeds the design capacity of the deck. Concrete shall be placed from a low level to avoid impact, in a uniform manner, over the supporting structure and spread toward the center of the deck span. If buggies are used to place the concrete, runways shall be planked and the buggies shall only operate on planking. Planks shall be of adequate stiffness to transfer loads to the steel deck without damaging the deck. Deck damage caused by roll bars or careless placement must be avoided.

4.6 Information:

Commentary: Fire ratings, diaphragm design information, and reinforced concrete slab capacities are available from most SDI form deck manufacturers.

Steel form deck may be used in a variety of ways, some of which do not lend themselves to a standard "steel deck" analysis for span and loading. In these cases there are other criteria which must be considered besides those given by the Steel Deck Institute. Make sure that this investigation starts with a review of the applicable codes and that any special conditions are included in the design.

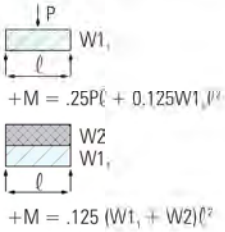
4.7 Fireproofing: The steel deck manufacturer shall not be responsible for ensuring the bonding of fireproofing. The adherence of fireproofing materials is dependent on many variables; the deck manufacturer (supplier) is not responsible for the adhesion or adhesive ability of the fireproofing.

SDI Specifications and Commentary

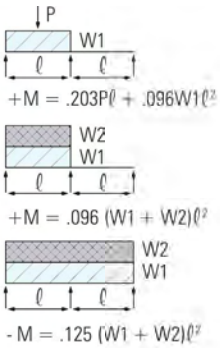
FIGURE 1

Loading Diagrams and Bending Moments

Simple Span Condition



Double Span Condition



Triple Span Condition

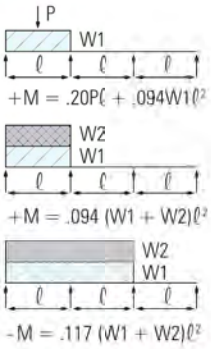
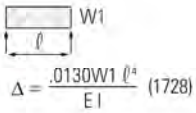


FIGURE 2

Loading Diagrams and Deflections

Simple Span Condition

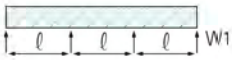


$$\Delta = \frac{.0130W1\,\ell^4}{E\,I}\ (1728)$$

Double Span Condition

$$\Delta = \frac{.0054W1\,\ell^4}{E\,I}\ (1728)$$

Triple Span Condition



$$\Delta = \frac{.0069W1\,\ell^4}{E\,I}\ (1728)$$

FIGURE 3

Form Deck Typical Slabs

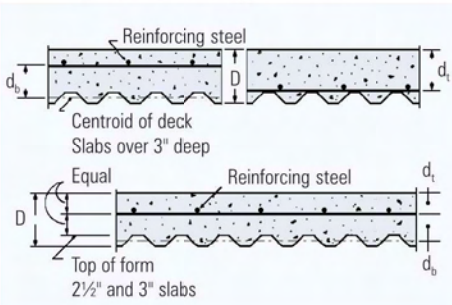
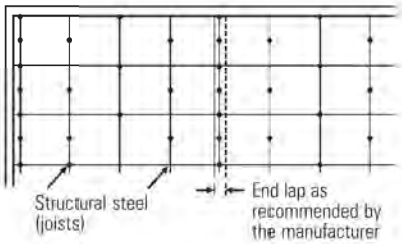
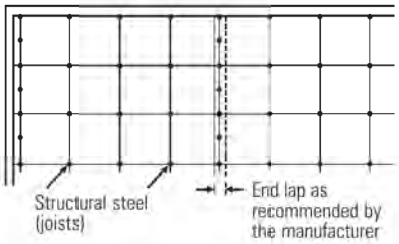
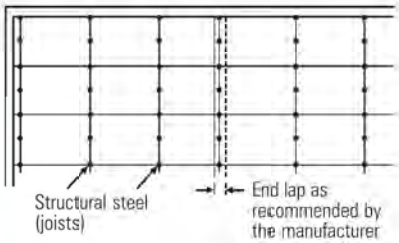


FIGURE 4

Minimum Fastening Patterns







Intermediate side lap attachments not shown. See Section 4.4 Anchorage non-composite steel form deck.

Note:
Fastener patterns A and B are for deck spans up to 4'6". Fastener pattern C is for deck spans from 4'6" to 8'0". If spans exceed 8'0", fastener should be placed so that the average spacing (at supports) is not more that 12".

Notes for Figures 1, 2, and 3

P = 150 - pound concentrated load
I = In^4/ft. - deck moment of inertia
W1 = slab weight + deck weight, psf
W2 = 20 pounds per square foot construction load
E = 29.5 x 10^6 psi
ℓ = clear span length (ft.)
$W1_1$ = 1.5 x slab weight + deck weight ≤ slab weight + 30 + deck weight
D = depth of slab
d_t = distance from reinforcing steel to top of concrete
d_b = distance from reinforcing steel to centroid of deck

Dimensional check shows the need for the 1728 factor when calculating deflections using pound inch units.

SDI Specifications and Commentary

FOR STEEL ROOF DECK

1. Scope

The requirements of this section shall govern only ribbed steel roof deck construction of varying configurations used for the support of roofing materials, design live loads and SDI construction loads shown on page 25.

Commentary: Suspended ceilings, light fixtures, ducts, or other utilities shall not be supported by the steel deck.

2. Materials

2.1 Steel Roof Deck: The steel roof deck units and accessories shall be fabricated from steel conforming to Section A3 of the latest edition, (1996) of the American Iron and Steel Institute, Specifications for the Design of Cold-Formed Steel Structural Members. The steel used shall have a minimum yield strength of 33 ksi (230 MPa).

2.2 Tolerances:
Panel length: Plus or minus ½ inch (13 mm).
Thickness: Shall not be less than 95% of the design thickness.
Panel cover width: Minus 3/8 inch (10 mm), plus ¾ inch (20 mm).
Panel camber and/or sweep: ¼ inch in 10 foot length (6 mm in 3 meters).
Panel end out of square: 1/8 inch per foot (3 mm in 300 mm) of panel width.

Commentary: The above tolerances reflect the fabrication processes for steel deck products. Variation in cover width tolerances may vary due to trucking, storage, handling.

The steel roof deck shall be manufactured from steel conforming to ASTM Designation A1008-00 Grades C, D or E or from A653/A 653M-00 Structural Quality grade SQ33 or higher. If the published product literature does not show the uncoated steel thickness in decimal inches (or millimeters) but lists gages or type numbers, then the thickness of steel before coating with paint or metal shall be in conformance with the following table:

TYPE NO.	DESIGN THICKNESS		MINIMUM THICKNESS	
	in.	mm	in.	mm
22	0.0295	0.75	0.028	0.70
20	0.0358	0.90	0.034	0.85
18	0.0474	1.20	0.045	1.15
16	0.0598	1.50	0.057	1.45

3. Design

3.1a Allowable Stress Design (ASD): Under the combined dead and design live loads, the bending stress in the steel deck shall not exceed 0.6 times the yield strength or 36ksi (250MPa).

3.1b Load Resistance Factor Design (LRFD): The load and resistance factors and the load combinations shall be as required by the AISI Specification.

Commentary: Either ASD or LRFD design is acceptable to the Steel Deck Institute. If LRFD uniform load tables are desired, the SDI Roof Deck Construction Handbook is a source. Generally, in ASD, 20 ksi (140Mpa) is the published maximum stress as is shown in the load tables of this manual.

3.2 Section Properties: Structural properties of roof deck sections shall be computed in accordance with the American Iron and Steel Institute (AISI) specification for the Design of Cold-formed Steel Structural Members, 1996 edition.

Commentary: Arbitrarily assumed effective compression flange widths shall not be allowed. Testing shall not be used in lieu of the above in determination of vertical load carrying capacity of steel deck.

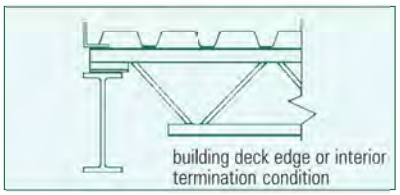
3.3 Load Tables: Uniform loads determined for published tables shall be based on equal adjacent two and three span conditions and on single spans. Appropriate combinations of shear and bending shall be made to determine the published loads. Widths of 2.0 inches (50mm) for end bearing and 4.0 inches (100mm) for interior shall be used to check web crippling. Deflection coefficients shall be 0.013 for single spans, 0.0054 for double spans and 0.0069 for triple spans.

Commentary: For deck layouts that provide more than three equal spans, the user can apply the loads published for three spans. Published uniform load tables do not apply for adjacent spans that differ in length by more than 10%.

3.4 Maximum Deflections: Deflection of the deck shall not exceed L/240 or 1 inch (25 mm) whichever is less, under the uniformly distributed design live load. All spans are to be considered center-to-center of supports.

Commentary: The adequacy of deck edge support details should be reviewed. At the building perimeter or any other deck termination or direction change, occasional concentrated loading of the roof

deck could result in temporary differences in deflection between the roof deck and the adjacent stationary building component. Supplemental support such as a perimeter angle may be warranted.



Construction and Maintenance loads: SPANS are governed by a maximum stress of 26 ksi (180 MPa) and a maximum deflection of L/240 with a 200-pound (0.89 kN) concentrated load at midspan on a 1'-0" (300 mm) wide section of deck. If the designer contemplates loads of greater magnitude, spans shall be decreased or the thickness of the steel deck increased as required.

All loads shall be distributed by appropriate means to prevent damage to the completed assembly during construction.

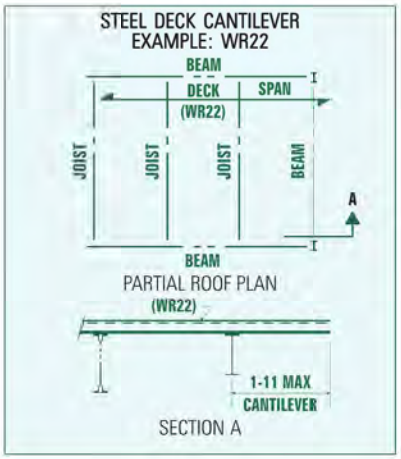
Cantilever loads:
Construction phase load of 10 psf (0.48 kPa) on adjacent span and cantilever, plus 200 pound load (0.89 kN) at end of cantilever with a stress limit of 26 ksi (180 MPa) (ASD).

Service load of 45 psf (2.15 kPa) on adjacent span and cantilever, plus 100 pound load (0.44 kN) at end of cantilever with a stress limit of 20 ksi (140 MPa) (ASD).

Deflection limited to L/240 of adjacent span for interior span and deflection at end of cantilever to L/120 of overhang.

RECOMMENDED MAXIMUM SPANS FOR CONSTRUCTION AND MAINTENANCE LOADS STANDARD FOR 1½ INCH AND 3 INCH ROOF DECK

	TYPE	SPAN CONDITION	SPAN FT.-IN.	SPAN METERS	MAX. RECOMMENDED SPANS ROOF DECK CANTILEVER FT.-IN.	MAX. RECOMMENDED SPANS ROOF DECK CANTILEVER METERS
NARROW RIB DECK	NR22	1	3'-10"	1.15 m	1'0"	.30 m
	NR22	2 or more	4'-9"	1.45 m		
	NR20	1	4'-10"	1.45 m	1'2"	.35 m
	NR20	2 or more	5'-11"	1.80 m		
	NR18	1	5'-11"	1.80 m	1'7"	.45 m
	NR18	2 or more	6'-11"	2.10 m		
INTERMEDIATE RIB DECK	IR22	1	4'-6"	1.35 m	1'2"	.35 m
	IR22	2 or more	5'-6"	1.65 m		
	IR20	1	5'-3"	1.60 m	1'5"	.40 m
	IR20	2 or more	6'-3"	1.90 m		
WIDE RIB DECK	WR22	1	5'-6"	1.65 m	1'11"	.55 m
	WR22	2 or more	6'-6"	1.75 m		
	WR20	1	6'-3"	1.90 m	2'4"	.70 m
	WR20	2 or more	7'-5"	2.25 m		
	WR18	1	7'-6"	2.30 m	2'-10"	.85 m
	WR18	2 or more	8'-10"	2.70 m		
DEEP RIB DECK	3DR22	1	11'-0"	3.35 m	3'-5"	1.05 m
	3DR22	2 or more	13'-0"	3.95 m		
	3DR20	1	12'-6"	3.80 m	3'-11"	1.20 m
	3DR20	2 or more	14'-8"	4.45 m		
	3DR18	1	15'-0"	4.55 m	4'-9"	1.45 m
	3DR18	2 or more	17'-8"	5.40 m		



Notes:

1. Adjacent span: Limited to those spans shown in Section 3.4 of Roof Deck Specifications. In those instances where the adjacent span is less than 3 times the cantilever span, the individual manufacturer should be consulted for the appropriate cantilever span.

2. Sidelaps must be attached at end of cantilever and at a maximum of 12 inches (300 mm) on center from end.

3. No permanent suspended loads are to be supported by the steel deck.

4. The deck must be completely attached to the supports and at the sidelaps before any load is applied to the cantilever.

continued on next page

FOR STEEL ROOF DECK

continued

4. Installation & Site Storage

4.1 Site Storage: Steel deck shall be stored off the ground with one end elevated to provide drainage, and shall be protected from the elements with a waterproof covering, ventilated to avoid condensation.

4.2 Deck Placement: Place each deck unit on supporting structural frame. Adjust to final position with accurately aligned side laps and ends bearing on supporting members. On joist framing, be sure the appropriate end lap occurs over a top chord angle for proper anchorage.

Commentary: Staggering roof deck end laps is not a recommended practice. The deck capacity is not increased by staggering the end laps, yet layout and erection costs are increased.

4.3 Lapped or Butted Ends: Deck Ends may be either butted or lapped over supports. Standard tolerance for ordered length is plus or minus ½ inch (13 mm).

4.4 Anchorage: Roof deck units shall be anchored to supporting members including perimeter support steel and/or bearing walls by either welding or mechanical fasteners, to provide lateral stability to the top flange of the supporting structural members and to resist the following minimum gross uplifts; 45 pounds per square foot (2.15 kPa) for eave overhang; 30 pounds per square foot (1.44 kPa) for all other roof areas. The dead load of the roof deck construction shall be deducted from the above forces. The location and number of fasteners required for satisfactory attachment of deck to supporting structural members are as follows:
All side laps plus a sufficient number of interior ribs to limit the spacing between adjacent points of attachment to 18 inches (500 mm). Do not walk or stand on deck until these minimum attachments are accomplished at the structural supports. Deck units with spans greater than 5 feet (1.5 m) shall have side laps and perimeter edges (at perimeter support steel) fastened at midspan or 36 inches (1 m) intervals, whichever distance is smaller. Sidelap attachment shall progress from support to midspan.

A perimeter deck system support parallel to deck flutes or ribs is necessary to provide for a minimum fastener spacing as specified. The design and detailing of this perimeter deck support system is the responsibility of the project designer.

Commentary: The deck should be anchored as soon as possible to act as a working platform, to prevent blowoff and slipoff from supports and to provide stability to deck system and frame. The designer should check the appropriate codes for the required uplift loading and show the required anchorage connections on the plans. If no information is shown on the plans, the uplift loads shown in paragraph 4.4 will be assumed. Sidelap fasteners can be welds, screws, crimps (button punching), or other methods approved by the designer. Welding sidelaps on thicknesses 0.028 inches (.7 mm) or less may cause large burn holes and is not recommended. The objective of sidelap fastening is to prevent differential sheet deflection. The five foot (1.5 m) limit on side lap spacing is based on experience.
The deck erector should not leave broken bundles or unattached deck at the end of the day as the wind may displace the sheets and cause injury to persons or property. In the past, 1½ inches (38 mm) of end bearing was the minimum; this is still a good "rule of thumb" that will, in general prevent slip off. If less than 1½ inches (38 mm) of end bearing is available, or if high support reactions are expected, the design engineer should ask the deck manufacturer to check the deck web stress. In any case, the deck must be adequately attached to the structure to prevent slip off.

The SDI Diaphragm Design Manual, Second Edition, should be used to determine fastening requirements if the deck is to be designed to resist horizontal loads. The most stringent requirements, of either section 4.4 or, if applicable, the SDI Diaphragm Design Manual, should be used.

4.4a Welding: All field welding of deck shall be in strict accordance with ANSI/AWS D1.3 Structural Welding Code-Sheet Steel. Each welder must demonstrate an ability to produce satisfactory welds using a procedure such as shown in the Steel Deck Institute Manual of Construction with Steel Deck or as described in ANSI/AWS D1.3. A minimum visible 5/8 inch (15 mm) diameter puddle weld or an elongated weld with an equal perimeter is required. Fillet welds, when used, shall be at least 1 inch (25 mm)

long. Weld metal shall penetrate all layers of deck material at end laps and shall have good fusion to the supporting members. Welding washers shall be used on all deck units with a metal thickness less than 0.028 inches (0.7 mm). Welding washers shall be a minimum thickness of 0.056 inches (1.5 mm), 16 gage, and have a nominal 3/8 inch (10 mm) diameter hole. Care shall be exercised in the selection of electrodes and amperage to provide a positive weld and prevent high amperage blow holes.

Commentary: The obligation is placed on the contractor to prepare welding procedure specifications and to qualify them before production use. These procedure specifications must include classification of the filler metal, its size, and for each type of weld, its melting rate or any other suitable means of current control indicative of melting rate, as applicable.

The welder qualification test requires each welder to prove the ability to produce satisfactory welds using these qualified procedures. The fact that the welder may have been successfully qualified on plate or pipe under the provisions of ANSI/AWS D1.1 Structural Welding Code-Steel for structural welding, or on plate or pipe under the provisions of other codes governing the welding of specific products, does not qualify the welder for welding steel sheet.

The selections of welding rod and amperage are left to the individual welder. Welds are made from the top side of the deck, with the welder immediately following the placement crew. In general, stronger welds are obtained on 0.028 inches (.70 mm) or thicker deck without weld washers. Welds on deck less than 0.028 inches (.70 mm) are stronger with washers.

4.4b Mechanical Fasteners: Mechanical fasteners (powder-actuated, screws, pneumatically driven fasteners, etc.) are recognized as viable anchoring methods, provided the type and spacing of the fasteners satisfy the design criteria. Documentation in the form of test data, design calculations, or design charts should be submitted by the fastener manufacturer as the basis for obtaining approval. The deck manufacturer may recommend additional fasteners to stabilize the given profile against sideslip of any unfastened ribs.

Commentary: The allowable load value per fastener used to determine the maximum fastener spacing is based on a structural support thickness of not less than 1/8 inch (3 mm) when powder-actuated or pneumatically driven fasteners with 5/16 inch (8 mm) diameter minimum bearing surface (fastener head size) are used. When the structural support thickness is less than 1/8 inch (3 mm), powder actuated or pneumatically driven fasteners shall not be used but screws are acceptable.

5. Protective Coatings

5.1 Finishes: All steel to be used for roof deck shall be galvanized, aluminized or prime painted. The roof deck shall be free of grease and dirt prior to the coating.

Commentary: The primer coat is intended to protect the steel for only a short period of exposure in ordinary atmospheric conditions and shall be considered an impermanent and provisional coating. Field painting of prime painted deck is recommended especially where the deck is exposed. In corrosive or high moisture atmospheres, a galvanized finish is desirable in a G-60 (Z180) or G-90 (Z275) coating. In highly corrosive or chemical atmospheres or where reactive materials could be in contact with the steel deck, special care in specifying the finish should be used. In this case, individual manufacturers should be contacted. See important information Section 4.1. Insulation, page 7.

In most cases, deck welds are removed from a corrosive environment when the roof is installed and no weld touch up paint or cold galvanizing is necessary. In those instances where the welds are left exposed to a corrosive atmosphere, the weld should be wire brushed and coated with an approved substance.

