INVITATION TO BID 21-006
PUMP STATION 4059 IMPROVEMENT PLANS
BGJWSC PROJECT NO. 2005
TO THE BRUNSWICK - GLYNN COUNTY JOINT WATER AND SEWER COMMISSION

MANDATORY Pre-Bid Conference Call / Optional Site Visit :

Friday, September 18, 2020 - 10:00 a.m. EST

Pre-register with Purchasing Department for call-in credentials via email: pcrosby@bgjwsc.org

OPTIONAL Site Visit at Station Location immediately following call:

3059 Old Cypress Mill Road

Brunswick, Georgia 31520

Bids Due by 12:00 NOON, EST on Tuesday, October 6, 2020 to:

Office of Procurement
Joint Water and Sewer Commission 1703
Gloucester Street
Brunswick, Georgia 31520
(912) 261-7127
Pamela Drury-Crosby, Procurement Director
pcrosby@bgjwsc.org

Complete RFP Document and Specifications may be accessed electronically at

http://www.bgjwsc.org/about-the-bgjwsc/bid-opportunities-and-rfps/

Please Label Submission with Firm's Name, Address and Project Title: "Sealed Bid – Pump Station 4059 Improvement Plans – BGJWSC Project No. 2005"

INVITATION FOR BIDS

IFB NO. 21-006

PUMP STATION 4059 IMPROVEMENT PLANS

BGJWSC PROJECT NO. 2005

Sealed bids will be received by the Brunswick-Glynn County Joint Water and Sewer Commission (BGJWSC) at the JWSC's Office of the Procurement Director, 1703 Gloucester Street, Brunswick, Georgia 31520 until ***12:00 NOON EST, TUESDAY, OCTOBER 6, 2020,*** at which time and place they will be publicly opened and read aloud**.**

Plans, specifications and bidding documents are on file at the JWSC Main Office, 1703 Gloucester Street, Brunswick, GA 31520. The documents are also available electronically at http://www.bgjwsc.org/about-the-bgjwsc/bid-opportunities-and-rfps/ or (CD) / USB free of charge. All addenda will be available electronically on the BGJWSC website. Interested bidders are advised to review these postings frequently throughout the solicitation process and prior to all bid submissions being finalized to ensure the most accurate information is being taken into consideration.

SCOPE OF WORK

The work to be performed under this contract consists of furnishing all skill, labor, materials (unless noted otherwise), tools, equipment and incidentals required to construct complete, in place, and ready to operate pump station with improvements along Old Cypress Mill Road in Glynn County and the City of Brunswick, Georgia. More specifically, the work includes, but is not limited to:

- Provide traffic control.
- Remove existing fencing and gate for temporary access to pump station and replace with new fencing and gate with 3 strands barbed wire.
- Provide temporary bypass operations until improved pump station is successfully tested, approved for use by the BGJWSC, and returned into operation.
- Provide erosion and sediment control.
- Provide excavation and backfill in accordance with OSHA requirements.
- Provide dewatering and proper disposal of pump discharge.
- Demolish existing 4-inch force main between existing wetwell and tie-in connection to existing 8-inch force main.
- Remove existing 4-inch flow meter from existing meter vault and return to BGJWSC designated location. Existing rack-mounted transmitter and enclosure to be reused at new Site location. Existing meter vault to remain.
- Remove existing 4-inch check/plug valves and associated equipment from existing valve vault and return equipment to BGJWSC designated location. Remove existing valve vault and access hatch intact and return to BGJWSC designated location.
- Demolish concrete top and access hatch from existing wetwell.
- Remove existing 3-hp submersible pumps and associated equipment and return to BGJWSC designated location.
- Provide new 8-feet x 8-feet x 7.5-feet deep precast concrete valve vault with new access hatch.
- Provide (2) new 8-inch check/plug valve trains in new valve vault and (1) new 8-inch magnetic flow meter in existing meter vault.
- Provide new 8-inch force main from existing wet well, through existing vaults with connections to new valves and meter, with termination connection to existing 8-inch force main.
- Upgrade existing electrical service to 3-phase, 230-volt, with capacity to power (2) 6.5-hp submersible pumps that will be controlled by (2) variable frequency drives in flow pacing operation. Provide new 200-amp disconnect fused per NEC.

- Provide (2) new 6.5-hp submersible motors complete with submersible pumps, floor-mounted discharge bases, guide rails, lifting chains, motor electrical cables, and floats and radar level controls.
- New 6-inch HDPE bypass.
- Provide air release valves in existing wet well.
- Maintenance of erosion and sedimentation control BMPs.
- Maintenance of traffic control required to complete work shown in construction documents and as required for project by Glynn County and the City of Brunswick.
- Restoration including but not limited to; seeding, new fencing section replacement, and all other areas disturbed by construction as per construction documents to equal or better than existing condition.

The Bidder is ***encouraged*** to examine the location of the work and inform themselves fully as to the conditions present at the project site. A ***MANDATORY pre-bid conference call*** is scheduled for **Friday, September 18, 2020** at **10:00 a.m. EST** followed by an optional site visit to PS 4059 for anyone interested in attending. Interested parties must pre-register no later than 3:00 p.m. on Thursday, September 17th with the Purchasing Department via email, pcrosby@bgjwsc.org to obtain log-in credentials for these two events.

The deadline for questions is 5:00 P.M. EST. WEDNESDAY, SEPTEMBER 23RD. All questions must be submitted in writing, via email to the Purchasing Director, Pamela Drury-Crosby at pcrosby@bgjwsc.org

A bid guarantee in an amount not less than five percent (5%) of the amount bid must accompany each bid. Acceptable forms of bid guarantees are: a bid bond, certified check or cashier's check made payable to the Brunswick-Glynn County Joint Water and Sewer Commission. Performance and Payment bonds, each in an amount equal to hundred percent (100%) of the contract amount will be required of the successful Bidder.

The Brunswick-Glynn County Joint Water and Sewer Commission provides equal opportunity for all businesses and does not discriminate against any person or business because of race, color, religion, sex, national origin, disability or veteran status. This policy ensures all segments of the business community have access to supplying the goods and services needed by the JWSC.

The JWSC reserves the right to reject any and all bids, waive technicalities and make an award in the best interest of the JWSC

Brunswick - Glynn County Joint
Water and Sewer Commission

BIDDING DOCUMENTS
AND
TECHNICAL SPECIFICATIONS

PUMP STATION 4059 IMPROVEMENT PLANS
BGJWSC PROJECT NO. 2005

BIDDING
DOCUMENTS AND
TECHNICAL SPECIFICATIONS

PUMP STATION 4059 IMPROVEMENT PLANS

BGJWSC PROJECT NO. 2005

TABLE OF CONTENTS

TECHNICAL SPECIFICATIONS

JWSC Standard Specifications

Section 1 - General Information
Section 3 - Gravity Sewer Systems
Section 4 - Sanitary Sewer Lift Stations and Force Mains

Roberts Civil Engineering Specifications

GENERAL REQUIREMENTS

01150 - Measurement and Payment

SITE WORK

02050 - Demolition
02210 - Erosion and Sedimentation Control
02221 - Excavation, Trenching & Backfill for Utility Systems
02451 - Chain Link Fence
02480 - Grassing and Sodding

BIDDING DOCUMENTS

Office of the Director of Procurement

Brunswick-Glynn County
Joint Water andSewer Commission 1703
Gloucester Street
Brunswick, Georgia 31520