5.2 Fireproofing: The metal deck manufacturer shall not be responsible for the cleaning of the underside of metal deck to ensure bond of fireproofing. Adherence of fireproofing materials is dependent on many variables; the deck manufacturer (supplier) is not responsible for the adhesion or adhesive ability of the fireproofing.

continued on next page

FOR STEEL ROOF DECK

continued

6. Erection

Deck sheets will be placed in accordance with approved erection layout drawings supplied by the deck manufacturer and in conformance with the deck manufacturer's standards. End joints of sheets shall occur over supports. (see Section 4.4)

Commentary: Openings greater than 25 square feet (2.3m^2) are generally located and shown on the detailed erection drawings and deck will be provided to the job in lengths to accommodate the opening. Openings less than 25 square feet (2.3m^2) can be located and shown on the erection drawings, and be decked over; the deck erector or the appropriate trade is to cut these openings as well as provide any skew cutting shown.

It is extremely important that deck cantilevers and decked over areas are not overloaded. Openings in the deck and building edges must be protected by using OSHA approved methods.

Openings not shown on the erection drawings, such as those required for stacks, conduits, plumbing, vents, etc. are to be cut, and reinforced if necessary, by the trades requiring the openings. Refer to the *SDI Manual of Construction with Steel Deck* for a reinforcing schedule.

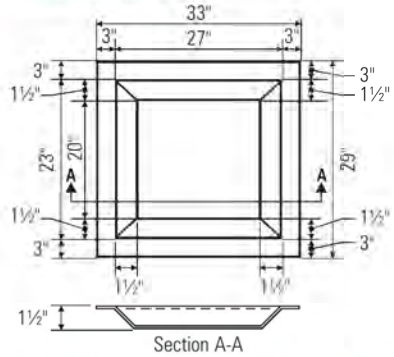
7. Insulation

Insulation board shall be of sufficient strength and thickness to permit unsupported spans and edges over the deck's rib openings. Cementitious insulating fills shall be poured only over galvanized deck and shall be adequately vented. In all cases, the recommendations of the insulation manufacturer shall be followed.

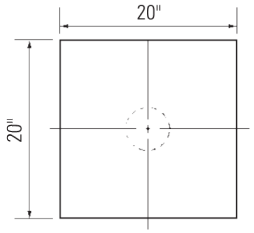
8. CAUTION

Steel roof deck may be used in a variety of ways, some of which do not lend themselves to a standard "steel deck" analysis for span and loading. There are, in these cases, other criteria which must be considered besides that given by the Steel Deck Institute. Make sure that this investigation starts with a review of the applicable Codes and that any special conditions are included in the design.

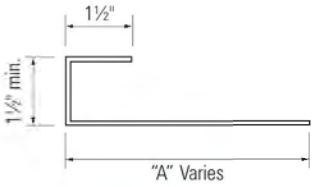
9. Accessories



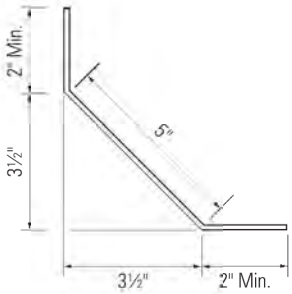
Recessed Sump Pan - Level (0.071" Min.)
(Hole cut in field by others)



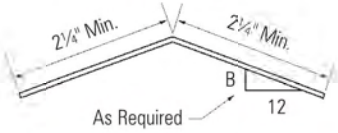
Flat Sump Plate (0.071" Min.)
Dimensions shown are minumum.
(Hole cut in field by others)



Eave Plate (0.028" Min.)
(Hole cut in field by others)



Cant Strip (0.028" Min.)



Ridge and Valley Plate (0.028" Min.)

sustainable insulation™
Specification Sheet

CertainTeed
SAINT-GOBAIN

Metal Building Insulation 202-96

PRODUCT DESCRIPTION

Basic Use: CertainTeed Fiber Glass Metal Building Insulation 202-96 is a flexible blanket insulation furnished in rolls and intended to be laminated on one side with a suitable vapor retarder. It is used as a thermal and acoustical insulation in the roofs and sidewalls of pre-engineered metal buildings and post frame construction.

Benefits: Metal Building Insulation 202-96 reduces transmission of exterior sound to the interior of the building and absorbs reverberating sounds within the building.

Composition and Materials: The product is composed of tan, uniformly textured, inorganic fibrous glass and formed with a formaldehyde-free binding agent.

Limitations: This product is designed for use in interior (weather protected) walls and roofs of pre-engineered metal buildings. It should be laminated on a first-in, first-out basis and should be kept dry at all times during processing and end use. After lamination, packaging should not exceed a 5.5:1 compression ratio. For additional information, please refer to the appendix of the NAIMA 202-96 (Rev. 2000) standard.

Sizes: Standard available sizes as noted in table below. Contact CertainTeed for non-standard sizes.

INSTALLATION

The vapor retarder on Metal Building Insulation 202-96 should be installed toward the conditioned spaces in the building. The insulation is normally applied over or between the structural members of the building and held in place by the covering sheets or insulation support system. When using high R-Value systems, it is recommended that the cavity between the exterior metal sheet and the faced fiber glass insulation should be completely filled.

THERMAL PERFORMANCE

Nominal Thickness (Pre-Lamination)		R-Value	
in.	mm	R	RSI
3⅜	86	10	1.76
3¾	95	11	1.94
4⅜	111	13	2.29
5¼	133	16	2.82
6⅜	162	19	3.35
6¾	171	21	3.70
8	203	25	4.40
9¼	235	30	5.30

AVAILABLE SIZES

R-Value	Nominal Thickness		Width		Length	
R	in.	mm	in.	mm	ft.	m
10	3⅜	76.2	36, 48, 60, 72	914, 1219, 1524, 1829	100	30.5
11	3¾	88.9	36, 48, 60, 72	914, 1219, 1524, 1829	100	30.5
13	4⅜	101.6	36, 48, 60, 72	914, 1219, 1524, 1829	75	22.9
16	5¼	133.35	36, 48, 60, 72	914, 1219, 1524, 1829	50	15.2
19	6⅜	127	36, 48, 60, 72	914, 1219, 1524, 1829	50	15.2
21*	6¾	152.4	36, 48, 60, 72	914, 1219, 1524, 1829	45	13.7
25*	8	203.2	36, 48, 60, 72	914, 1219, 1524, 1829	30	9.1
30*	9¼	203.2	36, 48, 60, 72	914, 1219, 1524, 1829	25	7.6

Non-standard widths are available and subject to an upcharge on an individual basis determined by manufacturer's capability, quantity, lead times and packaging availability. *R-21, R-25 and R-30 are made to order.

Product Name	CertainTeed Metal Building Insulation 202-96
Manufacturer	CertainTeed Corporation
Address	P.O. Box 860 Valley Forge, PA 19482-0105
Phone	610-341-7000 • 800-233-8990
Fax	610-341-7571
Website	www.certainteed.com/insulation

TECHNICAL DATA

Applicable Standards

- Model Building Codes:
  - ICC
- Material Standards:
  - ASTM C991, Type I
  - NAIMA 202-96 (Rev. 2000)

Fire Resistance

- Fire Hazard Classification:
  - UL 723, ASTM E84, NFPA 255
    Max. Flame Spread Index: 25
    Max. Smoke Developed Index: 50
  - CAN/ULC-S102-M88
- Non-combustible:
  - ASTM E136 / Meets requirements

Physical/Chemical Properties

- Thermal Resistance:
  - ASTM C518 and/or ASTM C177 at 75˚F (24˚C) mean temperature: see table at left
- Acoustical Performance: see tables on other side
- Water Vapor Sorption:
  - ASTM C1104 / No greater than 5.0% by weight
- Corrosiveness:
  - ASTM C665 / Meets requirements for steel, copper and aluminum
- Odor Emission:
  - ASTM C1304 / Pass
- Fungi Resistance:
  - ASTM C1338 / Pass Test

Quality Assurance

CertainTeed's commitment to quality and environmental management has ensured the registration of the Athens, Chowchilla and Kansas City plants to ISO 9001:2000 and ISO 14001: 2004 standards.

AVAILABILITY AND COST

Manufactured and sold throughout the United States and Canada. For availability and cost, contact your local distributor or call CertainTeed Sales Support Group in Valley Forge, PA at 800-233-8990.

WARRANTY

In as much as CertainTeed has no control over installation design, installation workmanship, accessory materials or conditions of application, CertainTeed does not warrant the performance or results of any installation containing its products.

MAINTENANCE

An inspection and preventative maintenance program for the insulation and vapor retarder system is recommended to ensure optimum performance.

TECHNICAL SERVICES

Technical assistance can be obtained either from the local CertainTeed sales representative, or by calling CertainTeed Sales Support Group in Valley Forge, PA at 800-233-8990.

FILING SYSTEMS

- CertainTeed Pub. No. 30-25-056.
- Additional product information available upon request.

SOUND ABSORPTION - UNFACED

R-Value	Nom. Thickness		Absorption Coefficients @ Octave Band Frequencies (Hz)						NRC
R	in.	mm	125	250	500	1000	2000	4000	
10	3⅜	86	0.29	0.82	1.02	0.94	0.96	0.98	0.95
11	3¾	95	0.39	0.91	1.01	0.92	0.93	0.98	0.95
13	4⅜	111	0.53	0.97	1.04	0.90	0.95	0.98	0.95
16	5¼	133	0.67	1.05	1.02	0.92	0.98	0.99	1.00
19	6⅜	162	0.89	1.22	1.02	0.98	1.01	1.00	1.05

Sound absorption tested in accordance with ASTM C423 using Type A mounting per ASTM E795.

SOUND TRANSMISSION

Construction Type	Transmission Loss in dB at the Octave Frequencies						STC Rating
	125	250	500	1000	2000	4000	
ROOFS							
No Insulation	12	13	19	24	30	32	24
R-10 Faced 202-96 Insulation Over the Purlins	12	16	26	37	45	49	29
R-19 Faced 202-96 Insulation Over the Purlins	13	20	30	41	49	51	32
202-96 Insulation Over & Between the Purlins to Fill the Cavity (R-25 Combined)	14	24	34	44	53	56	36
WALLS							
No Insulation	12	14	19	19	20	27	21
R-10 Faced 202-96 Insulation Over the Girts	13	16	25	32	37	46	28
R-13 Faced 202-96 Insulation Over the Girts	13	17	26	33	38	47	29
R-13 Faced 202-96 Insulation Over the Girts 3-5/8" Steel Studs on 24" Centers with 1/2" Gyp. Board on Interior	26	40	51	60	64	65	50
R-13 Faced 202-96 Insulation Over the Girts 3-5/8" Steel Studs on 24" Centers with R-11 Batts & 1/2" Gyp. Board on Interior	31	43	55	68	73	75	54

Sound Transmission Class (STC) in accordance with ASTM E90.
– Roof construction is 24ga. standing seam roof with 8" Z purlins on 5' centers.
– Wall construction is 26ga. wall panels screwed to 8" Z girts placed on 7' centers.
– Interior metal furring wall studs were 3-5/8" by 25ga. on 24' centers.

Samples of this product are tested periodically by the NAHB Research Center, Inc., and determined to meet the average of the manufacturer's stated dimensions and thermal resistance at or below the stated thickness. Manufacturer represents that this product has been produced to the same standard as samples tested.
Tested R-Values: 11, 13, 19, 30

ASK ABOUT OUR OTHER CERTAINTEED PRODUCTS AND SYSTEMS:

EXTERIOR: ROOFING • SIDING • WINDOWS • FENCE • RAILING • TRIM • DECKING • FOUNDATIONS • PIPE
INTERIOR: INSULATION • GYPSUM • CEILINGS

CertainTeed Corporation
P.O. Box 860
Valley Forge, PA 19482

Professional: 800-233-8990
Consumer: 800-782-8777
www.certainteed.com/insulation

Code No. 30-27-016, © 10/10 CertainTeed Corporation

SCHEDULE OF SPECIAL INSPECTION SERVICES					
PROJECT	**Etowah Raw Water Pump Station**				
		APPLICABLE TO THIS PROJECT			
MATERIAL / ACTIVITY	**SERVICE**	**Y/N**	**EXTENT**	**AGENT***	**DATE COMPLETED**
1704.2.5 Inspection of Fabricators					
Verify fabrication/quality control procedures	In-plant review (3)	Y	Periodic	1,2	
1705.1.1 Special Cases (work unusual in nature, including but not limited to alternative materials and systems, unusual design applications, materials and systems with special manufacturer's requirements)	Submittal review, shop (3) and/or field inspection	NA			
1705.2 Steel Construction					
1. Fabricator and erector documents (Verify reports and certificates as listed in AISC 360, chapter N, paragraph 3.2 for compliance with construction documents)	Submittal Review	Y	Each submittal	1,2	
2. Material verification of structural steel	Shop (3) and field inspection	Y	Periodic	1,2	
3. Embedments (Verify diameter, grade, type, length, embedment. See 1705.3 for anchors)	Field inspection	Y	Periodic	1,2	
4. Verify member locations, braces, stiffeners, and application of joint details at each connection comply with construction documents	Field inspection	Y	Periodic	1,2	
5. Structural steel welding:					
a. Inspection tasks Prior to Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4-1)	Shop (3) and field inspection	Y	Observe or Perform as noted (4)	1,2	
b. Inspection tasks During Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4-2)	Shop (3) and field inspection	Y	Observe (4)	1,2	
c. Inspection tasks After Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4-3)	Shop (3) and field inspection	Y	Observe or Perform as noted (4)	1,2	
d. Nondestructive testing (NDT) of welded joints: *see Commentary*					
1) Complete penetration groove welds 5/16" or greater in *risk category* III or IV	Shop (3) or field ultrasonic testing - 100%	Y	Periodic	1,2	
2) Complete penetration groove welds 5/16" or greater in *risk category* II	Shop (3) or field ultrasonic testing - 10% of welds minimum		Periodic		
3) Thermally cut surfaces of access holes when material t > 2"	Shop (3) or field magnetic Partical or Penetrant testing		Periodic		
4) Welded joints subject to fatigue when required by AISC 360, Appendix 3, Table A-3.1	Shop (3) or field radiographic or Ultrasonic testing		Periodic		
5) Fabricator's NDT reports when fabricator performs NDT	Verify reports		Each submittal (5)		
6. Structural steel bolting:	Shop (3) and field inspection				
a. Inspection tasks Prior to Bolting (Observe, or perform tasks for each bolted connection, in accordance with QA tasks listed in AISC 360, Table N5.6-1)		Y	Observe or Perform as noted (4)	1,2	

SCHEDULE OF SPECIAL INSPECTION SERVICES					
PROJECT	**Etowah Raw Water Pump Station**				
		APPLICABLE TO THIS PROJECT			
MATERIAL / ACTIVITY	**SERVICE**	**Y/N**	**EXTENT**	**AGENT***	**DATE COMPLETED**
b.Inspection tasks During Bolting (Observe the QA tasks listed in AISC 360, Table N5.6-2)			Observe (4)		
1) Pre-tensioned and slip-critical joints					
a) Turn-of-nut with matching markings		Y	Periodic	1,2	
b) Direct tension indicator		Y	Periodic	1,2	
c) Twist-off type tension control bolt		Y	Periodic	1,2	
d) Turn-of-nut without matching markings		Y	Continuous	1,2	
e) Calibrated wrench			Continuous		
2) Snug-tight joints			Periodic		
c. Inspection tasks After Bolting (Perform tasks for each bolted connection in accordance with QA tasks listed in AISC 360, Table N5.6-3)			Perform (4)		
7. Inspection of steel elements of composite construction prior to concrete placement in accordance with QA tasks listed in AISC 360, Table N6.1	Shop (3) and field inspection and testing		Observe or Perform as noted (4)		
1705.2.2 Steel Construction Other Than Structural Steel					
1. Material verification of cold-formed steel deck:					
a. Identification markings	Field inspection		Periodic		
b. Manufacturer's certified test reports	Submittal Review		Each submittal		
2. Connection of cold-formed steel deck to supporting structure:	Shop (3) and field inspection				
a. Welding			Periodic		
b. Other fasteners (in accordance with AISC 360,Section N6)					
1) Verify fasteners are in conformance with approved submittal			Periodic		
2) Verify fastener installation is in conformance with approved submittal and manufacturer's recommendations			Periodic		
3. Reinforcing steel	Shop (3) and field inspection				
a. Verification of weldability of steel other than ASTM A706			Periodic		
b. Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames, boundary elements of special concrete structural walls and shear reinforcement			Continuous		
c. Shear reinforcement			Continuous		
d. Other reinforcing steel			Periodic		
4. Cold-formed steel trusses spanning 60 feet or greater					
a. Verify temporary and permanent restraint/bracing are installed in accordance with the approved truss submittal package	Field inspection		Periodic		
1705.3 Concrete Construction					
1. Inspection of reinforcing steel installation (see 1705.2.2 for welding)	Shop (3) and field inspection	Y	Periodic	1,2	
2. Inspection of prestressing steel installation	Shop (3) and field inspection	Y	Periodic	1,2	

SCHEDULE OF SPECIAL INSPECTION SERVICES					
PROJECT	**Etowah Raw Water Pump Station**				
		APPLICABLE TO THIS PROJECT			
MATERIAL / ACTIVITY	**SERVICE**	**Y/N**	**EXTENT**	**AGENT***	**DATE COMPLETED**
3. Inspection of anchors cast in concrete where allowable loads have been increased per section 1908.5 or where strength design is used	Shop (3) and field inspection	Y	Periodic	1,2	
4. Inspection of anchors and reinforcing steel post-installed in hardened concrete: Per research reports including verification of anchor type, anchor dimensions, hole dimensions, hole cleaning procedures, anchor spacing, edge distances, concrete minimum thickness, anchor embedment and tightening torque	Field inspection	Y	Periodic or as required by the research report issued by an approved source	1,2	
5. Verify use of approved design mix	Shop (3) and field inspection	Y	Periodic	1,2	
6. Fresh concrete sampling, perform slump and air content tests and determine temperature of concrete	Shop (3) and field inspection	Y	Continuous	1,2	
7. Inspection of concrete and shotcrete placement for proper application techniques	Shop (3) and field inspection	Y	Continuous	1,2	
8. Inspection for maintenance of specified curing temperature and techniques	Shop (3) and field inspection	Y	Periodic	1,2	
9. Inspection of prestressed concrete:	Shop (3) and field inspection				
a. Application of prestressing force			Continuous		
b. Grouting of bonded prestressing tendons in the seismic-force-resisting system			Continuous		
10. Erection of precast concrete members					
a. Inspect in accordance with construction documents	Field inspection		In accordance with construction documents		
b. Perform inspections of welding and bolting in accordance with Section 1705.2	Field inspection		In accordance with Section 1705.2		
11. Verification of in-situ concrete strength, prior to stressing of tendons in post tensioned concrete and prior to removal of shores and forms from beams and structural slabs	Review field testing and laboratory reports		Periodic		
12. Inspection of formwork for shape, lines, location and dimensions	Field inspection	Y	Periodic	1,2	
13. Concrete strength testing and verification of compliance with construction documents	Field testing and review of laboratory reports	Y	Periodic	1,2	
1705.4 Masonry Construction					
(A) Level A, B and C Quality Assurance:					
1. Verify compliance with approved submittals	Field Inspection		Periodic		
(B) Level B Quality Assurance:					
1. Verification of f'm and f'_{AAC} prior to construction	Testing by unit strength method or prism test method		Periodic		

SCHEDULE OF SPECIAL INSPECTION SERVICES					
PROJECT	**Etowah Raw Water Pump Station**				
		APPLICABLE TO THIS PROJECT			
MATERIAL / ACTIVITY	**SERVICE**	**Y/N**	**EXTENT**	**AGENT***	**DATE COMPLETED**
(C) Level C Quality Assurance:					
1. Verification of f'm and f'_{AAC} prior to construction and for every 5,000 SF during construction	Testing by unit strength method or prism test method		Periodic		
2. Verification of proportions of materials in premixed or preblended mortar, prestressing grout, and grout other than self-consolidating grout, as delivered to the project site	Field inspection		Continuous		
3. Verify placement of masonry units	Field Inspection		Periodic		
(D) Levels B and C Quality Assurance:					
1. Verification of Slump Flow and Visual Stability Index (VSI) of self-consolidating grout as delivered to the project	Field testing		Continuous		
2. Verify compliance with approved submittals	Field inspection		Periodic		
3. Verify proportions of site-mixed mortar, grout and prestressing grout for bonded tendons	Field Inspection		Periodic		
4. Verify grade, type, and size of reinforcement and anchor bolts, and prestressing tendons and anchorages	Field Inspection		Periodic		
5. Verify construction of mortar joints	Field Inspection		Periodic		
6. Verify placement of reinforcement, connectors, and prestressing tendons and anchorages	Field Inspection		Level B - Periodic		
			Level C - Continuous		
7. Verify grout space prior to grouting	Field Inspection		Level B - Periodic		
			Level C - Continuous		
8. Verify placement of grout and prestressing grout for bonded tendons	Field Inspection		Continuous		
9. Verify size and location of structural masonry elements	Field Inspection		Periodic		
10. Verify type, size, and location of anchors, including details of anchorage of masonry to structural members, frames, or other construction.	Field inspection		Level B - Periodic		
			Level C - Continuous		
11. Verify welding of reinforcement (see 1705.2.2)	Field inspection		Continuous		
12. Verify preparation, construction, and protestion of masonry during cold weather (temperature below 40°F) or hot weather (temperature above 90°F)	Field inspection		Periodic		
13. Verify application and measurement of prestressing force	Field Inspection		Continuous		

SCHEDULE OF SPECIAL INSPECTION SERVICES					
PROJECT	**Etowah Raw Water Pump Station**				
		APPLICABLE TO THIS PROJECT			
MATERIAL / ACTIVITY	**SERVICE**	**Y/N**	**EXTENT**	**AGENT***	**DATE COMPLETED**
14. Verify placement of AAC masonry units and construction of thin-bed mortar joints (first 5000 SF of AAC masonry)	Field inspection		Continuous		
15. Verify placement of AAC masonry units and construction of thin-bed mortar joints (after the first 5000 SF of AAC masonry)	Field inspection		Level B - Periodic		
			Level C - Continuous		
16. Verify properties of thin-bed mortar for AAC masonry (first 5000 SF of AAC masonry)	Field inspection		Continuous		
17. Verify properties of thin-bed mortar forAAC masonry (after the first 5000 SF of AAC masonry)	Field inspection		Level B - Periodic		
			Level C - Continuous		
18. Prepare grout and mortar specimens	Field testing		Level B - Periodic		
			Level C - Continuous		
19. Observe preparation of prisms	Field inspection		Level B - Periodic		
			Level C - Continuous		
1705.5 Wood Construction					
1. Inspection of the fabrication process of wood structural elements and assemblies in accordance with Section 1704.2.5	In-plant review (3)		Periodic		
2. For high-load diaphragms, verify grade and thickness of structural panel sheathing agree with approved building plans	Field inspection		Periodic		
3. For high-load diaphragms, verify nominal size of framing members at adjoining panel edges, nail or staple diameter and length, number of fastener lines, and that spacing between fasteners in each line and at edge margins agree with approved building plans	Field inspection		Periodic		
4. Metal-plate-connected wood trusses spanning 60 feet or greater: verify temporary and permanent restraint/bracing are installed in accordance with the approved truss submittal package	Field inspection		Periodic		
1705.6 Soils					
1. Verify materials below shallow foundations are adequate to achieve the design bearing capacity.	Field inspection	Y	Periodic	1,2	
2. Verify excavations are extended to proper depth and have reached proper material.	Field inspection	Y	Periodic	1,2	
3. Perform classification and testing of controlled fill materials.	Field inspection	Y	Periodic	1,2	
4. Verify use of proper materials, densities, and lift thicknesses during placement and compaction of controlled fill	Field inspection	Y	Continuous	1,2	
5. Prior to placement of controlled fill, observe subgrade and verify that site has been prepared properly	Field inspection	Y	Periodic	1,2	

SCHEDULE OF SPECIAL INSPECTION SERVICES					
PROJECT	**Etowah Raw Water Pump Station**				
		APPLICABLE TO THIS PROJECT			
MATERIAL / ACTIVITY	**SERVICE**	**Y/N**	**EXTENT**	**AGENT***	**DATE COMPLETED**
1705.7 Driven Deep Foundations					
1. Verify element materials, sizes and lengths comply with requirements	Field inspection		Continuous		
2. Determine capacities of test elements and conduct additional load tests, as required	Field inspection		Continuous		
3. Observe driving operations and maintain complete and accurate records for each element	Field inspection		Continuous		
4. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and document any damage to foundation element	Field inspection		Continuous		
5. For steel elements, perform additional inspections per Section 1705.2	See Section 1705.2		See Section 1705.2		
6. For concrete elements and concrete-filled elements, perform additional inspections per Section 1705.3	See Section 1705.3		See Section 1705.3		
7. For specialty elements, perform additional inspections as determined by the registered design professional in responsible charge	Field inspection		In accordance with construction documents		
8. Perform additional inspections and tests in accordance with the construction documents	Field Inspection and testing		In accordance with construction documents		
1705.8 Cast-in-Place Deep Foundations					
1.Observe drilling operations and maintain complete and accurate records for each element	Field inspection		Continuous		
2. Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end-bearing strata capacity. Record concrete or grout volumes	Field inspection		Continuous		
3. For concrete elements, perform additional inspections in accordance with Section 1705.3	See Section 1705.3		See Section 1705.3		
4. Perform additional inspections and tests in accordance with the construction documents	Field Inspection and testing		In accordance with construction documents		
1705.9 Helical Pile Foundations					
1. Verify installation equipment, pile dimensions, tip elevations, final depth, final installation torque and other data as required.	Field inspection		Continuous		
2. Perform additional inspections and tests in accordance with the construction documents	Field Inspection and testing		In accordance with construction documents		

SCHEDULE OF SPECIAL INSPECTION SERVICES					
PROJECT	**Etowah Raw Water Pump Station**				
		APPLICABLE TO THIS PROJECT			
MATERIAL / ACTIVITY	**SERVICE**	**Y/N**	**EXTENT**	**AGENT***	**DATE COMPLETED**
1705.10.1 Structural Wood Special Inspections For Wind Resistance					
1. Inspection of field gluing operations of elements of the main windforce-resisting system	Field inspection		Continuous		
2. Inspection of nailing, bolting, anchoring and other fastening of components within the main windforce-resisting system	Shop (3) and field inspection		Periodic		
1705.10.2 Cold-formed Steel Special Inspections For Wind Resistance					
1.Inspection during welding operations of elements of the main windforce-resisting system	Shop (3) and field inspection	Y	Periodic	1,2	
2.Inspections for screw attachment, bolting, anchoring and other fastening of components within the main windforce-resisting system	Shop (3) and field inspection	Y	Periodic	1,2	
1705.10.3 Wind-resisting Components					
1. Roof cladding	Shop (3) and field inspection	Y	Periodic	1,2	
2. Wall cladding	Shop (3) and field inspection	Y	Periodic	1,2	
1705.11.1 Structural Steel Special Inspections for Seismic Resistance					
Inspection of structural steel in accordance with AISC 341	Shop (3) and field inspection	Y	In accordance with AISC 341		
1705.11.2 Structural Wood Special Inspections for Seismic Resistance					
1. Inspection of field gluing operations of elements of the seismic-force resisting system	Field inspection		Continuous		
2. Inspection of nailing, bolting, anchoring and other fastening of components within the seismic-force-resisting system	Shop (3) and field inspection		Periodic		
1705.11.3 Cold-formed Steel Light-Frame Construction Special Inspections for Seismic Resistance					
1. Inspection during welding operations of elements of the seismic-force-resisting system	Shop (3) and field inspection		Periodic		
2. Inspections for screw attachment, bolting, anchoring and other fastening of components within the seismic-force-resisting system	Shop (3) and field inspection		Periodic		
1705.11.4 Designated Seismic Systems Verification					
Inspect and verify that that the component label, anchorage or mounting conforms to the certificate of compliance in accordance with Section 1705.12.3	Field inspection		Periodic		

SCHEDULE OF SPECIAL INSPECTION SERVICES					
PROJECT	**Etowah Raw Water Pump Station**				
		APPLICABLE TO THIS PROJECT			
MATERIAL / ACTIVITY	**SERVICE**	**Y/N**	**EXTENT**	**AGENT***	**DATE COMPLETED**
1705.11.5 Architectural Components Special Inspections for Seismic Resistance					
1. Inspection during the erection and fastening of exterior cladding and interior and exterior veneer	Field inspection		Periodic		
2. Inspection during the erection and fastening of interior and exterior nonbearing walls	Field inspection		Periodic		
3. Inspection during anchorage of access floors	Field inspection		Periodic		
1705.11.6 Mechanical and Electrical Components Special Inspections for Seismic Resistance					
1. Inspection during the anchorage of electrical equipment for emergency or standby power systems	Field inspection		Periodic		
2. Inspection during the anchorage of other electrical equipment	Field inspection		Periodic		
3. Inspection during installation and anchorage of piping systems designed to carry hazardous materials, and their associated mechanical units	Field inspection		Periodic		
4. Inspection during the installation and anchorage of HVAC ductwork that will contain hazardous materials	Field inspection		Periodic		
5. Inspection during the installation and anchorage of vibration isolation systems	Field inspection		Periodic		
1705.11.7 Storage Racks Special Inspections for Seismic Resistance					
Inspection during the anchorage of storage racks 8 feet or greater in height	Field inspection		Periodic		
1705.11.8 Seismic Isolation Systems					
Inspection during the fabrication and installation of isolator units and energy dissipation devices used as part of the seismic isolation system	Shop and field inspection		Periodic		
1705.12.1 Concrete Reinforcement Testing and Qualification for Seismic Resistance					
1. Review certified mill test reports for each shipment of reinforcement used to resist earthquake-induced flexural and axial forces in reinforced concrete special moment frames, special structural walls, and coupling beams connecting special structural walls	Review certified mill test reports		Each shipment		

SCHEDULE OF SPECIAL INSPECTION SERVICES					
PROJECT	**Etowah Raw Water Pump Station**				
		APPLICABLE TO THIS PROJECT			
MATERIAL / ACTIVITY	**SERVICE**	**Y/N**	**EXTENT**	**AGENT***	**DATE COMPLETED**
2. Verify reinforcement weldability of ASTM A615 reinforcement used to resist earthquake-induced flexural and axial forces in reinforced concrete special moment frames, special structural walls, and coupling beams connecting special structural walls	Review test reports		Each shipment		
1705.12.2 Structural Steel Testing and Qualification for Seismic Resistance					
Test in accordance with the quality assurance requirements of AISC 341	Shop (3) and field testing	Y	Per AISC 341	1,2	
1705.12.3 Seismic Certification of Nonstructural Components					
Review certificate of compliance for designated seismic system components.	Certificate of compliance review		Each submittal		
1705.12.4 Seismic Isolation Systems					
Test seismic isolation system in accordance with ASCE 7 Section 17.8	Prototype testing		Per ASCE 7		
1705.13 Sprayed Fire-resistant Materials					
1. Verify surface condition preparation of structural members	Field inspection		Periodic		
2. Verify application of sprayed fire-resistant materials	Field inspection		Periodic		
3. Verify average thickness of sprayed fire-resistant materials applied to structural members	Field inspection		Periodic		
4. Verify density of the sprayed fire-resistant material complies with approved fire-resistant design	Field inspection and testing		Per IBC Section 1705.13.5		
5. Verify the cohesive/adhesive bond strength of the cured sprayed fire-resistant material	Field inspection and testing		Per IBC Section 1705.13.6		
1705.14 Mastic and Intumescent Fire-Resistant Coatings					
Inspect mastic and intumescent fire-resistant coatings applied to structural elements and decks	Field inspection		Periodic		
1705.15 Exterior Insulation and Finish Systems (EIFS)					
1. Verify materials, details and installations are per the approved construction documents	Field inspection		Periodic		
2. Inspection of water-resistive barrier over sheathing substrate	Field inspection		Periodic		

SCHEDULE OF SPECIAL INSPECTION SERVICES

PROJECT	Etowah Raw Water Pump Station				
		APPLICABLE TO THIS PROJECT			
MATERIAL / ACTIVITY	SERVICE	Y/N	EXTENT	AGENT*	DATE COMPLETED
1705.16 Fire-Resistant Penetrations and Joints					
1. Inspect penetration firestop systems	Field testing		Per ASTM E2174		
2. Inspect fire-resistant joint systems	Field testing		Per ASTM E2393		
1705.17 Smoke Control Systems					
1. Leakage testing and recording of device locations prior to concealment	Field testing		Periodic		
2. Prior to occupancy and after sufficient completion, pressure difference testing, flow measurements, and detection and control verification	Field testing		Periodic		

*** INSPECTION AGENTS**

FIRM	ADDRESS	TELEPHONE NO.
1. Geo-Hydro Engineers	1000 Cobb Place Blvd Suite 290 Kennesaw, GA 30144	(770) 426-7100
2. Nova Engineering and Envronmental	3640 Kennesaw North Industrial Pkwy, Kennesaw, GA 30144	(770) 425-0777
3.		
4.		

Notes: 1. The inspection and testing agent(s) shall be engaged by the Owner or the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the Building Official prior to commencing work. The qualifications of the Special Inspector(s) and/or testing agencies may be subject to the approval of the Building Official and/or the Design Professional.

2. The list of Special Inspectors may be submitted as a separate document, if noted so above.

3. Special Insepctions as required by Section 1704.2.5 are not required where the fabricator is approved in accordance with IBC Section 1704.2.5.2

4. Observe on a random basis, operations need not be delayed pending these inspections. Perform these tasks for each welded joint, bolted connection, or steel element.

5. NDT of welds completed in an approved fabricator's shop may be performed by that fabricator when approved by the AHJ. Refer to AISC 360, N7.

Are *Requirements for Seismic Resistance* included in the *Statement of Special Inspections*? **Yes** **No**

Are *Requirements for Wind Resistance* included in the *Statement of Special Inspections*? **Yes** **No**

DATE: 2/15/2016

STATEMENT OF SPECIAL INSPECTIONS

PROJECT: Etowah Raw Water Pump Station

LOCATION: Spider Web Drive, Rome, GA 30161

PERMIT APPLICANT: City of Rome, Water and Sewer Division

APPLICANT'S ADDRESS: 100 Vaughn Road, Rome, GA 30161

ARCHITECT OF RECORD: N.A.

STRUCTURAL ENGINEER OF RECORD: Alpha Omega Engineering, LLC

REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE: Chuck Hardin

This Statement of Special Inspections is submitted in accordance with Section 1704.3 of the 2012 International Building Code. It includes a *Schedule of Special Inspection Services* applicable to the above-referenced Project as well as the identity of the individuals, agencies, or firms intended to be retained for conducting these inspections. If applicable, it includes *Requirements for Seismic Resistance* and/or *Requirements for Wind Resistance*.

Are *Requirements for Seismic Resistance* included in the *Statement of Special Inspections*?	☒ Yes	☐ No
Are *Requirements for Wind Resistance* included in the *Statement of Special Inspections*?	☐ Yes	☒ No

The Special Inspector(s) shall keep records of all inspections and shall furnish interim inspection reports to the Building Official and to the Registered Design Professional in Responsible Charge at a frequency agreed upon by the Design Professional and the Building Official prior to the start of work. Discrepancies shall be brought to the immediate attention of the Contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official and the Registered Design Professional in Responsible Charge prior to completion of that phase of work. A *Final Report of Special Inspections* documenting required special inspections and corrections of any discrepancies noted in the inspections shall be submitted to the Building Official and the Registered Design Professional in Responsible Charge at the conclusion of the project.

Frequency of interim report submittals to the Registered Design Professional in Responsible Charge:

__Weekly ____x__Bi-Weekly __Monthly Other; specify:_____

The Special Inspection program does not relieve the Contractor of the responsibility to comply with the Contract Documents. Jobsite safety and means and methods of construction are solely the responsibility of the Contractor.

Statement of Special Inspections Prepared by:

Jason P. Baines.
Type or print name

Signature 2-15-16
Date

Preparer's Seal

Building Official's Acceptance:

Signature Date

Permit Number:

Frequency of interim report submittals to the Building Official:

__Monthly __Bi- Monthly __Upon Completion Other; specify:_____

Statement of Special Inspections
Requirements for Seismic Resistance

See the Schedule of Special Inspections for inspection and testing requirements

Seismic Design Category: D

Statement of Special Inspection for Seismic Resistance Required (Yes/No): YES

Description of seismic force-resisting system subject to special inspection and testing for seismic resistance:

Steel frames that are not specifically detailed for seismic design

Description of designated seismic systems subject to special inspection and testing for seismic resistance:

Description of additional seismic systems and components requiring special inspections and testing:

Statement of Responsibility:
Each contractor responsible for the construction or fabrication of a system or component described above must submit a Statement of Responsibility.

Statement of Special Inspections
Requirements for Wind Resistance

See the Schedule of Special Inspections for inspection and testing requirements

Nominal Design Wind Speed, V_{asd}: 90 MPH

Wind Exposure Category: _C

Statement of Special Inspection for Wind Resistance Required (Yes/No): NO

<u>Description of main windforce-resisting system subject to special inspection for wind resistance:</u>

<u>Description of windforce-resisting components subject to special inspection for wind resistance:</u>

Statement of Responsibility:
Each contractor responsible for the construction or fabrication of a system or component described above must submit a Statement of Responsibility.

FINAL REPORT OF SPECIAL INSPECTIONS

PROJECT: Etowah Raw Water Pump Station

LOCATION: Spider Web Drive, Rome, GA 30161

PERMIT APPLICANT: City of Rome, Water and Sewer Division

APPLICANT'S ADDRESS: 100 Vaughn Road, Rome, GA 30161

ARCHITECT OF RECORD: N.A.

STRUCTURAL ENGINEER OF RECORD: Alpha Omega Engineering, LLC

REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE: Chuck Hardin

To the best of my information, knowledge, and belief, which are based upon observations or diligent supervision of our inspection services for the above-referenced Project, I hereby state that the special inspections or testing required for this Project, and designated for this Agent in the *Schedule of Special Inspection Services*, have been completed in accordance with the Contract Documents.

The Special Inspection program does not relieve the Contractor of the responsibility to comply with the Contract Documents. Jobsite safety and means and methods of construction are solely the responsibility of the Contractor.

Interim reports submitted prior to this final report and numbered___to___form a basis for, and are to be considered an integral part of this final report. The following discrepancies that were outstanding since the last interim report dated _____ have been corrected:

_____

_____

_____

_____

_____

(Attach 8 ½"x11" continuation sheet(s) if required to complete the description of corrections)

Prepared By:

_____
Special Inspection Agent/Firm

_____
Type or print name

_____
Signature Date

SECTION 7

CONCRETE WORK, REINFORCING STEEL, STRUCTURAL STEEL, AND MISCELLANEOUS METAL

7-01 SCOPE:

(a) Concrete: The requirements of this section apply to all concrete work, concrete surface treatments, cement finishes, cast-in-anchorage, etc. Concrete work called for by other sections of these specifications, if not specifically described otherwise, shall comply with the requirements of this section.