Advertisement for Bids
Instructions to Bidders Bid
Form
Oath
Bid Bond
Representation
Legal and Character Qualifications Affidavit
E-Verify Affidavit Contractor E-
Verify Affidavit Subcontractor

Instructions to Bidders

1. Intent and Timeline

It is intended that the Instructions to Bidders, General Conditions, Construction Plans and Technical Specifications shall define and describe the complete work to which they relate. Requests for clarification and all questions during the bidding period must be submitted in writing via e-mail to the Director of Procurement, Pam Crosby at pcrosby@bgjwsc.org on or before ***5:00 P.M. EST on WEDNESDAY, SEPTEMBER 23, 2020*** Requests for clarification received after this date will not be considered. Responses to requests for clarification and questions will be issued by addendum and will be posted on the JWSC website (www.bgjwsc.org). The bid due date is ***12:00 NOON EST on TUESDAY, OCTOBER 6, 2020.***

Timeline

Date	Event
Friday, September 18, 2020 – 10:00 a.m.	**Mandatory Pre-Bid Conference Call Held; Optional Site Visit**
Wednesday, September 23, 2020 - 5:00 p.m.	**Deadline for Questions**
No later than Monday, September 28, 2020	Issue Addenda for responses to final questions
Tuesday, October 6, 2020 – 12:00 NOON	**Bids Due**
Wednesday, October 14, 2020 – 1:00 p.m.	**Facilities Committee Approval**
Thursday, October 15, 2020 - 2:00 p.m.	**Full Commission Approval**
Thursday, 10/15/2020 – 11/16/2020	Execute Contract Documents
11/16/2020	Pre-Construction Meeting
No later than 12/7/2020	**Issue Notice To Proceed - Physical Construction Begins**

2. Work to be Done

The work to be performed under this contract consists of furnishing all skill, labor, materials (unless noted otherwise), tools, equipment and incidentals required to construct complete, in place, and ready to operate pump station with improvements along Old Cypress Mill Road in Glynn County and the City of Brunswick, Georgia. More specifically, the work includes, but is not limited to:

- Provide traffic control.
- Remove existing fencing and gate for temporary access to pump station and replace with new fencing and gate with 3 strands barbed wire.
- Provide temporary bypass operations until improved pump station is successfully tested, approved for use by the BGJWSC, and returned into operation.
- Provide erosion and sediment control.
- Provide excavation and backfill in accordance with OSHA requirements.
- Provide dewatering and proper disposal of pump discharge.
- Demolish existing 4-inch force main between existing wet well and tie-in connection to existing 8-inch force main.
- Remove existing 4-inch flow meter from existing meter vault and return to BGJWSC designated location. Existing rack-mounted transmitter and enclosure to be reused at new Site location. Existing meter vault to remain.
- Remove existing 4-inch check/plug valves and associated equipment from existing valve vault and return equipment to BGJWSC designated location. Remove existing valve vault and access hatch intact and return to BGJWSC designated location.
- Demolish concrete top and access hatch from existing wetwell.
- Remove existing 3-hp submersible pumps and associated equipment and return to BGJWSC designated location.
- Provide new 8-feet x 8-feet x 7.5-feet deep precast concrete valve vault with new access hatch.
- Provide (2) new 8-inch check/plug valve trains in new valve vault and (1) new 8-inch magnetic flow meter in existing meter vault.
- Provide new 8-inch force main from existing wet well, through existing vaults with connections to new valves and meter, with termination connection to existing 8-inch force main.
- Upgrade existing electrical service to 3-phase, 230-volt, with capacity to power (2) 6.5-hp submersible pumps that will be controlled by (2) variable frequency drives in flow pacing operation. Provide new 200-amp disconnect fused per NEC.
- Provide (2) new 6.5-hp submersible motors complete with submersible pumps, floor-mounted discharge bases, guide rails, lifting chains, motor electrical cables, and floats and radar level controls.
- New 6-inch HDPE bypass.
- Provide air release valves in existing wet well.
- Maintenance of erosion and sedimentation control BMPs.
- Maintenance of traffic control required to complete work shown in construction documents and as required for project by Glynn County and the City of Brunswick.
- Restoration including but not limited to; seeding, new fencing section replacement, and all other areas disturbed by construction as per construction documents to equal or better than existing condition.

3. Site Examination

The Bidder is ***encouraged*** to examine the location of the work and inform himself fully as to the conditions present at the project site. A ***mandatory pre-bid teleconference*** will be held on **Friday, September 18, 2020 – 10:00 a.m.** followed by an optional site visit to PS 4059 for anyone interested in attending. Pre-registration for the call is required.

4. Bid and Contract Security

A bid guarantee in an amount not less than five percent (5%) of the amount bid must accompany each bid. Acceptable forms of bid guarantees are: a bid bond, certified check or cashier's check made payable to the Brunswick-Glynn County Joint Water and Sewer Commission. The JWSC will return bid guarantees, other than bid bonds, to unsuccessful bidders as soon as practicable, but not sooner than the execution of a contract with the successful bidder. If for any reason whatsoever the successful Bidder withdraws from the competition after opening the bids, or refuses to execute the Contract, the Owner will proceed on the Bid Bond or deposit the certified check or cashier's check as damages for the Bidder's failure to enter into a contract for the work.

Performance and Payment bonds, each in an amount equal to one hundred percent (100%) of the contract amount will be required of the successful Bidder.

The Surety of the Bid Bond, Performance Bond, and Payment Bond shall be a surety company authorized to do business in the State of Georgia, shall be listed in the Department of the Treasury Circular 570, and shall have an underwriting limitation in excess of one hundred percent (100%) of the bid amount. The Bonds and Surety shall be subject to approval by the JWSC legal counsel.

Attorneys-in-fact who sign and seal Bid Bonds or Contract Bonds must file with each bond a certified and effectively dated copy of their power of attorney.

5. Determination of Successful Bidder

The contract will be awarded to the lowest responsive, responsible Bidder; if awarded.

The determination of the Bidder's ***responsibility*** will be made by the JWSC based on whether the Bidder:

1. Maintains a permanent place of business,
2. Has the appropriate technical experience (including proposed subcontractors),
3. Has adequate plant and equipment to do the work properly and expeditiously,
4. Has suitable financial means to meet obligations incidental to this work, and
5. Is appropriately licensed for the described work in the State of Georgia.

The Bidder shall furnish, to the JWSC, all such information and data for this purpose as the JWSC may request. The JWSC reserves the right to reject any bid if the evidence submitted by, or investigation of, the Bidder fails to satisfy the JWSC that he is properly qualified to carry out the obligations of the Contract.

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

6. Bid Alternates

Bidders are requested to review bid alternates, if any, as outlined on the Bid Form.

7. Contract Time

Contract time shall consist of one-hundred eighty (180) consecutive calendar days for the completion of work, to be computed from the date of the Notice to Proceed. Time is of the essence and is an essential element of this Agreement, and the Contractor shall pay to the JWSC, not as a penalty, but as damages, the sum of **Two Thousand Dollars ($2,000.00)** for each calendar day that he shall be in default of completing the work within the time limit named herein.

8. Bid Form

Bids shall be submitted on the Bid Form included. Bids shall be based upon lump sum prices as indicated by the Bid Form. Where errors or omissions result in discrepancies in proposal totals, prices per unit as submitted will be binding. Final payment will be based upon completion and acceptance of the work by the JWSC.