(b) Reinforcing Steel, Structural Steel and Miscellaneous Metal: The work covered by this section of Specifications consists of furnishing all materials and equipment and performing all labor necessary for furnishing and installing all reinforcing steel, fabricated steel, fabricated aluminum and appurtenances as indicated on the drawings, as specified, and as required for completion of all work under this contract or contracts.

All work, including labor and materials, is to comply with Occupational Safety and Health Act of 1970 (PL 91-596), latest revision, in accordance with the Supplemental General Conditions of these Specifications.

7-02 CONCRETE:

(a) Composition: Concrete shall be composed of fine and coarse aggregate, Portland Cement, water and such admixtures as may be specified which, when mixed and hardened, will have the ultimate compressive strengths specified hereinafter:

Class A 3750# for Structures
Class B 2500# for Sidewalks
Class C 2000# for Concrete Encasement

(b) Cement: Cement shall be Type I Portland Cement, the composition marking, handling and storage of which shall conform with A.S.T.M. C-150. Type III (High Early Strength) cement may be used, subject to the approval of the Engineer in each instance for its proposed use. Cement, which has become damp, lumpy or otherwise affected so as to reduce its strength, shall not be used in the work. The Contractor shall furnish the Engineer with Certified Mill Test Reports for all cement used on the work.

(c) Aggregates: Aggregates shall be clean, uncoated and free of any impurities other than nominal amounts of fine clay, the limits of which are specified herein. Aggregate shall conform with A.S.T.M. C-33 except that the gradation shall be within the limits specified below:

FINE AGGREGATE		COARSE AGGREGATE			
Sieve Size	Per Cent Passing	Sieve Size	Per Cent Passing 1½" Max	1" Max.	¾" Max.
4	95-100	1½	95-100	----------	----------
16	50-80	1	---------	90-100	----------
50	10-30	¾	40-70	----------	90-100
100	0-5	½	---------	25-60	----------
		3/8	10-30	----------	29-25
Clay – 3% Maximum		#4	0-5	0-10	0-10
			Clay – 1% Maximum		

Water shall be clean and free from injurious amounts of oil, acid, alkali or organic matter and shall be suitable for drinking.

An admixture to enhance strength and workability will be permitted if the Contractor proposes its use, subject to the approval of the Engineer.

Aggregate for cement finish, whether integral or separate topping, shall be clean washed and so graded that no more than 5% will pass through a 10-mesh sieve and not more than 15% will pass a 50-mesh sieve.

(d) Mixing and Proportioning Concrete: Concrete may be proportioned and mixed on the job, drybatched for mixing on the job, or procured from a "ready-mixed concrete plant.

If "ready-mixed" concrete, the mixing and transportation operations shall conform with A.S.T.M. C-94. Mixing water shall not be added after a truck has left the plant. No concrete shall be used in the work, which has been held longer than 1½ hours in a mixer truck.

If dry-batched on the job site, the batching plant operations shall be performed in such a manner as to prevent loss, segregation, or contamination of the ingredients.

If job proportioned and mixed, the aggregate shall be stockpiled separately and handled in such a manner as to prevent the inclusion of any foreign materials. Cement shall be stored in a watertight building with the floor raised off the ground. Except for emergency hand mixing under approved conditions, all concrete shall be machine mixed in an approved type mixer for a minimum period of 1½ minutes in a drum rotating at a peripheral speed of about 200 feet per minute.

Aggregates shall be proportioned by weight unless a satisfactory volumetric method of measurement is approved by the Engineer. The use of fractional sacks of cement will not be permitted unless the cement is proportioned by weight. Water shall be measured by an accurate measuring device that can be adjusted to compensate for variations in the free moisture content of the aggregate.

Retempering a partially hardened concrete or mortar will not be permitted.

Concrete shall be proportioned so as to include the minimum amount of water to obtain a workable mix in accordance with the limits prescribed by the following requirements:

Compressive Strength at 28 Days PSI	Maximum Aggregate Size Inches	Maximum Total Water Gallon/Sack of Cement	Minimum Cement Content 94# Sack Per Cubic Yard
3750	¾" – 1"	6	6
2500	1" – 1½"	7	4½
2000	1½"	7	4

7-03 TESTING LABORATORY SERVICES:

An independent testing laboratory, experienced and well qualified in the design of concrete mixtures and in concrete testing, shall be employed and paid for by the Owner to perform for him the services set forth below for all concrete used on the project. The testing laboratory may be selected by the Contractor but must be approved by the Engineer.

The testing laboratory shall design the proportions to be used for concrete mixtures to attain the unit compressive strengths specified and the workability or plasticity appropriate for the various conditions of concrete use. Determination by the testing laboratory of water cement ratio and proportions of cement, using in each sample of the actual cement, sand and gravel to be used for the project.

The testing laboratory shall furnish reports to the Engineer and the Contractor on all of its design of mix determinations, all of its services, and all of its cylinder tests.

The Contractor, under the supervision of the Engineer's representative, shall take sample specimens of the concrete in cylindrical containers at the point of deposit as follows:

> One sampling, consisting of two cylinders, shall be made from each pouring operation involving any change in the aggregates used or water-cement ratio change and not less than one sampling for each 20 cubic yards of concrete used in any event. Each time that samples are so taken, two sample cylinders shall be taken at the same time; one cylinder to be used for a 7 day test and one for a 28 day test. All cylinders, as above, shall be taken to the laboratory where the 7 day and 28 day tests shall be performed in accordance with current ASTM Specifications for handling and testing.

The Contractor shall collaborate with the testing laboratory to the end that its functions and services may be properly performed as to insure proportioning and handling of the concrete materials in such a manner as to result in the strength specified and in the desirable workability.

The testing laboratory shall perform all services necessary for the design of mix and redesign where changes are made in the aggregates or in the plasticity or workability of the concrete.

The testing laboratory shall submit a report on each cylinder check test, these reports to show all of the data customarily listed by the laboratory in reporting on such check tests.

Forms of reports on each of the testing laboratory services (design, control, and check tests) shall be submitted for the Engineer's approval, and approved forms shall thenceforth be used for the reports required above.

7-04 FORMS:

Forms for concrete work shall be so constructed that the finished concrete will conform to the shapes, lines, grades and dimensions indicated on the drawings. Materials used in these forms for exposed surfaces shall be dressed to a uniform thickness and shall be free of defects. Joints in forms shall be horizontal or vertical, unless otherwise specified. Lumber once used in forms, or used lumber, shall be cleaned and satisfactorily reconditioned.

Where concrete surfaces are exposed to the exterior or interior of walls or other surfaces are to be plastered, the use of large surface form material such as ¾" plywood or Masonite concrete form boards will be required. Under sides of exposed concrete slabs shall be a true plane.

Forms shall be sufficiently tight to prevent the leakage of mortar. They shall be properly shored, braced, and otherwise supported so as to maintain the desired position and shape during and after placing concrete. Exposed concrete shall have form marks rubbed down leaving a smooth surface and finished as hereinafter specified.

Rods or similar internal metal ties shall be so arranged that when the forms are removed no metal shall be within 1" of any surface.

Bottoms of earth forms for beams shall be level. The sides shall be even and clean, and unless otherwise shown, shall be vertical.

The inside of forms shall be coated with a non-staining mineral oil or other approved material. Oil shall be applied before the reinforcement is placed.

A 1" chamfer strip shall be placed at all exterior or interior exposed corners or as shown on plans.

Temporary openings shall be provided at the base of column and wall forms and at other points where necessary to facilitate cleaning and inspection immediately before depositing concrete.

The removal of forms shall be subject to the Engineer's approval and shall not be started until the concrete has attained the necessary strength the support its own weight and any construction live loads.

7-05 DEPOSITING CONCRETE:

No concrete shall be placed until the forms, reinforcement and other conditions are approved for pouring by the Engineer and until all pipes, conduits, sleeves, thimbles, hangers, anchors, flashing and other work required to be placed in the concrete have been properly installed.

Concrete shall not be placed when the temperature is 40º F and falling. It may be placed when the temperature is 45º F or more, and rising, provided there is no reason to expect a drop in temperature to below 40º F within 12 hours of the conclusion of the pour.

Hardened concrete and foreign materials shall be removed from the inner surfaces of mixing and conveying equipment before concrete is mixed. Before depositing concrete, forms shall be thoroughly wetted and all debris removed.

Water shall be removed from the space to be occupied by concrete, and any continuous flow of water shall be delivered to a sump or removed by pumping.

Concrete shall be deposited in the forms as rapidly as practicable to its final position and in such a manner as to prevent flow of concrete and to maintain a plastic surface, which is approximately horizontal.

Concrete during and immediately after depositing shall be thoroughly compacted by means of suitable tools. The use of approved type mechanical vibration is recommended.

No concrete shall be deposited with a free fall of more than 5'0". Proper openings shall be constructed in high wall forms for pouring. Concrete buckets shall be used for bottom pours in deep excavations.

Concrete shall be deposited continuously or in layers of such thickness that no concrete will be deposited against concrete which has hardened. If a section cannot be placed continuously, construction joints may be located at points as provided for in the drawings or as approved by the Engineer. Before depositing new concrete against old, the forms shall be retighten, the hardened surfaces cleaned and covered with a coating of neat cement grout.

7-06 FINISHING AND CURING SLABS:

All slabs will receive either wood float or steel trowel finish as shown on plans. Immediately after final trowelling, all concrete floors and roof slabs of buildings shall be cured with Hunt's process curing compound, or an approved equal, applied in accordance with the manufacturer's recommendations. One gallon of curing compound shall be used for each 250 square feet. No compound shall be placed on construction joints or dowels. Building floor slabs which are not to be tiled shall receive a floor hardening material equal to masterplate neutral color as manufactured by Master Builders Company, applied in strict accordance with the manufacturer's recommendations.

7-07 WALL FINISHING:

With the exception of areas indicated on the drawings, all interior and exterior exposed surfaces are to be rubbed. Forms shall be removed within 48 hours. Soffit forms shall remain in place until curing time has elapsed. All form ties shall be cut back into walls 1" and pointed and patched.

When the pointing has set sufficiently to permit, the surfaces shall be wet with a brush and given a first surface rubbing with a No. 16 Carborundum Stone or an abrasive of equal quality. The rubbing shall be continued sufficiently to bring the surface to a paste, to remove all form marks and projections and to produce a smooth dense surface without pits or irregularities. The use of cement to form a surface paste will not be permitted. The material, which has been ground to a paste in this process, shall be carefully spread or brushed uniformly over the surface and allowed to take a rest.

7-08 BUILT IN CONNECTIONS, SLEEVES, ETC.:

Contractors for other trades requiring built in connections, sleeves, slots, chases, recesses, etc., in concrete work will be responsible for the placing of same before concrete is poured.

7-09 WALKS:

The Contractor shall install all concrete walks as indicated on plot plans and as specified in Section 8 of these specifications.

7-10 CONSTRUCTION JOINTS:

Most of the construction joints to be required are not shown on the drawings. Joints shall be located as directed by the Engineer in accordance with coordinated agreement with the Contractor. Concrete will be placed continuously within the confines of the joints to achieve monolithic construction.

(a) Joints in Footing and Walls: Construction joints in footings and walls, required for proper execution of the work, and not shown on the drawings, shall be located, as directed by the Engineer, across regions of low shearing stress so as to least impair the strength and appearance of the work. Special provisions shall be made for joining successive units, as shown on the drawings and as directed by the Engineer.

(b) Joints in Slabs: Construction joints in slabs, required for proper execution of the work, and not shown on the drawings shall be located as directed by the Engineer, special provisions, including concrete footing for construction joints in slabs on earth, shall be made for joining successive units, as indicated on the drawings, and may be directed by the Engineer.

(c) Expansion Joints: Expansion joints, when required, shall be located as directed on the drawings or directed by the Engineer and constructed in accordance with details thereon.

(d) Keys and Water Stops: Keys shall be constructed in all construction joints, as indicated on the drawings, and as directed by the Engineer. Both keys and rubber water stops shall be constructed in construction joints subject to water pressure. Rubber water stops used in such joints, unless otherwise indicated on the drawings, shall be imbedded 3" into concrete each side of the joint and rubber water stop shall be 6" flat dumbbell, cured water stop as manufactured by Servicised Products Corporation, 6051 West 65th Street, Chicago, Illinois, or approved equal. (Approved P.V.C. water stops may be substituted.)

7-11 REFERENCES FOR STEEL CONSTRUCTION:

Reference specifications shall be a part of these specifications the same if fully written herein and shall constitute minimum requirements for structural steel, unless modified herein.

A. Specification for Structural Steel Buildings (June 22, 2010) by The American Institute of Steel Construction, Inc. (AISC)

B. Specification for Structural Joints using ASTM A325 or A490 bolts (June 30, 2004) by Research Council on Structural Connections (RCSC)

C. Code of Standard Practice for Steel Buildings and Bridges (March 18, 2005) by The American Institute of Steel Construction, Inc. (AISC)

D. Welding: AWS D1.1-2004 Structural Welding Code-Steel by American Welding Society (AWS)

7-12 SHOP DRAWINGS FOR REINFORCING STEEL AND OTHER FABRICATED METAL:

The Contractor shall furnish to the Engineer for checking and approval, six copies of bending and placing details for steel bar reinforcing which shall show bar size, spacing, bending and

tagging identification. Also, shop drawings covering fabricated steel and fabricated aluminum work shall show details of fabrication and erection. Manufacture or fabrication shall be delayed until the Engineer has approved such drawings.

Provide complete connection information. Fabricator shall select and complete the connection details using the LRFD method.

End shear connections for all structural beams shall be designed with ¾" diameter A325 bolts. Unless noted otherwise, end connections for non-composite beams shall be designed to resist 50% of the maximum total uniform loads given in tables 3-6, 3-8 and 3-9 in Part 3 of the 13th Edition of the AISC Steel Construction Manual. If a higher value is given on the drawings, end connection shall be designed for that higher load. Composite beams shall be designed for the loads shown on the drawings.

Connection design shall be stamped by a Professional Engineer registered in the State of Georgia.

7-13 REINFORCING STEEL:

(a) Materials: Reinforcing bars shall conform to A.S.T.M. Specifications A432, which shall have minimum yield strength of 60,000 psi. Deformations of deformed bars shall conform to A.S.T.M. Specification A-305.

Cold drawn wire shall conform to A.S.T.M. Specifications A82.

Welded wire fabric shall conform to A.S.T.M. Specifications A-185.

(b) Placement: Placement shall be accurately formed to the dimensions on the drawings. All bars shall be bent cold and shall not be straightened in a manner, which will injure the metal.

Metal reinforcement before being placed shall be free from scale, heavy rust, and other coatings, which would reduce the bond.

Reinforcement shall be accurately positioned and unless otherwise shown or specified, shall be secured against displacement by using, at intersections, annealed iron wire of not less than 18 gauge or suitable metal clips. It shall be supported by metal chairs, spacers, hangers, or bolsters.

Reinforcement in floors above earth shall be supported by masonry blocking of suitable height to hold the reinforcement at the proper level.

Bars shall be spaced and positioned, as shown on the drawings. Reinforcement, if not otherwise shown, shall be placed, spliced, and located in accordance with the recommendations of the Concrete Reinforcing Steel Institute.

7-14 STRUCTURAL STEEL SHAPES, PLATES, ETC.:

Reference specifications shall be a part of these specifications the same if fully written herein and shall constitute minimum requirements for structural steel, unless modified herein.

Specification for Structural Steel Buildings (June 22, 2010) by The American Institute of Steel Construction, Inc. (AISC)

Specification for Structural Joints using ASTM A325 or A490 bolts (June 30, 2004) by Research Council on Structural Connections (RCSC)

Code of Standard Practice for Steel Buildings and Bridges (March 18, 2005) by The American Institute of Steel Construction, Inc. (AISC)

Welding: AWS D1.1-2004 Structural Welding Code-Steel by American Welding Society (AWS)

Structural steel rolled W Shapes shall conform to ASTM A992 Grade 50. All other structural steel rolled shapes and plates shall conform to ASTM A36 as a minimum.

All hollow structural sections (HSS Rectangular, Square or Round) shall conform to ASTM A500, Grade B.

Anchor bolts shall conform to ASTM F1554 Grade 36, unless noted otherwise.

Connection bolts, nuts and washers for structural members shall conform to ASTM A325 unless noted otherwise. Bolts specified as A307 shall conform to ASTM A307.

Welding electrodes for shop and field welds shall conform to AWS D1.1 for matching filler metal requirements, with E70XX as minimum. All weld filler metal shall be capable of producing welds that have a minimum Charpy V-notch toughness of 20 ft-lb at 0 degrees F.

Installation: Structural steel shall be erected in accordance with approved shop drawings and in conformance with the referenced specifications.

Structural steel detailing shall conform to the AISC Specification, AISC Steel Construction Manual, AISC Code of Standard Practice and as applicable, The Seismic Provisions for Structural Steel Buildings (2010) including Supplement No. 1 (2010).

Welding shall conform to the Standards of the American Welding Society. All welding shall be performed by AWS Qualified Certified Welders. If a fillet weld is shown or implied, the minimum size shall be 3/16” unless noted otherwise.

Splicing of structural steel members where not detailed on the contract documents is prohibited without the prior approval of the Structural Engineer as to location, type of splice and connection to be made.

Where members are shown framing into each other but no connection is specified, the connection shall be accomplished with a 3/16" fillet weld all around. (ie: Where angle bracing is shown but no end connection specified)

If a deformed reinforcement bar is to be welded to a structural steel member or plate, the bar material shall conform to ASTM A706 (Weldable rebar)

Deformed bar anchors (DBA) shall conform to ASTM A496 and shall be automatically end welded with suitable welding equipment in the shop or in the field.

Headed concrete anchors (HCA) shall conform to ASTM A108 and shall be automatically end welded with suitable welding equipment in the shop or in the field.

Steel shall be cleaned of rust, loose mill scale and other foreign materials where required for proper fabrication, fitting up or welding.

All steel that is directly exposed to the wetting effects of weather and all steel that is to be permanently exposed to view shall be shop painted with a standard rust inhibiting primer that is compatible with the final coat of paint. Surface preparation and painting shall be in accordance with the provisions in AISC Code of Standard Practice for Steel Buildings and Bridges and as specified in The Steel Structures Painting Council (SSPC) Manuals. Steel areas to be welded or to be contact surfaces of friction type connections shall not be painted until after connections have been made. Touch up all areas damaged prior to final placement. All steel that is to be fire protected with spray-applied material should not be painted.

Structural steel connections not detailed on the contract documents shall be designed and detailed in accordance with the AISC Construction Manual and AISC Detailing for Steel Construction.

All connection bolts shall be 3/4" diameter unless noted otherwise. All beam connections shall be Snug-Tightened joints unless noted otherwise. All bracing connections shall be slip-critical joints unless noted otherwise. Use Twist-off-Type Tension-Bolt Pre-tensioning for slip-critical joints.

Shop and field testing of welded and bolted connections shall be done by an independent testing agency and the following shall be minimum testing criteria as applicable:

A. All welds shall be visually inspected.

B. Fillet welds for beam and girder shear connection plates or angles (10% at random) shall be checked by magnetic particle method for final pass only.

C. Ultrasonically test 100% of all full penetration welds.

D. Check 25% of bolts in each shear connection (2 minimum).

E. Check 25% of column splice fillet welds by magnetic particle on last layers.

F. All bolted connections shall be tested in accordance with the AISC Specification for Structural Joints using ASTM A325 or A490 Bolts.

G. The structural steel fabricator and erector shall schedule all work to allow the above testing requirements to be completed.

7-15 ALUMINUM:

Fabricated aluminum shall be furnished as indicated on the drawings and specified herein.

Aluminum in contact with steel or embedded in concrete shall be given one shop coat of Zinc Cromate Primer. Aluminum in contact with wood, masonry or concrete (not embedded) shall be given a heavy shop coat of an approved Alkali Resistant Bituminous Paint.

See subsequent specifications at the end of section 7 for aluminum stairs, railings and gratings.