9. Submission of Bids

Bids shall be submitted at the time and place designated in the Invitation for Bids. On the outside of the envelope containing the Bid shall be noted the following:

SEALED BID

IFB NO. 21-006 PUMP STATION 4059 IMPROVEMENT

PLANS BGJWSC PROJECT NO. 2005

The Bidder shall submit ***one (1) original Bid, five (5) duplicates (hardcopies) and one electronic copy (USB or CD)*** in an opaque sealed envelope at the time and place indicated in the Invitation. The outside of the envelope containing the Bid also shall be marked with the Bidder's name, address and Georgia Utility Contractor's License Number. If there is a discrepancy between the electronic copy and the hard copy, the hard copy will prevail.

All blanks in the Bid must be completed and written or printed in ink.

Bids by corporations must be executed in the corporate name by the president or vice- president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested to by the secretary or an assistant secretary of the corporation. The corporate address and state of incorporation must be shown on the Bid Form.

Bids by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature and the official address of the partnership

must be shown on the Bid Form.

The address, telephone number, facsimile number and email address for communications regarding the Bid must be shown on the Bid Form.

All names and titles must be typed or printed in ink below the signature.

The Bid shall contain an acknowledgement of receipt of all Addenda, if any. The numbers of each Addendum must be filled in on the Bid Form.

The completed ***Bid Form, Oath, Bid Bond, Representation, Legal and Character Qualifications, Affidavit, E- Verify Affidavit Contractor and E-verify Affidavit Subcontractor (if applicable)*** forms in this IFB shall be submitted with the Bid, and be executed in proper form.

IN ACCORDANCE WITH O.C.G.A. § 13-10-91, NO PROPOSAL FOR THE PHYSICAL PERFORMANCE OF SERVICES WILL BE CONSIDERED UNLESS THE BID INCLUDES A SIGNED, NOTARIZED E-VERIFY AFFIDAVIT AS SET FORTH HEREIN.

The submission of a Bid will constitute an incontrovertible representation by the Bidder that the Bidder has complied with every requirement of the IFB, that without exception the Bid is premised upon performing and furnishing the Work required by the Contract Documents and such means, methods, techniques, sequences or procedures of construction as may be indicated in or required by the Contract Documents, and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions of performance of the Project and furnishing of the Work.

BID FORM

IFB NO. 21-006 PUMP STATION 4059 IMPROVEMENT PLANS - BGJWSC PROJECT NO. 2005

BASE BID (Reference Section 01150 of the Technical Specifications for Scope of Each Item)					
Item	**Description**	**QTY**	**Unit**	**Unit Price**	**Total**
1	Mobilization, Demobilization, Insurance & Bonds	1	LS	$	$
2	Temporary Bypass Pumping/Connection	1	LS	$	$
3	Provide 8" Check Valves/Plug Valves, Appurtenances & Plumbing Installation Within New Valve Vault	1	LS	$	$
4	Remove Existing Pumps and Control Panel and Return to Designated BGJWSC Location	1	LS	$	$
5	Provide 6.5-Hp Pumps with VFD's and flow pacing operation	2	EA	$	$
6	Provide 8" Magnetic Flow Meter, Appurtenances, & Plumbing Installation within Existing Meter Vault	1	LS	$	$
7	Provide Upgrade of Wetwell Piping to 8" HDPE	30	LF	$	$
8	Provide 8-Inch HDPE Force Main	60	LF	$	$
9	Provide 8-Inch HDPE Pipe Fittings – Butt Fusion, Socket Fusion, and Electrofusion Couplings	1	LS	$	$
10	Provide Upgrade of Existing Electrical Service and Breaker Downstream of Utility Meter With Capacity to Power (2) 6.5-Hp Submersible Pumps in Flow Matching Operation Based on Current 3-Phase, 230-Volt Configuration. Provide New 200 Amp Fused Disconnect in NEMA 4X Enclosure	1	LS	$	$
11	Remove Existing 4" Valves, Mag Meter, Appurtenances, and Piping Within Existing Valve and Meter Vaults and Return to BGJWSC Designated Location. Remove Existing Valve Vault and Access Hatch Intact and Return to BGJWSC Designated Location	1	LS	$	$
12	Remove Fencing and Gate For Temporary Access to Pump Station and Replace With New Fencing and Gate With 3 Strands of Barbed Wire	1	LS	$	$
13	Demolish Portion of Existing 4" Force Main Between Existing Meter Vault and Tie-In Connection to Existing 8" Force Main	1	LS	$	$
14	Demolish Existing Piping From Existing Wet Well to Existing Meter Vault	1	LS	$	$
15	Remove Existing Wetwell Concrete Top and Access Hatch and Complete Existing Valve Vault	1	LS	$	$
16	New CIP Concrete Wetwell Top and New Access Hatch	1	LS	$	$
17	New 8'x8'x7.5' Deep Precast Concrete Valve Vault With Access Hatch Including Excavation, Backfill, and Compaction	1	LS	$	$
18	New 6-Inch HDPE Bypass	1	LS	$	$
19	Provide Silt Fence	200	LF	$	$
20	Provide Grassing, Fertilizing and Mulching	1	LS	$	$
	Sub-Total Base Bid			$	
	10% Supplemental Work Allowance			$	
	Total Base Bid			$	

Total Base Bid in Words: _____

Bidder Initials [ ]

OATH

State of Georgia City
of Brunswick County
of Glynn

I,_____ (name of individual), solemnly swear that in the procurement of the contract for

PUMP STATION 4059 IMPROVEMENT PLANS

BGJWSC PROJECT NO. 2005

that I, nor any other person associated with me or my business, corporation or partnership, has prevented or attempted to prevent competition in the bidding or Bids of said project or from submitting a bid for this project by any means whatever.

Lastly, I swear that neither I, nor any other person associated with me or my business, Corporation or partnership has caused or induced any other bidder to withdraw his/her bid from consideration for this project. Said oath is filed in accordance with the requirements set forth in O.C.G.A. § 36-91-21 (e).

This the_____day of_____2020.

Name of Party: _____

Corporate or Partnership Name: _____

Sworn to and subscribed before me this the_____day of_____2020.

NOTARY PUBLIC:

Name: _____

My Commission Expires: _____

(SEAL)

BID BOND

State of Georgia City
of Brunswick County
of Glynn

KNOW ALL MEN BY THESE PRESENT, that we, _____

_____, as Principal, and

_____, as Surety, are held and firmly bound unto

the Brunswick-Glynn County Joint Water and Sewer Commission (JWSC) in the not to exceed sum

of _____ Dollars

($_____) lawful money of the United states, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, personal representatives, successors and assign, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted to the JWSC a Bid for:

PUMP STATION 4059 IMPROVEMENT PLANS

BGJWSC PROJECT NO. 2005

NOW THEREFORE, the conditions of this obligation are such that if the Bid be accepted, the Principal shall, within fifteen days (15) days after receipt of conformed Contract Documents, execute a contract in accordance with the Bid upon the terms, conditions and prices set forth therein, and in the form and manner required by the JWSC and execute a sufficient and satisfactory Performance Bond and Payment bond payable to the JWSC, each in an amount of one hundred percent (100%) of the total contract price, in form and with security satisfactory to the JWSC, then this obligation shall be void; otherwise, it shall be and remain in full force and virtue in law; and the Surety shall, upon failure of the Principal to comply with any or all to the foregoing requirements within the time specified above, immediately pay to the aforesaid JWSC, upon demand, the amount hereof in good and lawful money of the United States of America, not as a penalty, but as liquidated damages.

This bond is given pursuant to and in accordance with the provisions of O.C.G.A. § 36-91- 50 *et seq*., as amended from time to time, and all the provisions of the law referring to this character of bond as set forth in said sections or as may be hereinafter enacted and these are hereby made a part hereof to the same extent as if set out herein in full.

(Continued on Next Page)

IN WITNESS WHEREOF, the said Principal has hereunder affixed its signature and said Surety has hereunto caused to be affixed its corporate signature and seal, by its duly authorized officers, on

This the_____ day of_____, 2020.

PRINCIPAL: _____

Signed and sealed in the Presence of:

By:_____

Title: _____

(Seal)

1. _____

2. _____

SURETY: _____

Signed and sealed in the Presence of:

By:_____

Title: _____

(Seal)

1. _____

2. _____

REPRESENTATION

EQUAL EMPLOYMENT OPPORTUNITY (EEO) PRACTICE:

EEO Plan: The successful Bidder will develop and implement an EEO policy that, as a minimum, will recruit, hire, train, and promote, at all levels, without regard to race, color, religion, national origin, sex, or age, except where sex or age is a bona fide occupational qualification.

EEO For Veterans/Handicapped: The successful Bidder will also provide equal employment opportunities for qualified disabled veterans, handicapped persons and veterans of the Vietnam Era.

EEO For Successful Bidder Programs: The successful Bidder, will ensure equal employment opportunity applies to all terms and conditions of employment, personnel actions, and successful Bidder-sponsored programs. Every effort shall be made to ensure that employment decisions, programs and personnel actions are non-discriminatory. That these decisions are administered on the basis of an evaluation of an employee's eligibility, performance, ability, skill and experience.

EEO Acquisitions: The successful Bidder will develop and implement a policy that will give equal opportunity to the purchase of various goods and services from small businesses and minority-owned businesses.

a. Does the Bidder have the above EEO policyin place? [

] Yes [ ] No

b. If the answer to a. above is no, will the Bidder have such a policy in place for the project?

[ ] Yes [ ] No

Statement of Assurance: The Bidder herein assures the JWSC that it is in compliance with Title VI & VII of the 1964 Civil Rights Act, as amended, in that it does not on the grounds of race, color, national origin, sex, age, disability, or veteran status, discriminate in any form or manner against employees or employers or applicants for employment and is in full compliance with A.D.A.

_____

(*Firm's Name*)

_____

(*AuthorizedSignature*)

_____/_____

(*Title*) **(*Date*)**

LEGAL AND CHARACTERQUALIFICATIONS

Convictions: Has the Bidder (including parent corporation, if applicable) or any principal ever been convicted in a criminal proceeding (felonies or misdemeanors) in which any of the following offenses were charged?

	Yes	No		Yes	No
a. Fraud	[ ]	[ ]	h. Obstruction of justice (or any other misconduct affecting public or judicial officers' performance of their official duties)	[ ]	[ ]
b. Embezzlement	[ ]	[ ]			
c. Tax Evasion	[ ]	[ ]			
d. Bribery	[ ]	[ ]	i. False/misleading advertising	[ ]	[ ]
e. Extortion	[ ]	[ ]	j. Perjury	[ ]	[ ]
f. Jury Tampering	[ ]	[ ]	k. Conspiracy to commit any of the Foregoing offenses	[ ]	[ ]
g. Anti-Trust Violations	[ ]	[ ]			

Civil Proceedings: Has the Bidder or any principal ever been a party, or is now a party, to a civil proceeding in which it was held liable for any of the following?

	Yes	No		Yes	No
a. Unfair/anti-competitive business practices	[ ]	[ ]	c. Violations of securities laws (state & federal)	[ ]	[ ]
			d. False / misleading advertising	[ ]	[ ]
b. Consumer fraud misrepresentation	[ ]	[ ]	e. Violation of local Government ordinances	[ ]	[ ]

License Revocation: Has the Bidder or any principal ever had a business license revoked, suspended, or the renewal thereof denied, or is a party to such a proceeding that may result in same?

Yes [ ] No [ ]

Responses: If "yes" is the response to any of the questions on the previous page, provide information such as date, court, sentence, fine, location, and all other specifics for each "yes" response.

AFFIDAVIT

This Bid is submitted to Brunswick-Glynn County Joint Water and Sewer Commission (JWSC) by the undersigned who is an authorized officer of the company and said company is licensed to do business in Georgia. Further, the undersigned is authorized to make these representations and certifies these representations are valid. The Bidder recognizes that all representations herein are binding on the Company and failure to adhere to any of these commitments, at the JWSC's option, may result in a revocation of the granted contract.

Consent is hereby given to the JWSC to contact any person or organization in order to make inquiries into legal, character, technical, financial, and other qualifications of the Bidder.

The Bidder understands that, at such time as the JWSC decides to review this Bid, additional information may be requested. Failure to supply any requested information within a reasonable time may result in the rejection of the Bid with no re-submittal rights.

The successful Bidder understands that the JWSC, after considering the legal, financial, technical, and character qualifications of the Bidder, as well as what in the JWSC's judgment may best serve the interest of its rate payers and employees, may grant a contract.

The successful Bidder understands that this bid is made without prior understanding, agreement, or connection with any corporation, firm or person submitting a bid for the same, and is in all respects fair and without collusion or fraud. I understand that collusive bidding is a violation of state and federal law and can result in fines, prison sentences, and civil damage awards.

Any contract issued will be on the basis of the Bidder's service, financial plans and arrangements being feasible and adequate to fulfill the conditions set forth in this project and the successful Bidder's response.

Company Name: _____

Authorized Person: _____ Signature: _____
(Print/Type)

Title: _____ Date: _____

Address: _____

_____

Telephone: _____ Fax: _____ Email: _____

FORM OF CONTRACT

Office of the Director
Brunswick-Glynn County Joint Water and Sewer Commission 1703
Gloucester Street
Brunswick, Georgia 31520
(912) 261-7127 Phone
(912) 261-7178 Fax
E-Mail: pcrosby@bgjwsc.org

PART A – CONTRACT FORM

AGREEMENT BETWEEN OWNER AND CONTRACTOR

This Agreement is by and between Brunswick-Glynn County Joint Water and Sewer Commission ("Owner") and **[name of contracting entity]** ("Contractor").

Terms used in this Agreement have the meanings stated in the General Conditions and the Supplementary Conditions.

Owner and Contractor hereby agree as follows:

ARTICLE 1—WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows: The work to be performed under this contract consists of furnishing all skill, labor, materials (unless noted otherwise), tools, equipment and incidentals required to construct complete, in place, and ready to operate pump station 4059 with improvements along Old Cypress Mill Road in Glynn County and the City of Brunswick, Georgia. More specifically, the work includes, but is not limited to:

- Provide traffic control.
- Remove existing fencing and gate for temporary access to pump station and replace with new fencing and gate with 3 strands barbed wire.
- Provide temporary bypass operations until improved pump station is successfully tested, approved for use by the BGJWSC, and returned into operation.
- Provide erosion and sediment control.
- Provide excavation and backfill in accordance with OSHA requirements.
- Provide dewatering and proper disposal of pump discharge.
- Demolish existing 4-inch force main between existing wetwell and tie-in connection to existing 8-inch force main.
- Remove existing 4-inch flow meter from existing meter vault and return to BGJWSC designated location. Existing rack-mounted transmitter and enclosure to be reused at new Site location. Existing meter vault to remain.
- Remove existing 4-inch check/plug valves and associated equipment from existing valve vault and return equipment to BGJWSC designated location. Remove existing valve vault and access hatch intact and return to BGJWSC designated location.
- Demolish concrete top and access hatch from existing wetwell.
- Remove existing 3-hp submersible pumps and associated equipment and return to BGJWSC designated location.
- Provide new 8-feet x 8-feet x 7.5-feet deep precast concrete valve vault with new access hatch.
- Provide (2) new 8-inch check/plug valve trains in new valve vault and (1) new 8-inch magnetic flow meter in existing meter vault.
- Provide new 8-inch force main from existing wet well, through existing vaults with connections to new valves and meter, with termination connection to existing 8-inch force main.
- Upgrade existing electrical service to 3-phase, 230-volt, with capacity to power (2) 6.5-hp submersible pumps that will be controlled by (2) variable frequency drives in flow pacing operation. Provide new 200-amp disconnect fused per NEC.