7-16 IRON CASTINGS:

The Contractor shall furnish and install all miscellaneous iron castings including catch basins and manhole frames, covers, steps, floor drains, bolt inserts, brackets, supports and such other iron castings as are shown on the plans.

(a) Castings: Unless otherwise specified, castings shall be of grey iron, conforming to Federal Specification QQ-I-652.

(b) Malleable Castings: Malleable castings shall conform to Federal Specifications QQ-I-666.

(c) Quality: All castings shall be tough, close grained, smoother and free from blow holes, blisters, shrinkage stains, cracks, cold shots and like defects. No plugging of defective castings will be permitted.

(d) Workmanship: All castings shall be made accurately to dimensions shown on the plans and shall be planed or ground where necessary, whether marked or not, to secure perfectly flat

bearing surfaces. Allowance shall be made in the patterns so that the specified thickness of metal will not be reduced.

(e) Weights: No castings will be accepted, the weight of which is less than a theoretical weights, based on required dimensions, by more than 5%.

(f) Cleaning and Painting: All castings shall be thoroughly cleaned and painted before rusting begins. All castings except those to be embedded in concrete shall be cleaned and given a priming coat of paint in the shop. Castings, which will be exposed in buildings, shall receive a shop coat of zinc cromate and iron oxide. Castings which are to be installed outdoors, such as manhole frames, covers and steps, shall be given two coats of approved Bituminous Paint in the shop.

7-17 PAYMENT:

No separate payment will be made for work under this section of the specifications, except as specifically listed in the proposal.

SECTION 05515

ALUMINUM STAIRS

PART 1 GENERAL

1.01 REFERENCES

A. AWS A2.0 - Standard Welding Symbols.

B. AWS D1.1 - Structural Welding Code.

C. ASTM B211 - Aluminum-Alloy Bars, Rods, and Wire.

D. ASTM B221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.

1.02 SYSTEM DESCRIPTION

A. Design Requirements
1. Fabricate stair assembly to support live load of 100 lb/sq ft or point load of 300 lbs, whichever controls, with deflection of stringer or landing framing not to exceed 1/360 of span.

1.03 SUBMITTALS

A. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Provide shop drawings sealed by a Professional Structural Engineer experienced in design of this work and licensed in the location of the project.

B. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

1.04 QUALITY CONTROL

A. Prepare Shop Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the location of the project.

1.05 PROJECT/SITE CONDITIONS

A. Verify that field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.01 MATERIALS

A. Structural Aluminum: Use new, standard sections of minimum weights shown, conforming to Aluminum Association of America Standards for structural sections, Alloy Type 6061.

B. Bolts, Washers, and Nuts: Mark for quick identification, use ASTM Type 304 or 316 stainless steel.

2.02 FABRICATION

A. Fit and shop assemble in largest practical sections, for delivery to site.

B. Fabricate components with joints tightly fitted and secured.

C. Continuously seal jointed pieces by continuous welds.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

G. Accurately form components required for anchorage of stairs, landings and railings to each other and to building structure.

H. Bolt treads to supports.

I. Form hollow stringers with channels.

J. Form landings with gratings of the same type as stair treads. Reinforce underside with angles and/or channels to attain design load requirements.

2.03 FINISHES

A. After erection or assembly, air blast the entire structure with 100 mesh glass beads to provide a uniform matte finish and to remove all markings and weld heat marks.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions.

3.02 PREPARATION

A. Prepare items where site welding is required.

B. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.

C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

D. Field weld components indicated on Drawings and/or on shop drawings. Perform field welding in accordance with AWS D1.1.

E. Field bolt and weld to match shop bolting and welding. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

F. Mechanically fasten joints butted tight, flush, and hairline. Grind welds smooth and flush.

G. Obtain ENGINEER approval prior to site cutting or making adjustments not scheduled.

H. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.04 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION

SECTION 05520

HANDRAILS AND RAILINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes
1. Anodized aluminum pipe handrails, balusters, and fittings.

B. Related Sections
1. Section 03300 - Cast-In-Place Concrete: Placement of anchors in concrete.
2. Section 05510 - Metal Stairs.
3. Section 09900 - Painting: Paint finish.

1.02 REFERENCES

A. ASTM B211 - Aluminum-Alloy Bars, Rods, and Wire.

B. ASTM B221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.

C. ASTM B241 - Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.

1.03 SYSTEM DESCRIPTION

A. Design Requirements
1. Railing assembly, wall rails, and attachments to resist lateral force of 75 lbs at any point without damage or permanent set.

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Provide shop drawings sealed by a Professional Structural Engineer experienced in design of this work and licensed in the location of the project.

C. Product Data: Provide physical characteristics, performance data, and span and deflection tables.

D. Manufacturer's Installation Instructions: Indicate special requirements of opening and perimeter framing.

1.05 PROJECT/SITE CONDITIONS

A. Verify that field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.01 ALUMINUM RAILING SYSTEM

A. Rails and Posts: 1-1/2 inch diameter, extruded tubing conforming to ASTM B241.

B. Posts: 2-1/2” size, extruded tubing conforming to ASTM B241.

C. Fittings: Elbows, T-shapes, wall brackets, escutcheons; cast or machined aluminum.

D. Splice Connectors: Collar with locking set screws; cast or machined aluminum.

E. Fasteners: Stainless steel countersunk screws or bolts; consistent with design of railing.

F. Finish: Anodized.

2.02 FABRICATION

A. Fit and shop assemble components in largest practical sizes, for delivery to site.

B. Fabricate components with joints tightly fitted and secured.

C. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

E. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

F. Accurately form components to suit stairs and landings, to each other, and to building structure.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate Sections.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions and Contract Drawings.

B. Install components plumb and level, accurately fitted, free from distortion or defects.

C. Provide anchors, plates, and angles required for connecting railings to structure. Anchor railing to structure.

D. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION

SECTION 05531

ALUMINUM GRATINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes
1. Aluminum stair tread gratings.
2. Aluminum floor gratings.

B. Related Sections
1. Section 05510 - Metal Stairs: Framing for grating and stair treads.
2. Section 05520 - Handrails and Railings.
3. Section 09900 - Painting: Field paint finish.

1.02 REFERENCES

A. ASTM A202.1 - Metal Bar Grating Manual for Steel and Aluminum Gratings and Stair Treads.

B. ASTM B221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.

C. ANSI/NAAMM MBG 531 - Metal Bar Grating Manual

1.03 SYSTEM DESCRIPTION

A. Design Requirements
1. Design Live Load: Uniform load of 150 lb/sq ft minimum.
2. Maximum Allowable Deflection Under Live Load: 1/360 up to 1/4 inch.

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Shop Drawings: Submit detailed shop drawings for the fabrication and installation of the grating including layout, arrangement, tolerances, and accessories.

C. Product Data: Provide physical characteristics, performance data, and span and deflection tables.

D. Manufacturer's Installation Instructions: Indicate special requirements of opening and perimeter framing.

1.05 QUALITY ASSURANCE

A. Design gratings under direct supervision of a Professional Structural Engineer experienced in design of this work.

1.06 PROJECT/SITE CONDITIONS

A. Verify that field measurements are as indicated on shop drawings.

1.07 SEQUENCING AND SCHEDULING

A. Coordinate the work with placement of frames, tolerances for placed frames, and openings.

PART 2 PRODUCTS

2.01 MATERIALS

A. Aluminum For Pressure Locking or Riveting: ASTM B221, extruded or ASTM B210, drawn seamless tubular aluminum alloy, of shapes indicated.

2.02 ACCESSORIES

A. Provide aluminum saddle clips or anchor blocks for grating hold down.

B. Perimeter Closure: of same material as grating.

2.03 FABRICATION

A. Grating Type: ANSI/NAAMM MBG 531, Pressure Locked or Riveted Type.

B. Fabricate grates to accommodate design loads.

C. Provide all ends of grating sections and openings in grating with banding bars of the same height and material as the grating.

D. Fabricate support framing for openings.

E. Top Surface: Serrated, Non-slip.

2.04 FINISHES

A. Aluminum: Anodized.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that opening sizes and dimensional tolerances are acceptable.

B. Verify that supports and anchors are correctly positioned.

3.02 INSTALLATION

A. Install components in accordance with manufacturer's instructions.

B. Place frames in correct position, plumb and level.

C. Secure to prevent movement.

3.03 TOLERANCES

A. Conform to ANSI/NAAMM MBG 531.

END OF SECTION

SECTION 8

PUMP STATION AND CONTROLS

8-01 SCOPE:

The work under this section of the specifications consists of furnishing all material and equipment and performing all labor necessary to construct and put into good working order the following items being a part of Contract No. 1, as bid:

Construct upgrades to The Etowah Raw Water Pump Station, complete, including pump house, pumps, motors, controls, yard valves and piping, and paved access drive. Install new Scada system and control equipment at the new pump station.

All the above work is to be as drawn and specified.

All work, including labor and materials is to comply with the Occupational Safety and Health Act of 1970 (PL 91-596), latest revision, in accordance with Paragraph 12 of the Supplemental General Conditions of these Specifications.

8-02 CLEARING, EXCAVATION, FILLING AND GRADING:

(This work to be in accordance with Section III and IV of these Specifications).

(a) Cearing and Rough Grading: Before the beginning of construction operations, the area upon which the structures and buildings are to be located shall be cleared of obstructions and graded to conform in general with finished elevations shown on the drawings.

Heavy equipment used for clearing and excavation will be as approved by the Engineer.

(b) Excavations: The Contractor shall perform all excavating of every description, and of whatever substances encountered, to the dimensions and levels shown on the drawings and/or specified.

1. Rock: Rock will not be classified as such for additional payment. The Bidder shall satisfy himself as to rock and other materials, which may be encountered in excavation, and make proper allowances for all contingencies his bid. Neither the Owner, nor the Engineer, will be responsible for sub surface conditions.

2. Footings: Footings shall be excavated to the depth indicated on the drawings. Footings shall rest on firm undisturbed earth or solid rock, assuring proper bearings.

3. Method: Excavation may be accomplished by any customary method except blasting.

4. Limits: Excavated for sufficient distance from foundation walls to allow inspection and to permit the various trades to install their work. Trenches for foundation walls shall be a minimum of two feet wider than the thickness of the walls. Excavation for piers shall be at least two feet greater than the dimensions of the footings. Excavation for footings shall be to the footing dimensions.

5. Depth: Care shall be taken that excavation does not extend below the exact lines of the footings and floor slabs on ground, except as shown. Should the excavation, through carelessness or negligence on the part of the Contractor, be carried below such lines, the Contractor shall fill in the excess excavation with concrete under walls and footings and with concrete or compacted crushed stone as directed under slabs, this work shall be done at the Contractor's expense. Concrete for this purpose shall be of the same quality and mix as that for footings.

6. Slabs on Earth: Where slabs on earth occur, all loam, organic, or other undesirable materials shall be removed as required by the Engineer. When filling is required to bring such excavated area to the levels required to receive slabs, the fill shall be compacted by tamping and rolling to obtain 100% of maximum density. Layers shall not be more than 6" thick.

(c) Water and Up-Lift: The Contractor shall, by the use of well points or other approved methods, prevent the accumulation of water in excavated areas. If water does accumulate it will be promptly removed. The Contractor shall also provide for de-watering areas adjacent to incomplete structures to prevent uplift during construction operations. The Contractor will be liable for any damage due to uplift of structures during construction operations.

(d) Yard Fills and Backfilling Around Structures: All yard fills and backfills around structures shall be selected materials placed in 6" layers. The layers shall be thoroughly compacted by use of heavy, tracked vehicles or other equipment suitable for compacting sandy material. Compaction around structures shall be by use of heavy power tamping equipment. Selected materials shall also be used for backfill around pipe trenches.

(e) Finish Grading: Finish grading shall be performed in accordance with the elevations and grades shown on the drawings and shall be made to blend into conformation with natural ground surfaces.

All graded surfaces shall be left smooth and free to drain. The tops of all cuts shall have berm ditches. Select materials, which have been obtained from stripping the site, shall be spread and compacted upon the slopes of fills and other areas to be grassed. Excess materials shall be spread and compacted as directed.

(f) Waste Materials: Excess materials from excavations, which are to be wasted, shall be spread on the site or utilized as directed by the Engineer.

(g) Grassing: This work shall consist of preparing the ground surface, furnishing and applying lime and fertilizer, furnishing and sowing seed, mulching, compacting, establishing, and repairing in accordance with these specifications. a stand of grass, as defined in the Section 700 of the State Highway Department of Georgia Standard Specifications. All work shall be in accordance with said specifications.

1. Materials: If seasonal limitation permits, the seed will be Bermuda, and shall be 82% pure live seed having a germination of 85%, and shall be hulled. Maximum percentage of weed seed allowed shall be 3%. The Engineer shall select the seed if Bermuda is out of season at the time seeding is required. The minimum quantity of lime applied shall be not less than 2,000 pounds per acre.

(h) Cleanup: Before the work covered in this Section of the Specifications is considered complete, all rubbish and unused material due to or connected with the construction must be removed from the site and disposed of in a manner satisfactory to the Owner.

(i) Payment: No separate payment will be made for work under this section of Specifications, the cost of all such work and all cost incidental thereto shall be included in the price bid for the item to which the work pertains.

8-03 PUMP HOUSE:

Construction of the elevated pump house shall be as indicated on the drawings, and conform to the structural specifications found in section 7 of these project specifications. In addition, the elevated pump house shall conform to the electrical specifications found in section 9 of these project specifications.

8-04 PUMP HOUSE APPURTENANCES:

All appurtenances specified herein to be installed in strict accordance with manufacturer's general application instructions.

(a) Doors: Furnish and install doors complete with frame and hardware. Furnish and install threshold and weather stripping.

The single opening door shall be a 3' 0" x 7' 0" x 1¾" flush, seamless 16 gauge steel door w/7¾" frame, hinges, lock and closers and shall be Series ST Door as manufactured by Mesker. Doors to be equipped with Heavy Duty ANSI A156.13 Knob Locks and shall be model 7800 as manufactured by Sargent. Provide 1430 Series Door Closer.

All door locks to be keyed to match existing City of Rome building locks. Coordinate with the City of Rome Water Department.

Thresholds shall be 5” x ½”, fluted top, aluminum.

(b) Workmanship and Installation: Door frames shall be installed plumb, straight and true, and at its proper location. Doors shall be installed so that all clearances are correct and equal so that the door will hang and swing plumb and hardware will operate properly and easily.

Thresholds shall be neatly cut and coped to fit opening. Secure with aluminum or stainless steel screws.

All doors shall receive one shop coat of metallic primer. Finish coat as specified in the section on painting. Where the factory coat has been damaged, a touch up coat of iron oxide shall be applied.

Upon completion, the Contractor shall check and adjust all doors and condition all movable parts of doors and hardware and put in proper operating condition.

(c) Monorail Door: Monorail door to be double opening door and shall be 5’ 0” x 12’ 0” x 1 ¾” flush. Door to be manufactured by SAK Enterprises, Inc. and shall be ordered to accommodate monorail beam dimensions.

(d) Roof Access Hatch: Roof to be equipped with two (2) 4’ 0” x 4’ 0” aluminum roof hatches to serve as access opening for removal vertical turbine pumps. Location of hatches are to be as shown on drawings. Roof hatches to be Type F manufactured by Bilco Company.

(e) Wall Mounted Jib Crane: Jib Crane to be cantilever and mounted to structural member of the pump house. Crane to have a minimum capacity of 2 Tons. Crane to be model no. WC200-B2-8-12 manufactured by Gorbel.

Jib crane to be equipped with a Accolift geared trolley with a capacity of 2 Tons and also an Accolift hand chain lift also with a 2 Ton capacity.

(f) Monorail Motorized Hoist/Trolley: Provide one motorized wire rope hoist and trolley unit manufactured by Wright. Unit to be Work Rated Product No. C2W05D036-15M2D1.
Hoist to have minimum lifting capacity of 5 Tons and a minimum lift distance of 36 feet. Hoist to be installed in accordance with manufacturer’s requirements and specifications. Monorail beam size to be determined by manufacturer. Hoist must be operational and tested by contractor.

8-05 ETOWAH RAW WATER PUMP STATION PUMPS:

The Contractor shall furnish and install at the Etowah Raw Water Pump Station, two vertical turbine water-flush lubricated enclosed linshaft pumps. Each shall include a bowl assembly, suction strainer, column, lineshaft, enclosing tube, discharge head, sealing assembly and driver. Pumps shall meet the performance criteria provided in the performance section of this specification. Pumps and shall conform strictly to the following specifications.

(a) Quality Assurance:

1. All pumping equipment furnished under this Section shall be of a design and manufacture that has been used in similar applications, and it shall be demonstrated to the satisfaction of the Owner that the quality is equal to equipment made by that manufacturer specifically named herein.

2. Unit responsibility. Pump(s), complete with motor, necessary guards and all other specified accessories and appurtenances shall be furnished by the pump manufacturer to insure compatibility and integrity of the individual components, and provide the specified warranty for all components.

3. The vertical turbine pump(s) specified in this section shall be furnished by and be the product of one manufacturer.

4. Pumps are to be engineered and manufactured under a written Quality Assurance program. The Quality Assurance program is to be in effect for at least ten years, to include a written record of periodic internal and external audits to confirm compliance with such program.

5. Pump(s) are to be engineered and manufactured under the certification of ISO-9001:2000.

(b) Performance:

1. All pumping equipment furnished under this Section shall be of a design and manufacture that has been used in similar applications, and it shall be demonstrated to the satisfaction of the Owner that the quality is equal to equipment made by that manufacturer specifically named herein.

2. The pump(s) shall be designed for continuous operation and will be operated continuously under normal service.

3. Pumps shall be capable of delivering 5500 gpm at a total head of 304 feet with an efficiency of not less than 84% at the specified condition. Additional approximate points on the pump curve shall be: 1500 GPM at 304 feet head; 3500 GPM at 304 feet head. Pumps will be operated using variable frequency drives.

4. Total dynamic head shall be as measured at the discharge of the pump and shall include velocity head and vertical static head from the minimum water level to the centerline of the pump discharge.

5. Minimum water level shall be at elevation __564.1___ feet.

6. Pump(s) are to be mounted at __602.5____ feet elevation with the sump floor at __558.1___ feet elevation. Refer to drawings for verification of elevations.

(c) Manufacturers:

1. Pumps shall be the product of National Pump or Peerless or approved equal.

2. Manufacturer shall have installations of like or similar application with a minimum of 5 years service for this pump size.

(d) Design:

1. Rotation: The pump will be counterclockwise rotation when viewed from the driver end looking at the pump.

2. Impeller: The impeller shall be of cast 316ss construction conforming to ASTM A743, 316SS and shall be epoxy coated. They shall be of one-piece construction, single suction, enclosed ____-vane, and radial flow design. The waterways through the impeller shall have extremely smooth contours, devoid of sharp corners, so as to promote maximum efficiency.

3. The impeller is to be balanced and secured to the shaft by means of a stainless steel drive collet for bowl shafts 1-15/16” diameter and smaller. For bowl shafts larger than 1-15/16” impellers shall be secured to the shaft using a combination of a thrust washer, key and/or snap rings.

4. Impellers shall be adjustable by means of a top shaft-adjusting nut.

5. Bowls: The bowls shall be made of close-grained cast iron conforming to ASTM A48 CL30. Castings shall be free from blowholes, sand holes and shall be accurately machined and fitted to close dimensions.

6. Bowls 8” and above shall be flange connected. Bowls below 8” nominal diameter may use either flanged or threaded connections.

7. Bowls shall be designed with smooth passages to ensure efficient operation and their interior shall be coated with Tnemec N140 Pota-Pox Plus, or equal.

8. The casing shall be hydrostatically tested to 1.5 times the design head or 1.25 times the shutoff head whichever is greater.