- Provide (2) new 6.5-hp submersible motors complete with submersible pumps, floor-mounted discharge bases, guide rails, lifting chains, motor electrical cables, and floats and radar level controls.
- New 6-inch HDPE bypass.
- Provide air release valves in existing wet well.
- Maintenance of erosion and sedimentation control BMPs.
- Maintenance of traffic control required to complete work shown in construction documents and as required for project by Glynn County and the City of Brunswick.
- *Restoration including but not limited to; seeding, new fencing section replacement, and all other areas disturbed by construction as per construction documents to equal or better than existing condition.*

ARTICLE 2 – THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: PUMP STATION 4059 IMPROVEMENT PLANS - BGJWSC PROJECT NO. 2005

ARTICLE 3 – THE ENGINEER

3.01 The Owner has retained Roberts Civil Engineering LLC ("Engineer") to act as Owner's representative, assume all duties and responsibilities of Engineer, and have the rights and authority assigned to Engineer in the Contract.

3.02 The part of the Project that pertains to the Work has been designed by ("Engineer").

ARTICLE 4 – CONTRACT TIMES

4.01 Time is of the Essence

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 Contract Times: Days

A. The Work will be substantially complete within <u>one-hundred eighty (180) consecutive calendar days</u> after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within **[number]** days after the date when the Contract Times commence to run.

4.04 Milestones

A. Parts of the Work must be substantially completed on or before the following Milestone(s):

1. Milestone 1 **[event & date/days]**
2. Milestone 2 **[event & date/days]**
3. Milestone 3 **[event & date/days]**

4.05 Liquidated Damages

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the Contract Times, as duly modified. The parties also recognize the delays, expense, and difficulties involved in proving, in a legal or arbitration

proceeding, the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. *Substantial Completion:* Contractor shall pay Owner Two-Thousand Dollars ($2,000.00) for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for Substantial Completion, until the Work is substantially complete.

2. *Completion of Remaining Work:* After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner Two-Thousand Dollars ($2,000.00) for each day that expires after such time until the Work is completed and ready for final payment.

3. *Milestones:* Contractor shall pay Owner $**[number]** for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for achievement of Milestone 1, until Milestone 1 is achieved, or until the time specified for Substantial Completion is reached, at which time the rate indicated in Paragraph 4.05.A.1 will apply, rather than the Milestone rate.

4. Liquidated damages for failing to timely attain Milestones, Substantial Completion, and final completion are not additive, and will not be imposed concurrently.

B. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner's sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct, excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.

4.06 Special Damages

A. Contractor shall reimburse Owner (1) for any fines or penalties imposed on Owner as a direct result of the Contractor's failure to attain Substantial Completion according to the Contract Times, and (2) for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Substantial Completion (as duly adjusted pursuant to the Contract), until the Work is substantially complete.

B. After Contractor achieves Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times, Contractor shall reimburse Owner for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Work to be completed and ready for final payment (as duly adjusted pursuant to the Contract), until the Work is completed and ready for final payment.

C. The special damages imposed in this paragraph are supplemental to any liquidated damages for delayed completion established in this Agreement.

ARTICLE 5 – CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents, the amounts that follow, subject to adjustment under the Contract:

A. For all Work other than Unit Price Work, a lump sum of $**[number]**.

All specific cash allowances are included in the above price in accordance with Paragraph 13.02 of the General Conditions.

B. For all Unit Price Work, an amount equal to the sum of the extended prices (established for each separately identified item of Unit Price Work by multiplying the unit price times the actual quantity of that item).

Unit Price Work					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Unit Price**	**Extended Price**
	6.5-Hp Pumps with VFD's and flow pacing operation	EA	2	$	$
	Wetwell Piping to 8" HDPE	FT	30	$	$
	8-Inch HDPE Force Main	FT	60	$	$
	Silt Fence	FT	200	$	$
Total of all Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities)					$

The extended prices for Unit Price Work set forth as of the Effective Date of the Contract are based on estimated quantities. As provided in Paragraph 13.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer.

C. Total of Lump Sum Amount and Unit Price Work (subject to final Unit Price adjustment) $**[number]**.

D. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 Progress Payments; Retainage

A. Owner shall make progress payments on the basis of Contractor's Applications for Payment on or about the 1st day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract.

    a. Ten (10%) percent of the value of the Work completed (with the balance being retainage).

B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 200 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 Final Payment

A. Upon final completion and acceptance of the Work, Owner shall pay the remainder of the Contract Price in accordance with Paragraph 15.06 of the General Conditions.

6.04 Consent of Surety

A. Owner will not make final payment, or return or release retainage at Substantial Completion or any other time, unless Contractor submits written consent of the surety to such payment, return, or release.

ARTICLE 7 - CONTRACT DOCUMENTS

7.01 Contents

A. The Contract Documents consist of all of the following:

1. This Agreement.
2. Bonds:
    a. Performance bond (together with power of attorney).
    b. Payment bond (together with power of attorney).
3. General Conditions.
4. Supplementary Conditions.
5. Specifications as listed in the table of contents of the project manual (copy of list attached).
6. Drawings (not attached but incorporated by reference) consisting of seven (7) sheets with each sheet bearing the following general title: PUMP STATION 4059 IMPROVEMENT PLANS, 3058 OLD CYPRESS MILL ROAD. BRUNSWICK, GEORGIA 31520
8. Addenda (numbers **[number]** to **[number]**, inclusive).
9. Exhibits to this Agreement (enumerated as follows):
    a. **[list exhibits]**
10. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
    a. Notice to Proceed.
    b. Work Change Directives.
    c. Change Orders.
    d. Field Orders.
    e. Warranty Bond, if any.

B. The Contract Documents listed in Paragraph 7.01.A are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 7.

D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 8 – REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS

8.01 Contractor's Representations

A. In order to induce Owner to enter into this Contract, Contractor makes the following representations:

1. Contractor has examined and carefully studied the Contract Documents, including Addenda.

2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

3. Contractor is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.

4. Contractor has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.

5. Contractor has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.

6. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (c) Contractor's safety precautions and programs.

7. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.

8. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

9. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

10. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

11. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

8.02 Contractor's Certifications

A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 8.02:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

8.03 Standard General Conditions

A. Owner stipulates that if the General Conditions that are made a part of this Contract are EJCDC® C-700, Standard General Conditions for the Construction Contract (2018), published by the Engineers Joint Contract Documents Committee, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or "track changes" (redline/strikeout), or in the Supplementary Conditions.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on **[indicate date on which Contract becomes effective]** (which is the Effective Date of the Contract).

Owner:

_____
(typed or printed name of organization)

By: _____
(individual's signature)

Date: _____
(date signed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

_____

_____

_____

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

_____

_____

_____

Phone: _____

Email: _____

*(If **[Type of Entity]** is a corporation, attach evidence of authority to sign. If **[Type of Entity]** is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)*

Contractor:

_____
(typed or printed name of organization)

By: _____
(individual's signature)

Date: _____
(date signed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

*(If **[Type of Entity]** is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)*

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

_____

_____

_____

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

_____

_____

_____

Phone: _____

Email: _____

License No.: _____
(where applicable)

State: _____

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

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

2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.

3. *Application for Payment*—The document prepared by Contractor, in a form acceptable to Engineer, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

5. *Bidder*—An individual or entity that submits a Bid to Owner.

6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.

7. *Bidding Requirements*—The Advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.

8. *Change Order*—A document 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, or other revision to the Contract, issued on or after the Effective Date of the Contract.

9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.

10. *Claim*

a. A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.

b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.

c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.

d. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.

13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.

14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.

15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.

16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.

17. *Cost of the Work*—See Paragraph 13.01 for definition.

18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.

19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.

20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.

21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

22. *Engineer*—The individual or entity named as such in the Agreement.

23. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.

24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.

    a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.

    b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.

    c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.

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

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

27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.

28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.

29. *Notice to Proceed*—A written notice 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.

30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.

31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor's plan to accomplish the Work within the Contract Times.

32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.

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

35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals.

36. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

38. *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, and such other lands or areas furnished by Owner which are designated for the use of Contractor.

39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.

40. *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.

41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers' instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.

42. *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 of such Work.

43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.

44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.

45. *Supplier*—A manufacturer, fabricator, supplier, distributor, 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 a Subcontractor.

46. *Technical Data*

    a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.

    b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.

    c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.

47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.

48. *Unit Price Work*—Work to be paid for on the basis of unit prices.

49. *Work*—The entire 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; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 *Terminology*

A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives*: The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, 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 exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the 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 is not intended to and 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 Article 10 or any other provision of the Contract Documents.

C. *Day*: The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*: The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

1. does not conform to the Contract Documents;
2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
3. 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 15.03 or Paragraph 15.04).

E. *Furnish, Install, Perform, Provide*

1. The word "furnish," when used in connection with services, materials, or equipment, means 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, means 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, means to furnish and install said services, materials, or equipment complete and ready for intended use.
4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words "furnish," "install," "perform," or "provide," then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

F. *Contract Price or Contract Times*: References to a change in "Contract Price or Contract Times" or "Contract Times or Contract Price" or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term "or both" is not expressed.

G. Unless stated otherwise in the Contract Documents, words or phrases that 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 Performance and Payment Bonds; Evidence of Insurance*

A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).

B. *Evidence of Contractor's Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.

C. *Evidence of Owner's Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.

B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for 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;

2. a preliminary Schedule of Submittals; 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.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

A. Before any Work at the Site is started, a conference attended by Owner, 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 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.

B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will 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 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 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 the component parts of the Work.

4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.

B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.

C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required 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.

C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.

D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.

E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

G. Nothing in the Contract Documents creates:

1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or

2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

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

1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, means the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract 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, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer 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 part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. *Contractor's Verification of Figures and Field Measurements*: Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents*: If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.

3. 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 had actual knowledge thereof.

B. *Resolving Discrepancies*

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

a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or

b. 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 *Requirements of the Contract Documents*

A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.

B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.

C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

A. Contractor and its Subcontractors and Suppliers shall not:

1. 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 its consultants, including electronic media versions, or reuse any 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 adaptation by Engineer; or

2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.

B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the 30th day after the Effective Date of the Contract 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 Contract. In no event will the Contract Times commence to run later than the 60th day after the day of Bid opening or the 30th day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

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

4.03 *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.

4.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 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 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Article 11.

B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.

B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.

C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this

paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:

1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
2. Abnormal weather conditions;
3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and
4. Acts of war or terrorism.

D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:

1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.
2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.
3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.

E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:

1. The circumstances that form the basis for the requested adjustment;
2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;
3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;
4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and
5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.

Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.

F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.

G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor in writing 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.

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 permanent improvements are to be made 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.

5.02 *Use of Site and Other Areas*

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

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against any such claim, and against all 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 directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

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

C. *Cleaning*: Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas 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 of 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 structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

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

1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;

2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and

3. Technical Data contained in such reports and drawings.

B. *Underground Facilities*: Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

C. *Reliance by Contractor on Technical Data*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.

D. *Limitations of Other Data and Documents*: Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, 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;

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

3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or

4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

A. *Notice by Contractor*: If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site:

1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;

2. is of such a nature as to require a change in the Drawings or Specifications;

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 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

B. *Engineer's Review*: After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.

C. *Owner's Statement to Contractor Regarding Site Condition*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to

Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.

D. *Early Resumption of Work*: If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.

E. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

    a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;

    b. 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 Paragraph 13.03; and,

    c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:

    a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;

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

    c. Contractor failed to give the written notice required by Paragraph 5.04.A.

3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.

4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

F. *Underground Facilities; Hazardous Environmental Conditions*: Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

A. *Contractor's Responsibilities*: Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:

1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;

2. complying with applicable state and local utility damage prevention Laws and Regulations;

3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;

4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and

5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.

B. *Notice by Contractor*: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then 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 7.15), notify Owner and Engineer in writing regarding such Underground Facility.

C. *Engineer's Review*: Engineer will:

1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;

2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;

3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and

4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.

During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

D. *Owner's Statement to Contractor Regarding Underground Facility*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.

E. *Early Resumption of Work*: If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.

F. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. 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 Paragraph 13.03;

b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and

c. Contractor gave the notice required in Paragraph 5.05.B.

2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.

3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

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

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;

2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and

3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, 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;

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 removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.

D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.

E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) 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. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide

Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.

G. 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, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.

H. 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, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, 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, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, 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 failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.

B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.

C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or Regulations, and must be issued and signed by a surety named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.

E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.

F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.

G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.

H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.

B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.

C. Alternative forms of insurance coverage, including but not limited to self-insurance and "Occupational Accident and Excess Employer's Indemnity Policies," are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.

D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.

E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may

block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.

F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.

G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

H. Contractor shall require:

1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and

2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.

I. If either party does not purchase or maintain the insurance required of such party by the Contract, 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.

J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.

K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.

L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.

M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.

N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 *Contractor's Insurance*

A. *Required Insurance*: Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.

B. *General Provisions*: The policies of insurance required by this Paragraph 6.03 as supplemented must:

1. include at least the specific coverages required;

2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;

3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;

4. apply with respect to the performance of the Work, whether such performance is 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; and

5. include all necessary endorsements to support the stated requirements.

C. *Additional Insureds*: The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:

1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;

2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;

3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

4. not seek contribution from insurance maintained by the additional insured; and

5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *Builder's Risk and Other Property Insurance*

A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.

B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.

C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.

D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.

E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.

1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, 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, risks, 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 Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.

2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.

1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.

C. The waivers in this Paragraph 6.05 include the waiver of rights 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 insured peril, risk, or cause of loss.

D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a

segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.

C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *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.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall maintain good discipline and order at the Site.

B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.

C. 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 will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, 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, whether or not such items are specifically called for in the Contract Documents.

B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will 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.

C. All materials and equipment must 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.

7.05 *"Or Equals"*

A. *Contractor's Request; Governing Criteria*: Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item 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 is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.

1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:

    a. in the exercise of reasonable judgment Engineer determines that the proposed item:

        1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

        2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;

        3) has a proven record of performance and availability of responsive service; and

        4) is not objectionable to Owner.

    b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:

        1) there will be no increase in cost to the Owner or increase in Contract Times; and

        2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.