9. Impeller Shaft: Impeller shaft shall be of stainless steel construction conforming to ASTM A582 (416 stainless steel).

10. The shaft shall be supported by bronze or neoprene bearings located on both sides of each impeller.

11. Impeller shaft coupling shall be of stainless steel construction conforming to ASTM A582 (416 stainless steel).

12. Wear Rings; Wear rings shall be provided on both the impellers and bowls on bowls of nominal diameter of 8” or larger so that clearances can be maintained throughout the life of the rings and minimize recirculation. Bowls of 6” and 7” nominal diameter shall incorporate bowl wear rings only. Impeller and bowl wear rings shall be of the radial-type. Wear rings shall be attached to the impellers and bowls using an interference fit and Loctite.
13. Wear rings shall be bronze C-844 conforming to ASTM, B505 C93200.

14. Column: Total length of discharge column shall be ___ feet, ____ inches.

15. Column pipe in sizes 4” through 12” diameter shall be furnished in interchangeable sections not over ten feet in length, and shall be connected with threaded, sleeve-type couplings. Column pipe 14” diameter and larger shall be flanged and furnished in interchangeable sections not over ten feet in length.Threaded column sections shall be connected with threaded, sleeve-type couplings. Column joints are to be butted to insure perfect column alignment after assembly. Lineshafting shall be of ample size to transmit the torque and operate the pump without distortion or vibration. Lineshafting shall be made of stainless steel conforming to 416ss and be furnished in interchangeable sections not over ten feet in length. Lineshafting shall be coupled with extra-strong threaded steel couplings machined from solid bar steel.

16. An enclosing tube shall be provided to house the lineshaft. It shall be of extra-strong ASTM A120, Schedule 80 pipe construction and furnished in interchangeable sections not over five feet in length. Each end of the enclosing tube shall be machined to receive a bronze connector bearing.

17. Discharge Head: Shall be of fabricated steel, accurately machined with a rabbet fit for mounting the driver and supporting the pump column assembly and with below ground discharge flange machined and drilled to ANSI standards to suit pump size and weight. The design shall allow for the headshaft/motor drive shaft to couple above the mechanical seal or stuffing box.

The standard stuffing box shall be cast iron and rated for _____ discharge pressure and shall contain a minimum of five acrylic graphite packing rings and shall have a grease chamber. The packing gland shall be bronze secured in place with stainless steel studs and adjusting nuts. The stuffing box bearing shall be C-844 bronze. A rubber slinger shall be installed on the top shaft above the packing gland. The top shaft shall be 416 S.S. and shall extend through the stuffing box.

If a mechanical seal is used, then a four piece spacer type coupling shall be used to allow seal replacement without motor removal. This will require a motor stand to be used with a cast iron discharge head or an extra height fabricated steel discharge head.

18. Impeller adjustment shall be provided at the top of the headshaft by means of an adjusting nut which shall be locked.

19. The driver mounting-base shall be of sufficient design to support the entire weight of the pump and driver.

20. If the application uses a variable frequency drive, the mounting-base shall be fabricated steel and specifically designed to elevate the mounting-base natural frequency above the operating speed.

21. The underground elbow shall be of fabricated steel and have an ANSI 125# discharge flange.

(e) Testing:

1. The limits of vibration as set forth in the standards of the Hydraulic Institute shall govern.

2. A certified factory hydrostatic and performance test shall be performed on each bowl assembly in accordance with Hydraulic Institute Standards, latest edition. Tests shall be sufficient to determine the curves of head, input horsepower, and efficiency relative to capacity from shutoff to 150% of design flow. A minimum of six points, including shutoff, shall be taken for each test. At least one point of the six shall be taken as near as possible to each specified condition.

3. Results of the performance tests shall be certified by a Registered Professional Engineer and submitted for approval before final shipment.

8-06 ETOWAH RAW WATER PUMP STATION MOTORS:

The Contractor shall furnish and install at the Etowah Raw Water Pump Station, two vertical hollow shaft vertically mounted, P-base, 3-Phase, squirrel cage, AC induction motors. Motors shall have WPII enclosures.

(a) General:

1. The limits of vibration as set forth in the standards of the Hydraulic Institute shall govern.

2. Motors shall be in accordance with NEMA Standard MG1-2011, or the latest revision in so far as it is applicable.

3. Unless otherwise specified, motors conforming to this specification shall be suitable for operation in accordance with their rating under the following service conditions.
   Ambient temperature in a range of -29°C to 40°C (-20°F to 104°F).
   Maximum altitude of 1000 meters (3300 feet) above sea level.
   Indoor or outdoor installations.
   Full voltage, across-the-line starting.
   Compatible with Variable Frequency Drives (VFD).

(b) Design:

1. The limits of vibration as set forth in the standards of the Hydraulic Institute shall govern.

2. Motors shall be in accordance with NEMA Standard MG1-2011, or the latest revision in so far as it is applicable.

3. Unless otherwise specified, motors conforming to this specification shall be suitable for operation in accordance with their rating under the following service conditions.
   Ambient temperature in a range of -29°C to 40°C (-20°F to 104°F).
   Maximum altitude of 1000 meters (3300 feet) above sea level.
   Indoor or outdoor installations.
   Full voltage, across-the-line starting.
   Compatible with Variable Frequency Drives (VFD).

4. Motor shall be 60 cycle, 3 phase: 460 and 575 volts are standard above 100 HP.

5. Motors shall operate successfully under running conditions at rated load and volts/hertz ratio when the voltage unbalance at the motor terminals does not exceed one percent.

6. Torques - Motors shall meet or exceed the minimum locked rotor (starting) and breakdown torques specified in NEMA Standard MG1 Part 12 for Design B for the rating specified when on sine wave power.

7. Currents - Locked rotor (starting) currents shall not exceed NEMA Design B values except on motor defined as large machines by NEMA.

8. Efficiency – Vertical motor efficiency will be determined according to NEMA standard MG1 Part 12, IEEE Test Procedure 112 Method B, using accuracy improvement by

segregated loss determination including stray load loss measurements. Efficiency calculations include friction losses due to high thrust bearings.

9. Temperature Rise - The temperature rise, by resistance, shall meet Class B requirements at 1.0 service factor and standard conditions and Class F requirements at 1.15 service factor.

10. Winding: All low voltage motors 700 HP and below shall be random wound type.

11. Insulation: Standard low voltage motors shall utilize the Nidec/ US Electrical Motors Insulife Vacuum Pressure Impregnation (VPI) 1000 insulation system which consists of at a minimum Class F or better insulation materials. This utilizes one VPI cycle of 100% solid epoxy resins completely impregnating slot and end turns. The standard insulation material is non-hypogrospic Class F (155 degrees C), suitable for a TEFC motor with moderate exposure to moisture.

12. If inverter duty is specified special INVERTER GRADE® insulation is required.INVERTER GRADE® insulation meets NEMA® MG1, Parts 30 and 31. This includes additional phase paper between coils, extra bracing on end turns, and additional insulation treatments to protect motor winding from damaging effects that could occur when motor is used with a variable frequency drive.

13. Enclosure: WPII - A Weather Protected Type II machine has its ventilating passages at both intake and discharge so arranged that high-velocity air and airborne particles blown into the machine by storms or high winds can be discharged without entering the internal ventilating passages leading directly to the electric parts of the machine itself. The normal path of ventilating air which enters the electric parts of the machine shall be so arranged by baffling or separate housings as to provide at least three abrupt changes in direction, none of which shall be less than 90 degrees. In addition, an area of low velocity not exceeding 600 feet per minute shall be provided in the intake air path to minimize the possibility of moisture or dirt being carried into the electric parts of the machine.

14. Material - Motor frame, endshields, fan cover, and inner bearing caps shall be cast iron or heavy gauge fabricated steel construction.

15. Bearings:

    a. Standard high thrust motor will be supplied with an angular contact thrust bearing and ball type guide bearing. Upper thrust bearing will be insulated on 5000 frame and above.

    b. 175% extra high thrust bearings. This arrangement consists of two angular contact bearings in tandem.

c. 300% & 500% extra high thrust bearings. These bearings are spherical roller type bearings to handle large thrust loads. These bearings are preloaded using springs so they require a minimum continuous down thrust.

d. Back-to-back bearings can be supplied for up-thrust protection and to meet API 610 endplay requirements of max 0.005". This arrangement consists of two angular contact bearings mounted in opposite directions (back-to-back).

e. Up-thrust – 30% momentary up-thrust protection (of standard high-thrust value -- NOT extra-high thrust value) is provided as standard. When up-thrust protection is supplied on vertical hollowshaft motors, the drive couplings must be bolted together and the self release feature will not apply.

16. Thermal Protection:

Thermocouple bearing protective devices are to be provided for protection of bearings.

For motor windings, A thermocouple consists of two dissimilar conductors welded together into a junction. This is inserted into the motor winding -- 2 per phase / 6 per motor. Thermocouple leads are brought out to terminal strip connections in an accessory conduit box, which is included in its price. These accessory signal wires leads are connected to an input instrument (supplied by others) to form a reference junction. Heating of the thermocouple imbedded in the winding generates a thermoelectric potential (EMF) proportional to the temperature difference between the two points, indicating the temperature of the embedded thermocouple.

8-07 INSTALLATION:

(a) Pump Foundation: Anchor bolts as shown on the drawing shall be set into position when the foundation concrete is being poured. The anchors shall be set accurately either by template or by locating to the dimensions on the approved shop drawings of the pump and base assembly. These bolts shall be of sufficient length so that they project through the nut about ¼" after allowance has been made for approximately ¾" to 1½" of grouting and the height of the base. After the concrete foundation has been allowed to set, the top of the foundation shall be thoroughly cleaned and, if necessary, "roughed" to insure a good bond between the pump base grouting and the foundation.

(b) Pump Base:

Grouting: The steel sole plate shall be grouted to the foundation. The following procedure shall be followed for grouting:

1. Build a wood dam around the foundation and wet the top surface of the concrete foundation thoroughly.

2. Use a non-shrink type grout.

3. Puddle the grout continuously to expel the air and completely fill the space under the base to the level of the grout hole.

4. Using a trowel, strike along the top of the wood dam to give it a neat finished appearance.

5. Allow the grout to harden for a minimum of 48 hours before connecting the suction or discharge piping.

6. After the grout has set, tighten the foundation bolts.

Piping shall not be connected to the pump until the grout has thoroughly hardened and the foundation bolts have been tightened.

8-08 PIPING SYSTEMS:

(a) General: The Contractor shall furnish and install all interior and exterior pump station piping, 14" check valve pit and piping, and 14" meter pit and piping, complete as indicated on the drawings and as specified. Pressure piping at the pump station and valve pit shall be sterilized and pressure tested in accordance with Section 2 of these specifications.

(b) Yard Piping: Yard pressure piping shall be ductile iron in accordance with Section 2 of these specifications.

(c) Interior Piping: Interior piping shall be cast or ductile iron, flanged unless otherwise indicated on the drawings. Flanges shall be ASA 125 lb. or as shown on the drawings. Flanged pipe shall be faced across the face of the flange and the end of the pipe to allow for seating of gasket over machined ends of pipe to be jointed. Piping shall be supported and braced as required and as indicated on the drawings. Piping shall be shop primed (not tar coated).

(d) Valves and Miscellaneous Items:

1. General: The Contractor shall furnish and install all valves of every type shown. Valves shall be furnished with operating nut and installed inside cast iron boxes when placed in a buried condition and shall have operating hand wheel when installed in other locations.

   Valves shall have MJ, flanged or screwed ends to fit the pipe to which they are to be used.

2. Gate Valves: Gate Valves shall be cast iron AWWA Standard C500 type which shall be standard product of a recognized valve manufacturer such as Mueller, Clow, U.S., or

approved equal. Valves shall be constructed with an interchangeable parts system, with parts readily available, and shall meet the following requirements.

Iron body bronze mounted
Rubber encapsulated solid iron gate
"O" ring seal
200 psi minimum working pressure
Counterclockwise (left) opening
2" operating nut or handwheel (handwheel required in buildings and pits)
Non rising stem

Mechanical joint ends except flanged ends where shown or specified.

Valves shall be resilient seated gate valves meeting AWWA C509-87, with fusion bonded epoxy coating on all inside and outside surfaces of body and bonnet.

Valves 1½" and smaller shall be all brass or bronze, conforming to Federal Specification WW-V-76b.

3. Butterfly Valves: Valves shall have rubber vane seats and stainless steel valve seat construction, providing a permanent 360 degree bottle tight closure. Valve shall be as manufactured by Pratt Valve Company or equal.

   The valve operators and end covers shall be permanently sealed against groundwater infiltration with interior mechanism permanently lubricated. All critical bearing and sealing surfaces and parts shall be stainless steel, Teflon, or rubber. Valve operators for buried service valves shall be suitable for use with standard "tee" wrenches.

   Valves operators in buildings and pits will be handwheel type and shall have an "open-close" indicator. Valves in buildings and pits shall be equal to Model 2FII as manufactured by Pratt Valve Company.

   Valve ends shall be suitable for connection to the type of water pipe used without use of additional fittings.

   Valves shall be rated at 150 psi working pressure 300 psi test pressure, and meet the strength and performance requirements of AWWA Specifications C-504, latest revision.

4. Valve Boxes: Except as shown, underground valves shall be installed in standard cast iron valve boxes. Boxes shall be of the two-piece screw type, adjustable to suit the depth of bury and type of valve with a minimum shaft diameter of 5¼".

5. Check Valves in Water Pump Station: Check valves shall be globe style, silent check valves, Figure 636 by Clow Corporation with semi-steel body and bronze trim (as manufactured by Williams-Hager Valves, Chicago, Illinois). Seats of check valves to be threaded into valve body.

8-09 BRONZE PLAQUE:

The Contractor shall furnish and install on the exterior of the Etowah Raw Water Pump Station, one bronze tablet which will be sized eighteen by twenty-four inches (18" x 24"). The following information shall be cast into the tablet:

ETOWAH RAW WATER PUMP STATION
CITY OF ROME, GEORGIA WATER & SEWER DIVISION

UPGRADED 2016

ROME CITY COMMISSION

JAMIE DOSS – MAYOR
MILTON O. SLACK III – MAYOR PRO-TEM
BILL COLLINS – COMMISSIONER
WENDY DAVIS – COMMISSIONER
BILL IRMSCHER – COMMISSIONER
SUE LEE – COMMISSIONER
CRAIG McDANIEL - COMMISSIONER
EVIE McNIECE – COMMISSIONER
SUNDAE STEVENSON - COMMISSIONER
SAMMY RICH – COUNTY MANAGER
PATRICK EIDSON – ASSISTANT MANAGER
MIKE HACKETT – DIVISION DIRECTOR

SOUTHERN ENGINEERING & SURVEYING, INC.

NAME OF CONTRACTOR

A proof layout will be submitted for approval prior to ordering the casting made. The plaque shall be no less than 3/16" thick in body, the edges beveled, cast in one piece and be of high grade U.S. Standard Bronze.

8-10 PAINTING :

Scope: All exterior and interior piping, fittings, valves and equipment shall be pained with the exception of aluminum, copper, and galvanized surfaces upon which the galvanizing is intact.

1. Application of Coatings:

   (a) Coating Thickness: The Contractor shall apply each coating at the rate specified by the manufacturer. If material has thickened or must be diluted for application by spray gun, the coating shall be built up to the same film thickness achieved with undiluted material. In other words, a gallon of paint as originally furnished by the manufacturer must not cover a greater square foot area when applied by spray than when applied

unthinned by brush. Failure to achieve minimum dry film thickness specified shall be cause for additional costs to be applied at the Contractor's expense.

(b) Drying Time: Drying time shall be construed to mean "under normal conditions". Where conditions are other than normal because of weather or because painting must be done in a confined space, longer drying time will be necessary. Additional coats of paint shall not be applied nor shall units be put into service until paints are thoroughly dry.

(c) Thinners: Where thinning is necessary, only products of or recommended by the manufacturer furnishing the paint shall be used. Only thinners and solvents recommended for the particular purpose shall be allowed and all such thinning shall be done strictly in accordance with the manufacturer's recommendations, as well as, with the full knowledge and approval of the Engineer.

(d) Temperature and Humidity: No coatings shall be applied when the temperature is likely to remain below minimum established by coating manufacturer for coating system being applied. No coatings shall be applied when the temperature is less than minimum established by coating manufacturer or when humidity is such that condensation can interfere with proper film formation or when temperature is less than 5º above the dew point.

2. Surface Preparation and Preparation and Painting Schedule:

(a) Cast Iron Pipe – Tar Coated:

1. Surface Preparation: Tar coated cast iron pipe shall be cleaned of all dust, dirt, and any other deleterious substances before painting is to be done. Surface shall be free of all contamination and prepared to accept coating system in accordance with coating manufacturers printed label and Technical Data instructions.

2. Materials (For None Immersion Service):

Seal Coats: Two coats of 2.0 Dry Mils Per Coat.

1) Rust-Oleum #5781 Gray Primer @ 300 sq. ft. to gal.
2) Inertol Tar Stop @ 250 sq. ft. to gal.
3) Industrial Tar Stop @ 250 sq. ft. to gal.

Finish Coat: Two coats of 1.5 Dry Mils Per Coat.

1) Rust-Oleum New Color Horizons Systems @ 345 sq. ft. per gal.
2) Koppers Rust-Armour 500
3) Tnemec Tneme-Gloss

(b) Cast Iron Pipe – Uncoated: (Non Submerged Service)

1. Surface Preparation: Uncoated cast iron pipe shall be cleaned in the field by scraping and wire brushing SSPC-SP2 Hand Tool Cleaning and/or SSPC-SP3 Power Tool Cleaning (if approved by the Engineer), or by Abrasive Blasting (SSPC-SP6, NACE-2). After proper cleaning by method approved by the Engineer, surface shall be primed immediately.

2. Materials:

   Primer: One Coat: 2.0 Dry Mils Minimum Per Coat

   1) Rust-Oleum #1069 Heavy Duty Red Primer
   2) Norcoro Rust-Inhibitive Primer M-6511
   3) Koppers #622 Rust-Penetrating Primer

   Finish: Two Coats: 1.5 Dry Mils Minimum Per Coat

   1) Rust-Oleum New Color Horizons System
   2) Chembar Finish
   3) Ramuc Utility Enamel

(c) Metal Surfaces – Non Submerged:

1. Surface Preparation: All exposed steel, iron, metal doors and frames, telemetering transmitter enclosures, handrails, fittings, valves, stands, and other ferrous metal items generally are to be shop primed and shall have all rust, scale, dust, grease, or other deleterious substances removed by sandblasting Commercial Grade (SSPC-SP6, NACE-3) or pickling. Cleaned metal shall be immediately primed to prevent new rusting. All ferrous metal items, not shop primed, shall be field cleaned by wire brushing SSPC-SP2 Hand Tool Cleaning and/or SSPC-SP3 Power Tool Cleaning (if approved by the Engineer), or sandblasting minimum Commercial Blast Cleaning SSPC-SP6 NACE-3, and immediately primed. Non-ferrous metals shall be solvent cleaned just prior to the application of prime coat or pretreatment.

2. Materials:

   Primer: One Coat: 2.0 Dry Mils Minimum Per Coat

   1) Rust-Oleum #1069 Heavy Duty Red Primer
   2) Tnemec Red Primer
   3) Koppers #622 Rust-Penetrating Primer

   Finish: Two Coats: 1.5 Dry Mils Minimum Per Coat

Indoors & 1) Rust-Oleum New Color Horizons System
Outdoors 2) Tnemec Tneme Gloss
3) Koppers Rustarmor 500

(d) Galvanized Surfaces: (Not normally required if galvanizing is intact.) If hand rails require color coding or galvanized steel needs repair apply following:

1. Surface Preparation: Solvent clean by SSPC-SP-1 Solvent Cleaning Method or by Application of Rust-Oleum #108 SURFA ETCH Cleaning Solution per coating manufacturers label directions. Surface shall be free of all deleterious materials and contamination in accordance with coating manufacturer instructions.