B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.

C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.

E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 *Substitutes*

A. *Contractor's Request; Governing Criteria*: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.

1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.
2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.
3. Contractor shall make written application to Engineer for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:
    a. will certify that the proposed substitute item will:
        1) perform adequately the functions and achieve the results called for by the general design;
        2) be similar in substance to the item specified; and
        3) be suited to the same use as the item specified.
    b. will state:
        1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;
        2) whether 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 other work on the Project) to adapt the design to the proposed substitute item; and
        3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
    c. will identify:
        1) all variations of the proposed substitute item from the item specified; and
        2) available engineering, sales, maintenance, repair, and replacement services.
    d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.

B. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.

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

D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.

F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.

Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning Subcontractors and Suppliers*

A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.

B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.

C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.

D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.

E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.

F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.

G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.

I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.

J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.

K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.

L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.

M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 *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 an 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 will be disclosed in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors, 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 infringement 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 specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.

C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, 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 any infringement 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.

7.09 *Permits*

A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, licenses, and certificates of occupancy. 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 the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

7.10 *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.

7.11 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, 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 such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.

C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 *Record Documents*

A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations.

B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.

C. 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, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.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 at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer 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).

E. 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.

F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.

G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.

H. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).

J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of safety data sheets (formerly known as 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.

7.15 *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 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 by an emergency, or are required as a result of Contractor's response to an emergency. If Engineer determines that a change in the Contract Documents is required because of an emergency or Contractor's response, a Work Change Directive or Change Order will be issued.

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

1. Before submitting a Shop Drawing or Sample, Contractor shall:

a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

b. determine and verify:

1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;

2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;

c. confirm that the Submittal is complete with respect to all related data included in the Submittal.

2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.

B. *Submittal Procedures for Shop Drawings and Samples*: Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.

1. *Shop Drawings*

a. Contractor shall submit the number of copies required in the Specifications.

b. Data shown on the Shop Drawings must 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 7.16.C.

2. *Samples*

a. Contractor shall submit the number of Samples required in the Specifications.

b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.

3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, 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.

C. *Engineer's Review of Shop Drawings and Samples*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. 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, comply with the requirements of 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, or to safety precautions or programs incident thereto.

3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.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. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.

6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.

7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. *Resubmittal Procedures for Shop Drawings and Samples*

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.

2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.

3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

E. *Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs*

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:

    a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.

    b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.

    c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

    d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.

2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03. 2.04, and 2.05.

F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.

B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:

1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and

2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.

C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, or improper modification, 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.

D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:

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 review and approval of a Shop Drawing or Sample submittal;

6. The issuance of a notice of acceptability by Engineer;

7. The end of the correction period established in Paragraph 15.08;

8. Any inspection, test, or approval by others; or

9. Any correction of defective Work by Owner.

E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from losses, damages, costs, and judgments (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 from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused 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.

B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, 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 7.18.A will 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.

7.19 *Delegation of Professional Design Services*

A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.

B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.

C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.

E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:

1. Checking for conformance with the requirements of this Paragraph 7.19;

2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and

3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.

F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.

G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.

C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.

D. 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 such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, 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.

F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:

1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;

2. An itemization of the specific matters to be covered by such authority and responsibility; and

3. The extent of such authority and responsibilities.

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

8.03 *Legal Relationships*

A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with,

or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.

1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.

2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.

C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all 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 damage, delay, disruption, or interference.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents will be that of the former Engineer.

9.03 *Furnish Data*

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

9.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.

B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.

C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *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.

9.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.

B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *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.

10.02 *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 10.07. 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.

10.03 *Resident Project Representative*

A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.

B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

A. Engineer has the authority to reject Work in accordance with Article 14.

B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.

C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.

D. Engineer's authority as to changes in the Work is set forth in Article 11.

E. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.05 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

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

A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, 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, will 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 Contractor under Paragraph 15.06.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 10.07 also apply to the Resident Project Representative, if any.

10.08 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs of which Engineer has been informed.

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.

B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.

C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders covering:

1. Changes in 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;

2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;

3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and

4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.

B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change

Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.

B. If Owner has issued a Work Change Directive and:

1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.

2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

A. Engineer may authorize minor changes in the Work if the changes 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. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.

B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *Owner-Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.

B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.

C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *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, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.

B. 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, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);

2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or

3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).

C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit will 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 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;

b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;

c. 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 Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;

d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;

e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and

f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

11.08 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.

B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

A. *Purpose and Content*: Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

B. *Change Proposal Procedures*

1. *Submittal*: Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.

2. *Supporting Data*: The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.

    a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.

    b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

    The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

3. *Engineer's Initial Review*: Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.

4. *Engineer's Full Review and Action on the Change Proposal*: Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.

C. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *Notification to Surety*

A. If the provisions of any bond require notice to be given to a surety 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), 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.

ARTICLE 12—CLAIMS

12.01 *Claims*

A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:

1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;

2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;

3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and

4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.

B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.

D. *Mediation*

1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.

2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.

E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.

F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13—COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:

1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.

B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:

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 in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will 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 accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will 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, which 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 will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.

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

5. Other costs consisting of the following:

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

    b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, 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.

        1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

    c. *Construction Equipment Rental*

        1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.

        2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.

3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as 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.

f. 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 builder's risk or other property insurance established in accordance with Paragraph 6.04), 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 include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

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

h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

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

1. Payroll costs and other compensation of Contractor's officers, executives, principals, 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 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.

2. The cost of purchasing, renting, or furnishing small tools and hand tools.

3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

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

5. 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.

6. Expenses incurred in preparing and advancing Claims.

7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*

1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:

a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.

b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:

1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.

2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.

2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

E. *Documentation and Audit*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 *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 and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances*: Contractor agrees that:

1. the cash 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, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.

C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

13.03 *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.

B. 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. Payments to Contractor for Unit Price Work will be based on actual quantities.

C. 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.

D. 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, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:

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

   b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.

2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.

3. Adjusted unit prices will apply to all units of that item.

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.

B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.

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, obtaining, and paying for all inspections and tests required:

1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;

2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;

3. by manufacturers of equipment furnished under the Contract Documents;

4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and

5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests will be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.

F. 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, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

A. *Contractor's Obligation*: It is Contractor's obligation to assure that the Work is not defective.

B. *Engineer's Authority*: Engineer has the authority to determine whether Work is defective, and to reject defective Work.

C. *Notice of Defects*: Prompt written notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.

D. *Correction, or Removal and Replacement*: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.

E. *Preservation of Warranties*: When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

F. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.

C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then 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, and provide all necessary labor, material, and equipment.

1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages 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 pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.

2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, 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, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *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, then 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 will 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.

14.07 *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 defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or 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, 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 incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. 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 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 14.07.

ARTICLE 15—PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 *Progress Payments*

A. *Basis for Progress Payments*: The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.

B. *Applications for Payments*

1. At least 20 days before the date established in the Agreement 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.

2. 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 must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and

equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, 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 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:

   a. the Work has progressed to the point indicated;

   b. 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, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and

   c. 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:

   a. 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; or

   b. 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:

   a. to supervise, direct, or control the Work;

   b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;

   c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;

   d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or

   e. 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 stated in Paragraph 15.01.C.2.

6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:

    a. the Work is defective, requiring correction or replacement;

    b. the Contract Price has been reduced by Change Orders;

    c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

    d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

    e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:

    a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

    b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;

    c. Contractor has failed to provide and maintain required bonds or insurance;

    d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

    e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

    f. The Work is defective, requiring correction or replacement;

    g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

    h. The Contract Price has been reduced by Change Orders;

    i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;

    j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

    k. 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; or

    l. Other items entitle Owner to a set-off against the amount recommended.