2. Materials: (Non Submerged – Normal Environment)

Spot Prime: One Spot Prime Coat of 1.5 Dry Mils Per Coat
(Spot Prime Rusted, Damaged or Weld Areas Only)

1) Hard Hat Brand #2185 Cold Galvanized Compound
2) Rust-Oleum #7785 Cold Galvanized Compound or Approved Equal

Full Prime: One Coat of 1.5 Dry Mils of Galvanized Primer

1) Rust-Oleum #5769 Red Primer
2) Kopper #40 Passivator
3) Or Approved Equal

Finish: One Coat of 1.5 Dry Mils Per Coat

1) Rust-Oleum New Color Horizons System
2) Tnemec Tneme Gloss
3) Koppers Rustarmor 500

(Submerged or Severe Environment)
Spot Prime: One Spot Prime Coat of 1.5 Dry Mils Per Coat
(Spot Prime Rusted, Damaged or Weld Areas Only)

1) Hard Hat Brand #2185 Cold Galvanizing Compound
2) Rust-Oleum #7785 Cold Galvanizing Compound or Approved Equal

Full Prime: One Coat of 2.5 Dry Mils Per Coat of Polyamide Epoxy Primer

1) Rust-Oleum #C9369 Red Epoxy Primer

2) Tnemec Epoxoline Red 66-1255 Primer
3) Koppers #654 Maroon Primer

Full Finish: One Coat of 2.5 Dry Mils Per Coat of Polyamide Epoxy

1) Rust-Oleum #9300 Polyamide Epoxy System
2) Tnemec 66 Series Eposoline
3) Koppers 200 H.B. Epoxy

(e) Concrete Block and Concrete Surfaces to be Painted:

1. Surface Preparation: Remove all dirt, grease form oil, and concrete spatter leaving only a smooth surface for application of coating. Remove form oil by application of Rust-Oleum #108 SURFA ETCH Chemical Cleaning Solution or approved equal. Note: Muratic acid will not remove form oil or grease. Muratic acid will not be considered as an approved equal if it is used alone. Follow coating manufacturers label instructions for application of chemical cleaning solution.

2) Materials:

Application Procedures: Surface Filler Application to concrete block and masonry to fill all voids and surface defects. Scrub filler into voids but do not build up excessive film build.

a) Walls and Ceilings:

Prime Coat:

1) Rust-Oleum #5199 Block Filter (Fill Voids)
2) Koppers Block Sealer (Fill Voids)
3) Tnemec 54-563 Masonry Filter (Fill Voids)

Intermediate Coat:

1) Rust-Oleum #9391 Flat White Primer (2.0 Dry Mils Per Coat)
2) Koppers 201 Epoxy (2.0 Dry Mils per Coat)
3) Tnemec 108 Series Epoxy (3.0 Dry Mils Per Coat)

Finish Coat:

1) Rust-Oleum #9300 System Epoxy (2.0 Dry Mils Per Coat)
2) Koppers 201 Epoxy (2.0 Dry Mils Per Coat)
3) Tnemec 108 Series Epoxy (3.0 Dry Mils Per Coat)

NOTE: Thin Prime and Intermediate coats per coating manufacturers Label and Technical Data Instructions with thinners from coating manufacturer only.

b) Floors:

1) Surface Preparation: Apply Rust-Oleum #108 SURFA ETCH (or approved equal) per coating manufacturer's instructions.

2) Materials:

Primer: One Coat of 1.5 Dry Mils Per Coat (Thin prime coat per manufacturers instructions)

a) Rust-Oleum #9300 System Epoxy or Approved Equal

b) Rust-Oleum #9300 System Epoxy with #200 non skid additive per label instruction (or approved equal)

c) Rust-Oleum #9300 clear single package moistured cured Polyurethane (to give high gloss, waxed appearance and improve chemical resistance and wear) do not apply to submerged or extremely wet areas (or approved equal)

NOTE: Only Epoxy Systems that are designed for wet and high abrasion shall be considered as "or equal".

3. Clean Up:

Oily rags and waste shall be removed from the building(s) every night and no debris shall be allowed to accumulate. Upon completion of the work, all refuse and unused material shall be removed and the premises left in a neat and orderly condition.

4. Paint to be Supplied to Owner:

Upon completion of painting work and at not additional cost, the Owner shall be furnished one gallon of each type and color of finish paint for touching up. Paint container labels shall have information specified herein and in addition shall have location of color and type marked thereon.

8-11 MECHANICAL EQUIPMENT:

(a) Work under this section of the Specifications consists of furnishing all materials and equipment and performing all labor necessary for the installation of all mechanical equipment and appurtenances, complete, including service, testing and painting, as

indicated on the drawings, and/or specified and in accordance with approved manufacturer's erection instructions and drawings.

The principal items of equipment covered by this section of Specifications are as follows:

Vertical Turbine Pumps
Electrical Motors
Electrical Equipment and Controls
SCADA Equipment

(b) Service Requirements: The Contractor shall furnish the services of competent factory representatives for the purpose of supervising and/or inspecting the assembly, installation and initial operation of the items of equipment listed above. The number of days of service for each item is as required in getting the equipment in good working order.

Periods of installation and initial operation shall occur on successive days, if possible. Periods of service on more than one item of equipment furnished by the same manufacturer may run concurrently, if possible, and when approved by the Engineer. Manufacturers furnishing supervisory and/or inspection service for any item of equipment shall extend such service to include all equipment furnished by said manufacturer whether listed above or not.

(c) Information Required for Approval: Each manufacturer furnishing equipment shall submit the following information for the Engineer's approval.

1. Shop Drawings: Six (6) sets of certified drawings, guaranteed performance curves, wiring diagrams, lists of electrical controls (including manufacturer's name and catalog number), horsepower of motors, normal full load and maximum load ampere rating for each motor.

2. Weight: Estimated weight of each unit of equipment.

3. Spare Parts and Tools: Lists of spare parts and tools to be furnished with equipment. Unless otherwise specified, only special tools required for the particular equipment shall be furnished with equipment.

4. Installation and Operating Instructions: After approval of equipment has been given, the manufacturer shall furnish promptly six (6) sets of complete installation, operating and maintenance instructions. Such instruction manuals shall list all of the equipment specified in this and other referenced sections of specifications and shall include equipment serial numbers, design data, operating instructions and shall include instructions, lubrication instructions, piping, wiring and control diagrams, assembly drawings showing locations of parts, part numbers and spare parts lists.

(d) Bids on Major Equipment: The Bidder should base his bid on equipment supplied by the manufacturers named herein. If a Bidder desires to furnish equipment by a manufacturer

not specified by name herein, the Bidder must submit to the Engineer, not less than two weeks prior to the date set for opening bids, sufficient data to enable the Engineer to determine if the equipment is equal to that specified. The Engineer shall be the sole judge as to acceptable manufacturers. Bidders will be notified of additional acceptable manufacturers by Addendum.

(e) Standardization of Equipment: In order to avoid a division of responsibility among several manufacturers for like items of equipment having functions relating to each other, and to avoid unnecessary duplication of replacement parts and service calls, the items of equipment to be furnished under this section shall be the product of or guaranteed by one manufacturer, all materials and/or components specified or required for the safe operation or proper use of each item of equipment.

Also, in certain instances, in these specifications and on the contract drawings, a particular item of equipment is specified as being furnished by a designated manufacturer. These designations are made only to allow the Owner to have standardization of proposed equipment with existing equipment, thereby avoiding unnecessary duplication of spare parts and service calls and reducing operation and maintenance costs.

(f) Mechanical Tests: After installation of each unit of mechanical equipment, the unit will be operated continuously for a period of twenty-four (24) hours. During this period, the equipment will be inspected for defects or weaknesses, and any part of the unit showing a defect or weakness shall at once be replaced or shall be made good in a satisfactory manner at no expense to the Owner. After any part of the equipment showing defects or weaknesses has been replaced or made good, additional mechanical tests will be made with the equipment operating continuously for a twenty-four (24) hour period until no further defects or weaknesses occur in the unit.

(g) Start Up: Start up includes 1 day for start up and training in the proper operation and maintenance of the equipment.

8-12 FENCING:

The work covered by this section consists of furnishing all materials and equipment, and performing all labor necessary for complete fencing of the pump station site, as shown on the plans. The completed fence shall be seven feet high overall.

1. Materials: The fence shall consist of 2” mesh x 9 gauge x 72” galvanized fabric, hot dipped galvanized after fabrication, and 3 strands of zinc coated 12½ gauge barbed wire on galvanized post tops at a 45 degree angle. A bottom tension wire and 1-5/8” top rail shall be provided. Line posts shall be galvanized 2” O.D. pipe spaced not more than 10 feet apart. Pull, corner and terminal posts shall be galvanized 3” O.D. with all necessary struts and tie bracing. Gate posts for main entrance gates shall be 4” O.D. galvanized pipe. Gate posts for other gates shall be 3” O.D. galvanized pipe. All posts shall be set in concrete footings not less than 3 feet deep. All posts shall be schedule 40 or better.

Gate frames shall be 2" O.D. galvanized pipe with 1-5/8" O.D. internal bracing. The main entrance gates shall be double opening and equipped with a positive type latch and ground stop anchored in concrete. Clear opening and location of gates shall be as shown on the plans. Double opening gate shall have gatekeepers on each side to hold when open.

2. Materials and Workmanship: All materials and workmanship shall be first class in every respect and shall conform to the specifications.

3. Methods of Construction: All posts and wire shall be installed in accordance with the manufacturer's recommendations and as shown on the plans. Post spacing shall not exceed ten feet (10').

8-13 PAYMENT:

The work included in this section of the specifications shall be considered as a subsidiary part of the item to which it relates, and shall be included in the lump sum price as bid for the particular item.

SECTION 9

ELECTRICAL WORK AND CONTROL EQUIPMENT

9-01 GENERAL:

This section describes the electrical and control work to be accomplished under this contract. The Contractor shall furnish and install all materials and apparatus specified and required to provide a complete and operable installation, as set forth in the contract documents and drawings.

The inclusion of electrical work in this specification shall not be construed as determination of jurisdiction between trades or of contractual scope. The Contractor shall have the sole responsibility for determining the scope of his subcontracts.

Competent and experienced electricians shall install electrical work.

Refer to all other sections of this specification where electrical equipment is described.

All work, including labor and materials, is to comply with the Occupational Safety and Health Act of 1970 (PL 91-596), latest revision, in accordance with Paragraph 12 of the Supplemental General Conditions of these specifications.

If there is any discrepancy between the specifications and drawings, the Contractor shall bid the highest priced item and request clarification from the Engineer.

9-02 STANDARDS AND CODES:

All electrical construction shall be in accordance with the National Electric Code, 2014 Edition, OSHA, the Georgia State Electrical Code and all local requirements.

New materials that are in the scope of the Underwriters Examination Service shall bear the Underwriters Laboratories, Inc. label of approval.

Electrical work and materials shall further comply with the standards described in this specification and shall be certified by the authorities referenced.

9-03 MATERIALS:

All materials supplied under this contract shall be new, and shall be of the make, type, and quality (or approved equal) as specified in this specification and drawings.

All materials shall be checked for dimensions to insure that they will fit into the allocated space.

9-04 DRAWINGS:

Measurements for the location of all equipment shall be made on the site, and shall be verified by reference to the specification and drawing.

The electrical drawings are schematic, and shall not be scaled to obtain equipment locations.

Engineer may, before final installation, require the relocation of any outlet by as much as 10′-0″ without any extra cost to the Owner.

9-05 COOPERATION AND COORDINATION:

The electrical work shall be scheduled in every way possible with the work of other trades involved to avoid delays, interference and unnecessary work.

Advance arrangements shall be made with the Georgia Power Company for temporary construction service at the site and for power to operate the completed installation.

The Contractor shall pay all one-time costs charged by utility companies.

9-06 RACEWAYS AND ENCLOSURES:

Underground conduits outside buildings shall be PVC Schedule 40, laid on a 2″ deep bed of sand or rock-free earth, and graded to allow drainage of conduits. Backfilling shall be done in 12″ layers with each layer wet down and tamped before proceeding with the next layer.

Conduits shall be buried not less than 24″ below grade.

Fittings on underground steel conduit shall have male threads sealed with all joints wrench tight.

Conduits lying in concrete slabs or beneath slabs shall be rigid hot-dipped galvanized steel. Conduits laid beneath vapor barriers shall be installed as underground conduits.

Where conduits are encased in a concrete slab, the diameter of the largest conduit fitting shall not exceed ½ of the slab thickness. Conduits embedded in reinforced concrete slabs shall be installed so as not to interfere with reinforcing steel or mesh.

Conduits shall not be laid in a gravel bed without the special permission of the Engineer.

Install bushings on all rigid steel conduits entering outlet boxes, panelboards and cabinets. Bushings shall be insulating type. Bushings on rigid steel service entrance conduit shall be of the grounding type with screw attachment for bonding jumper.

Conduit fittings and couplings shall be threaded watertight and shall be made up wrench-tight. Couplings shall be made up with the same amount of thread on each stalk.

All raceways for signal control and communication wiring shall be installed for line voltage wiring, regardless of the voltage to be handled.

Ground continuity in all circuits shall be maintained throughout the raceway system by NEC-sized equipment grounding conductor.

Conduit in the pump station shall be run in the floor where practical, and shall be rigid hot-dipped galvanized steel except where noted.

Conduit sizes given in the plans and specifications are intended to be typical of installed sizes; however, the Contractor shall consider the sizes given as minimums, and shall install conduit sizes per NEC rules, taking into account the physical dimensions of the actual wires to be installed in the conduit, including any wiring for future equipment shown.

9-07 CONDUCTORS AND CONDUCTOR INSTALLATION:

Copper wire shall be used throughout. Wire size No. 12 AWG and smaller shall be solid. Wire larger than No. 12 AWG shall be stranded. Stranded wire shall not have strands removed, unwound or spread. Line voltage wiring shall not be smaller than No. 12, unless noted otherwise on the drawings.

Conductors shall be 600-volt, NEC building wire, type THHW/THHN.

Unless noted otherwise, shielded instrument cable shall be No. 16 AWG twisted shielded pair with 300-volt thermoplastic insulation, by Belden or approved equal.

Wire shall not be pulled until the conduit system has been completed, cleaned, drained and swabbed with a mandrel swab throughout the entire run. Only a commercial grade, U/L approved lubricant shall be used for pulling wires.

Pulling tension shall be limited to a value which will not damage insulation at bends, and in no case shall exceed 100 lbs. per foot of radius of the smallest bend.

Service conductors shall not be spliced. Splices in other conductors shall be made in approved boxes. Branch circuit splices up to No. 6 wire shall be made with insulated spring grip type connectors.

Wire larger than No. 6 shall be spliced with compression sleeves or split bolts and shall be fully insulated.

9-08 GROUNDING:

The service entrance shall be grounded to the water discharge pipeline and the foundation reinforcing steel. The ground wire shall be bare or green insulated.

Ground continuity shall be assured throughout the electrical system by using equipment grounding conductors run with circuits, with the raceways as backup. Make up all raceway joints wrench-tight, taking care that paint or other matter does not interfere with electrical continuity of the raceway.

At the service disconnect, the grounding conductor, the neutral circuit conductor and the disconnect enclosure shall all be bonded together. The neutral conductor shall not be used to ground enclosures or raceways.

All receptacles shall be provided with a green grounding conductor jumper connected between the grounding lug on the receptacle and the grounded outlet box or the conduit system. The screws securing the receptacle to the box shall not be considered as providing a sufficient ground connection.

A continuous copper bonding conductor, sized per NEC, shall be installed in all conduit, and shall be bonded to all motor frames, enclosures, receptacles, housings, lighting fixtures, etc. The conductor shall be green insulated. Minimum size conductor shall be #1/0 Awg.

9-09 PUMP HOUSE:

(a) Service Entrance: The Contractor shall furnish and install main feed, all conduit, conduit fittings, main breaker, and necessary apparatus for the electric power service entrance per the drawings.

Approved transient voltage surge suppressors (TVSS) shall be provided at the main panel, as shown on the drawing and in accordance with the National Electric Code. The TVSS will be placed in order to protect the equipment.

(b) Wall Switches shall be 20 ampere, 120-volt, AC quiet type, specification grade, back and side wired. All wall switches shall be mounted 4′, 0″ above finished floor.

(c) Duplex Receptacles shall be 20 ampere, 120-volt, specification grade, back and side wired, NEMA Standard 5-20R grounding type.

(d) Safety/Disconnect/Main Switches:

All switches shall be heavy duty and rated as shown on the drawings.

(e) Approved Vendors:

All switches, breakers, and panelboards shall be by Square D, General Electric, or Cutler-Hammer.

(f) Lighting: all lighting to be installed as drawn and specified on electrical plans.

9-11 SCADA EQUIPMENT SYSTEM:

(a) The City of Rome will provide personnel and equipment to implement control by the SCADA sytem.

(b) The Contractor shall coordinate the work of the City of Rome personnel during construction testing, calibration and acceptance of instruments and equipment.

(c) All of the equipment shall be the manufacturer's latest and proven design and shall be fully compatible with the existing equipment. Specifications and drawings call attention to certain features, but do not purport to cover all details entering into the design of the system. The completed system shall be compatible with the functions required and the equipment furnished by the Contractor.

1) All electrical components of the system shall operate on 120-volt, single phase, 60-cycle current, except as otherwise noted in the specifications.

2) All controls for remote electrically operated equipment shall be complete, including all necessary auxiliary relays so as to require only wiring and connections to the equipment control circuit. All contacts for control of electrically operated equipment shall be rated not less than 10 amperes on 120 volts unless otherwise specified herein.

3) All necessary fuses or switches required by the vendor for his equipment shall be provided with the equipment. All instruments requiring an internal power supply shall have an internal ON-OFF switch.

9-12 NAMEPLATES AND IDENTIFICATION:

Each starter, control relay, disconnect, panelboard, and motor circuit breaker shall have a nameplate.

The nameplate shall be made of laminated layers of Phenolic material, black outer layer and white inner layer, with the letters cut through the black layer to exhibit white letters on a black background. The letter shall be sized appropriately for the function being identified, but in no case shall the letters be less than 3/8″ in height.

The nameplates shall be permanently and securely attached to the panels in appropriate locations, with small non-rusting screws, or with a permanent adhesive.

Selector switches and indicating lights shall be provided with manufacturer's standard metal legend plates. Label as shown on the drawings.

9-13 TESTING:

On completion of the work, the system shall be subjected to a full-scale test, with all light, machinery, SCADA equipment and controls in full operation, in the presence of the Engineer or his representative. The Contractor shall immediately remedy any defects in equipment, or deviations from the plans and specifications, which may be discovered during the test.

9-14 AS-BUILT DRAWINGS:

The Contractor shall keep a record set of electrical drawings showing all changes and deviations from the contract drawings. The drawings shall be kept up to date on a daily basis. When work on the job has been completed, the record drawings shall be delivered to the Engineer, who shall revise his tracings to show the as-built installation. After a reasonable time in which to modify the tracings has elapsed and on request of the Contractor, the Engineer shall return the record drawings to the Contractor.

9-15 APPROVAL DRAWINGS:

The Contractor shall submit seven sets of all shop drawings for the approval of the Engineer. The Engineer shall review the drawings for conformance to the drawings and specifications but approval of the drawings by the Engineer shall not relieve the Contractor of his responsibility and obligation to furnish a complete and working installation, in accordance with the plans and specifications.

9-16 PAYMENT:

No separate payment shall be made for work or materials under this section of the specifications. Payment shall be included in the price bid for the item to which the work relates.

CITY OF ROME
ETOWAH RAW WATER PUMPING STATION

26 29 23 Variable Frequency Drives

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Variable Frequency Drives (VFDs), rated 600 V and less, for speed control of three-phase, induction motors.
   2. Extent of variable frequency drives (VFD's) is indicated on the Drawings and as defined by the requirements of this section.

B. Related Documents:
   1. Drawings and general provisions of Contract

1.2 DEFINITIONS

A. BAS: Building automation system. In this document BAS refers to the City's SCADA system
B. EMI: Electromagnetic interference
C. FLA: Full Load Amps
D. IGBT: Insulated-gate bipolar transistor
E. LAN: Local area network
F. LED: Light-emitting diode
G. PWM: Pulse-width modulated
H. RFI: Radio-frequency interference
I. VFD: Variable-frequency drive motor controller

1.3 COMPLIANCE WITH SPECIFICATIONS

A. Complete compliance with all requirements of this specification is required. If any supplier takes exception to any of the requirements of this specification, the deviations from the specification requirements shall be clearly explained on the submittal documents.

1.4 REFERENCES

A. Institute of Electrical and Electronic Engineers:
   1. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.

B. National Electrical Manufacturers Association:
   1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
   2. NEMA FU1 - Low Voltage Cartridge Fuses.
   3. NEMA ICS 7 - Industrial Control and Systems: Adjustable Speed Drives.
   4. NEMA ICS 7.1 – Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable Speed Drive Systems.

1.5 SUBMITTALS

A. Submit specific product data and shop drawings for each type and rating of Variable Frequency Drive (VFD) indicated. Include manufacturer, dimensions, weight, mounting arrangements, required clearances and service space around equipment, ratings, listings, enclosure types, conduit entry locations and sizes, schematic power and control wiring diagrams and complete list of all features and components (standard and optional). Any exceptions to the specification shall be clearly noted in the submittal.

B. Field quality-control reports. Indicate field test and inspection procedures and test results.

C. Operation and maintenance data. Submit instructions for starting and operating controllers, and describe operating limits that may result in hazardous or unsafe conditions. Submit routine preventive maintenance schedule.

1.6 WARRANTY

A. The VFD shall be warranted by the manufacturer for a period of 12 months from the date of certified start-up, not to exceed 30 months from date of shipment. The warranty shall include parts, labor, travel time, and expenses incurred by the manufacturer to provide factory authorized service to diagnose and repair or replace VFD's that fail within warranty period.

1.7 QUALITY ASSURANCE

A. The drive manufacturer shall supply the drive and all necessary options as herein specified.
   1. The manufacturer shall have been engaged in the production of this type of equipment for a minimum of five years documented experience.
   2. The drive manufacturing facility shall be ISO 9001 certified.
   3. VFD's that are manufactured by a third party and "brand labeled" shall not be acceptable.
   4. All VFDs shall be from the same manufacturer and a single supplier for single-source responsibility and product support.
      a. For equipment that is specified to have VFD's factory mounted/wired, the successful single-source VFD supplier shall coordinate arrangements to ship VFD packages to equipment vendor for final factory installation.

B. VFDs and options shall be UL listed as a complete assembly. VFD's that require the customer to supply external fuses for the VFD to be UL listed are not acceptable. VFDs with red label UL stickers, requiring additional branch circuit protection are not acceptable.

C. The VFD and options shall comply with the applicable requirements of the latest standards of ANSI, IEEE, the National Electrical Code and NEMA.

D. The VFD and options shall be tested to ANSI/UL Standard 508C and listed by a nationally recognized testing agency such as UL or ETL.

E. All standard and optional features shall be functionally tested at the factory for proper operation.

F. Product Support: Factory trained application engineering and service personnel that are thoroughly familiar with the VFD products offered shall be locally available, within approximately 100 miles, of installation locations. A toll free 24/365 technical support line shall be available.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site with factory-installed protective skids and containers.

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 components, enclosure, and finish.

1.9 MAINTENANCE MATERIALS

A. Furnish two of each filter.

PART 2 PRODUCTS

2.1 PACKAGED VARIABLE FREQUENCY DRIVES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Yaskawa
   2. Or approved equal.

B. General: Furnish complete variable frequency drive(s) as specified herein for the equipment designated on the drawing schedules or control sequences with variable speed controls. Each VFD, with all standard and optional features, shall be factory packaged in a UL rated and listed enclosure most appropriate for each application and location, completely assembled and tested by the manufacturer in an ISO9001 facility. The variable frequency drives shall convert three-phase, 60 Hz utility power to proportionally variable voltage and frequency, three-phase, AC power using the latest isolated gate bipolar transistor (IGBT) technology for stepless motor speed control of one or more three-phase induction motors. Drives shall include integral manual disconnecting means and shall provide means of overload and overcurrent self-protection and motor protection. Input voltage shall be as specified in the schedule.
   1. The VFD power input stage shall convert three-phase AC line power to a fixed DC bus voltage. This will be accomplished with a solid state three-phase full-wave diode rectifier with metal oxide varistor (MOV) three-phase protection.
   2. The VFD output power shall vary frequency to the motor from 0 to 60 Hz with resultant motor speed varying at the motor nameplate rated speed, with output voltage variation from zero to motor rated voltage for optimum volts per hertz (V/Hz) ratio for fan and pump loads. The output must be a voltage source type generating a sine coded PWM waveform utilizing an asynchronous carrier frequency (output transistor switching frequency is to be independent of drive output frequency). This carrier frequency shall be adjustable to minimize harmonically induced noise or vibration.
   3. Cooling Fan and Exhaust System: For Type 1 or Type 12; UL 508 component recognized: Cooling fan, with intake and exhaust grills [**and filters for Type 12**]. The VFD shall have cooling fans **[and filters – when applicable]** that are designed for easy replacement. The fans shall be designed for replacement without requiring removing the VFD from the wall or removal of circuit boards. The cooling fans shall be controlled by VFD to cycle on only as required to maintain safe operating temperature.
   4. The VFD shall include a door interlocked, padlockable, input power disconnect switch that will disconnect all input power from the drive and all internally mounted options.
   5. Application: Drives shall be capable of controlling and set up for either variable or constant torque loads, as follows.
      a. Variable torque: loads such as centrifugal fans, pumps and compressors
      b. Constant torque: loads such as positive displacement pumps and reciprocating or screw compressors.

C. Service Conditions and Performance Ratings: All VFD's shall be designed to operate continuously within the following conditions:
   1. Ambient Conditions:
      a. Ambient temperature, 0-40ºC (32 to 104ºF).
      b. 0 to 95% relative humidity, non-condensing.
      c. Elevation to 1,000 meters (3,300 feet) without derating.
   2. Input Ratings:
      a. AC line voltage variation, -10% to +10% of nominal,
      b. AC line frequency variation: 48-63 Hz.
      c. Input AC Voltage Unbalance: Not exceeding **3** percent.
      d. Displacement power factor shall not be less than 0.95 throughout the speed range.

3. Output Ratings:
   a. Minimum Efficiency: 97 percent at full load. (The input current rating of the VFD shall be no more than 3% greater than the output current rating.) VFD's with lower efficiencies (higher input current ratings) require the upstream wiring, protection devices, and source transformers to be oversized per NEC 430.120 and are not acceptable. Input and output current ratings must be shown on the VFD nameplate.
   b. Minimum Short-Circuit Current (Withstand) Rating: The base VFD shall be UL listed for 100 KAIC without the need for input fuses.
   c. Continuous Output Current: 100% of the nominal FLA rating
   d. Overload Capability: minimum short term of 110% of the nominal FLA rating for 60 seconds every 10 minutes; minimum peak overload of 130% of the nominal FLA rating for 2 seconds per minute.

D. Adjustments: The VFD shall include the following minimum adjustments inside the enclosure:
   1. Maximum speed limit: adjustable 50-200% base speed.
   2. Minimum speed limit: adjustable 0-50% base speed.
   3. Acceleration time, adjustable 0.1 to 1800 seconds.
   4. Deceleration time, adjustable 0.1 to 1800 seconds with override circuit to prevent nuisance trips if decel time is set too short.
   5. Current Regulation limit, adjustable 0-130%.
   6. Output Carrier Frequency: Field selectable between 1 to 12 kHz.in maximum increments of 4 kHz. See Start- Up Service requirements in Part 3.

E. Protective Features: The VFD shall include the following protective features:
   1. Protection against input transient voltage spikes (phase to phase and phase to ground).
   2. Separate overload protection for each motor controlled.
   3. Protection against input power under voltage, over voltage, and phase loss (input and output).
   4. Protection against output current overload and over current.
   5. Protection against over temperature within the VFD enclosure.
   6. Protection against over voltage on the DC bus.
   7. DC bus discharge circuit for protection of service personnel.
   8. Insensitive to incoming power phase sequence.
   9. Output Ground Fault protection
   10. Output Short Circuit protection
   11. Microprocessor fault
   12. Motor Over temperature
   13. Motor Stall protection shall be programmable to provide a warning or stop the drive after the motor has operated above a programmed torque level for a programmed time limit.
   14. Underload / loss-of-load (broken drive belt or coupling): The drive shall be programmable to signal the loss-of-load condition via a keypad warning, Form-C relay output, and / or over the serial communications bus. The loss-of-load condition sensing algorithm shall include a programmable time delay that will allow for motor acceleration from zero speed without signaling a false loss-of-load condition.
   15. Critical frequency lockout ranges, with a minimum of 3 selectable, adjustable deadbands. The lockout range must be fully adjustable, from 0 to full speed.
   16. Loss of control signal: Selectable response strategy, including speed default to a percent of the most recent speed, a preset speed, or stop; with alarm, or warning alarm alone to be issued. The drive shall be programmable to signal this condition via a keypad warning, Form-C relay output and / or over the serial communication bus.

F. Line Conditioning and Filtering: Include internal mounted components to mitigate harmonic distortion, provide protection from input transients and reduce EMI/RFI emissions as required for each application.

G. Control Features: The VFD shall include the following control features:
   1. The control pad shall include a backlit LCD multi-line display in plain English. The display shall be in complete English words for programming and fault diagnostics (alpha-numeric codes are not acceptable). All VFD faults shall be displayed in English words.
   2. The following display/control parameters shall be located on the front of the enclosure:
      a. Hand/Off/Auto selector to start and stop the motor. In the auto position, the drive shall start/stop from a remote contact closure. In the auto position, motor speed shall be determined by the follower signal. In the manual position, motor speed shall be determined by manual adjustment.
      b. Power on indication that the VFD is being supplied by the power line.
      c. Fault indication that the VFD has tripped on a fault condition.
      d. Display shall indicate load parameters such as motor speed (RPM or percent), output frequency/voltage, running load amps, motor torque, motor power (kW), DC bus voltage, motor status, fault or alarming status.
   3. A set of form C, dry contacts to indicate when the VFD is in the run mode.
   4. A set of form C, dry contacts to indicate when the VFD is in the fault mode. This fault output shall be hard-wired to BAS independently of Serial Communications interface so it can be monitored even network connection has failed.
   5. Terminations for safety interlocks such as freeze and smoke shut-down.
   6. For a fault condition other than a ground fault, short circuit or internal fault, an auto restart function shall provide up to 6 programmable restart attempts. The time delay before restart attempts shall be a minimum of 30 seconds. This function permits automatic restarting after the drive controller detects a fault, provided that the other operating functions are correct, a run command is present, and the fault has disappeared. This shall be a function that is field selectable.
   7. Run permissive circuit - There shall be a run permissive circuit for damper or valve control. Regardless of the source of a run command (keypad, input contact closure, time-clock control, or serial communications), the VFD shall provide a dry contact closure that will signal the damper to open (VFD motor does not operate). When the damper is fully open (proven by damper end switch feedback), a normally open dry contact (end-switch) shall close. The closed end-switch is wired to a VFD digital input and allows VFD motor operation. Two separate safety interlock inputs shall be provided. When either safety is opened, the motor shall be commanded to coast to stop and the damper shall be commanded to close. The keypad shall display “start enable 1 (or 2) missing”. The safety input status shall also be transmitted over the serial communications bus.
   8. Speed Reference Input: Shall accept both a manual speed signal and a 4-20 mAspeed reference analog input signal from the Building Automation System (BAS).
   9. Feedback Signal: Provide 4-20 mA analog output signal to indicate actual operating speed of VFD. Output signal shall be fed into the BAS.

   10. BAS Serial Communications Interface: VFD manufacturer shall include factory-installed hardware and software to enable the BAS primarily to monitor and display VFD feedback, status, alarms and energy usage, and secondarily to allow but not be fully dependent on BAS control commands. Each individual drive shall have the protocol in the base VFD. The use of third party gateways and multiplexers is not acceptable. All protocols shall be “certified” by the governing authority (i.e. BTL Listing for BACnet). Use of non-certified protocols is not allowed. Allows VFD to be used with an external system within a multidrop LAN configuration; settings retained within VFD's nonvolatile memory. The VFD BAS interface shall comply with the requirements defined in the BAS Specifications and Sequences of Operation.
      a. Network Communications Ports: Ethernet and **RS-485**.
      b. Embedded BAS Protocols for Network Communications: Shall include B**ACnet** protocol accessible via the communications ports.

c. Communication capabilities shall include, but not be limited to; run-stop control, speed set adjustment, proportional/integral/derivative PID control adjustments, current limit, accel/decel time adjustments, and lock and unlock the keypad. The drive shall have the capability of allowing the BAS to monitor feedback such as process variable feedback, output speed / frequency, current (in amps), % torque, power (kW), kilowatt hours (resettable), operating hours (resettable), and drive temperature. The BAS shall also be capable of monitoring the VFD relay output status, digital input status, and all analog input and analog output values. All diagnostic warning and fault information shall be transmitted over the serial communications bus. Remote VFD fault reset shall be possible.

2.2 ENCLOSURES AND OTHER ACCESSORIES:

A. Enclosures: Shall be selected to provide protection of all internal components for the application and environmental conditions at installed location. Enclosures shall be rated and listed UL Types. VFD's without these UL ratings are not acceptable. NEMA only type enclosures are not acceptable.

PART 3 EXECUTION

3.1 EXAMINATION

A. Contractor to verify that jobsite conditions for installation meet factory recommended and code required conditions for VFD installation prior to start-up. These shall include as a minimum:
   1. Clearance spacing.
   2. Temperature, contamination, dust, and moisture of the environment.
   3. Separate conduit installation of the motor wiring, power wiring, and control wiring.

B. Do not install controller until building environment can be maintained with the service conditions required by the manufacturer.

3.2 INSTALLATION

A. The installing contractor shall install the drive in accordance with the recommendations of the VFD manufacturer as outlined in the VFD installation manual.

   1. The VFD is to be covered and protected from installation dust and contamination until the environment is cleaned and ready for operation. The VFD shall not be operated while the unit is covered.
   2. The installation shall comply with the working, access, and equipment protective space requirements in the NEC - Spaces About Electrical Equipment, including "Dedicated Equipment Space". If it is unavoidable to have foreign systems running above the dedicated space, adequate protection must be installed to avoid damage to the VFD from condensation, leaks, or breaks in such foreign systems.

B. All electrical power wiring shall be completed by the electrical contractor, to NEC wiring requirements based on the VFD input current. **The contractor shall complete all wiring in accordance with the instructions of the VFD manufacturer as outlined in the installation or user's manual.** In general, comply with the following:
   1. Input power, motor output and control wiring shall each be run in separate conduits.
   2. Use a separate conduit run for each drive.
   3. Motor cables require shielding using conduit, armored cable or shielded cable.

a. When using conduit:
   1) Bridge joints with a ground conductor bonded to the conduit on each side of the joint.
   2) Bond conduit run to the drive enclosure.
b. When using armored cable:
   1) Use six-conductor (3 phases and 3 grounds), type MC continuous corrugated aluminum armor cable with symmetrical grounds.
   2) Armored motor cable can share a cable tray with input power cables, but not with control cables.
c. For shielded cable details: Comply with manufacturer's instructions.

4. For personnel safety, proper operation and to reduce electromagnetic emission/pick-up, the drive and motor shall be properly grounded.
   a. Motor cables require extra care in grounding and routing in order to reduce parasitic capacitance current leaks that can create noise interference, damage motor bearings or other components.
5. Check motor and motor cable insulation for adequate resistance per manufacturer's recommendations.
   a. **WARNING!** Disconnect the drive before conducting any voltage tolerance (Hi-Pot) test or insulation resistance (Megger) test on the motor or motor cables. Do not conduct these tests on the drive.

3.3 CONTROL WIRING INSTALLATION AND COORDINATION

A. The Contractor shall install control wiring between VFDs and remote devices and facility's central BAS per requirements in BAS specifications.
   1. Connect all hard-wired control inputs from BAS devices to VFD.

Connect all hard-wired control outputs (normal/fault indication) from VFD to BASConnect network communication and coordinate that correct parameter values are reading to BAS

B. Bundle, train, and support wiring in enclosures. Control wiring shall ALWAYS be run in control pathways separated from VFD input and output power wiring.

C. Connect selector switches and other automatic control devices where applicable.
   1. Connect selector switches to bypass only those manual- and automatic control devices that have no safety functions when switches are in manual-control position.
   2. Connect selector switches with control circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.4 IDENTIFICATION

A. Contractor shall identify VFDs, components, driven motor characteristics, and control wiring. Comply with requirements specified in Identification sections.
   1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
   2. Label each VFD with engraved nameplate.
   3. Label each enclosure-mounted control and pilot device.
   4. Provide neatly typed label inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.
   5. Where specialty enclosures with air filters or other options that need routine inspection and maintenance to ensure proper operation are required for the application, the installing contractor shall provide identification labels requiring preventative maintenance for such units.

3.5 START UP SERVICE:

A. The manufacturer shall provide certified start up service by a factory trained service technician. The service technician shall verify correct installation, start up the drive, and check for proper operation of all features, including interface to the building automation system. Sales personnel and other agents who are not factory certified technicians for drive field repair shall not be acceptable as commissioning agents. A certified start-up form shall be filled out for each drive with a copy provided to the owner, and a copy kept on file at the manufacturer. Included in this service shall be (as a minimum):
   1. Verification of contractor wire terminations to the VFD and its optional circuitry.
   2. **Setting of carrier frequency: Select for lowest frequency available that provides acceptable motor audible noise for the application.** Lower carrier frequencies generate less heat in the VFD and motor and less potential for undesirable currents through motor shaft bearings.
   3. Measurements and verification for proper operation and reliability of the VFD, the motor being driven, and the building automation system.
      a. Calibration check for the following set points (and adjustment as necessary) (1) minimum speed (optimized for each application and coordinated with TAB Agency and CSC), (2) maximum speed, (3) acceleration and deceleration rates.
      b. Confirmation of proper installation and functioning of grounding of VFD, motor, and motor shaft.
      c. Confirm correct settings of control input/output programmed parameters for proper building automation system interface and control calibration.

B. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.

C. Compile a thorough list of all specialty enclosures with air filters or other options that need routine inspection and maintenance to ensure proper operation are required for the application. Provide written and/or electronic documentation (signed and dated) to the Owner's Preventive Maintenance (PM) representatives during start-up to ensure any and all such specialty units get input in the PM database as part of project turnover.

3.6 TESTING

A. After check out and start up of drive(s) by manufacturer, the City will monitor the voltage and current percent Total Harmonic Distortion (THD) at the input of each drive installed. The Electrical Contractor shall provide manpower to assist the City with the operation of the drives during testing.

3.7 TRAINING

A. The manufacturer shall have regularly scheduled maintenance and training schools on the equipment supplied.

B. A computer based training CD or 8-hour professionally generated video shall be provided to the owner at the time of project closeout. The training shall include installation, programming and operation of the VFD, bypass and serial communication.

C. Where specialty enclosures with air filters or other options that need routine inspection and maintenance to ensure proper operation are required for the application, the installing contractor shall include specific training coordinated with the Owner's O & M representatives as part of project turnover.

END OF SECTION