2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, 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, if

Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 *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 and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

B. Promptly after Contractor's notification, 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.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy 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, subject to the following conditions:

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.

2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. 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 15.03 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.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *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, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *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, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.

2. The final Application for Payment must be accompanied (except as previously delivered) by:

   a. all documentation called for in the Contract Documents;

   b. consent of the surety, if any, to final payment;

   c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

   d. a list of all duly pending Change Proposals and Claims; and

   e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, 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, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Final Application and Recommendation of Payment*: 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 have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Notice of Acceptability*: In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.

D. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.

E. *Final Payment Becomes Due*: Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim, appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. correct the defective repairs to the Site or such adjacent areas;

2. correct such defective Work;

3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.

B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.

C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written 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. Contractor shall pay all 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). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.

D. 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.

E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, 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.

F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *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 written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will constitute a default by Contractor and 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);

2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;

3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or

4. Contractor's repeated disregard of the authority of Owner or Engineer.

B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:

1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and

2. enforce the rights available to Owner under any applicable performance bond.

C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, 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 complete the Work as Owner may deem expedient.

D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds 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.

F. 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, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.

G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. 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. 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; and

3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 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 16.03.

B. 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, 7 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 are not intended to preclude Contractor from submitting a Change Proposal 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 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

A. *Disputes Subject to Final Resolution*: The following disputed matters are subject to final resolution under the provisions of this article:

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and

2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.

B. *Final Resolution of Disputes*: For any dispute subject to resolution under this article, Owner or Contractor may:

1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;

2. agree with the other party to submit the dispute to another dispute resolution process; or

3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:

1. in person, by a commercial courier service or otherwise, to the recipient's place of business;

2. by registered or certified mail, postage prepaid, to the recipient's place of business; or

3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

A. When any period of time is referred to in the Contract 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.

18.03 *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. 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.

18.04 *Limitation of Damages*

A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

A. A party's non-enforcement of any provision will not constitute a waiver of that provision, nor will it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Assignment of Contract*

A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party to this Contract of any rights under or interests in the Contract will be binding on the other party without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract.

18.09 *Successors and Assigns*

A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

18.10 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SPECIAL CONDITIONS

ARTICLE 1 - EXISTING FACILITY OPERATIONS

The Contractor shall coordinate the work with the Owner so that the construction activities required do not interfere with or prevent the operation of the existing facilities. If at any time, any portion of the facility is out of service, the Contractor must obtain approval from the Owner as to the date, time and length of time that portion of the facility is out of service. Extended outages will require that the Contractor provide, at Contractor's expense, any necessary by-pass pumping or other arrangements as required.

Connections to the existing facilities or alteration of existing facilities will be made at times when the facility involved is not in use or at times established by the Owner when the use of the facility can be conveniently interrupted for the period of time needed to make the connection or alteration. Notify the Owner at least ten (10) days prior to relocating any facility piping or taking any existing facility component out of service.

ARTICLE 2 – PROJECT SCHEDULE

2.0 **Project Schedule:** The following activities shall be completed by the indicated date or days after Notice to Proceed.

Task or Milestone	Completion (Days after NTP)
Shop Drawing Submittals	
Completion and submission of all Shop Drawings by Contractor	14
Review of Shop Drawings By JWSC/Engineer	28
Re-submittal of Shop Drawings By Contractor (if Required)	35
Review of Re-submittal Shop Drawings By JWSC/Engineer (if Required)	42
Critical Submittals	
Project Schedule*	7
Schedule of Values*	7
Horizontal Directional Drill Work Plan, Supplemental Work Plan, and Calculations	7
Superintendent Qualifications and Contact Information	7
Temporary Bypass Systems Plan and Requirements	14
Dewatering Plan	14
Final Completion of All work (including all restoration)	180
* The construction progress schedule shall show the proposed dates of commencement and completion of the various milestones of the work required under the contract as well as the anticipated amounts of each monthly payment that will become due to the Contractor in accordance with the progress schedule. The construction progress schedule will be a true reflection of the actual construction progress, shall be reviewed and updated for the bi-weekly project meetings and submitted with the monthly periodic payment request. The monthly payment request shall not be considered complete without the accurately updated construction progress schedule.	

2.1 Work Hours

Unless otherwise noted in the Contract Documents, the time allotted for completion of the project is based on a standard work week with construction activities between 7:00 a.m. and 7:00 p.m., Monday through Friday. Contractor shall coordinate any necessary night or weekend construction activities a minimum of 24 hours in advance with the JWSC project representative and Glynn County/City of Brunswick. The Contractor shall provide in writing any requests to work on weekends & holidays. Requests shall be submitted to the Owner and Engineer for consideration a minimum of 48 hours prior to the requested weekend and holidays. The Contractor shall credit the JWSC by Change Order for inspection services for overtime work on work performed on Sundays or legal holidays. The amount of credit to JWSC shall be $50 per hour, per inspection services.

2.2 Delays

Contractor shall not be compensated for delays caused by Contractor's inefficiency, rework made necessary by Contractor's error, failure to perform the Work as scheduled, or any other corrective or productivity measures made necessary by errors, omissions, or failures to properly perform the Work. Neither shall the Contractor be compensated for delays caused by events by Act of God as described in the General Conditions. Within thirty
(30) days after the onset of a delay, Contractor shall notify the JWSC in writing of the delay, which shall provide: (1) a detailed description of the delay and its probable duration, (2) the specified portion of the Work affected, and (3) an opinion as to the cause of the delay and liability (if any) for the delay. In the case of continuing delay for the same cause, only one notice of delay is necessary. Failure to provide this notice within thirty (30) days of the delay waives any claim for extension of time resulting from such delay. If the delay is due to the failure of another contractor on a separate but conflicting project to complete its work in a timely manner, changes ordered in the Work, an Act of God event, or any other cause which the JWSC, in its sole judgment and discretion, determines to justify the delay, then the Contract Completion Date may be extended as necessary to compensate for the delay. All time extensions shall be in the form of a written amendment signed by both parties.

ARTICLE 3 - SUBSTITUTIONS

This Section outlines the restrictions and requirements for substitutions, product and manufacturer options, and construction method options.

For the purposes of these Contract Documents, a "substitute item" shall be defined as one of the following:

A product or manufacturer offered as a replacement to a specified product or manufacturer.

A product or manufacturer offered in addition to a specified product or manufacturer.

A "substitute construction method" shall be defined as one of the following:

A mean, method, technique, sequence or procedure of construction offered as a replacement for a specified mean, method, technique, sequence or procedure of construction.

A mean, method, technique, sequence or procedure of construction offered in addition to a specified mean, method, technique, sequence or procedure of construction.

An item or construction method, which is offered where no specific product, manufacturer, mean, method, technique, sequence or procedure of construction is specified or shown on the drawings, shall not be considered a substitute and shall be at the option of the Contractor, subject to compliance with all provisions in the Contract Documents for that item or construction method.

For products specified only by a referenced standard, the Contractor may select any product by any manufacturer, which meets the requirements of the Specifications, unless otherwise indicated in the Contract Documents.

If the manufacturer is named on the drawings or in the Specifications as an acceptable manufacturer, products of that manufacturer meeting all requirements of the drawings and specifications are acceptable.

Whenever the Engineer's design is based upon a specific product or process of a specific manufacturer, that manufacturer shall be so listed in the specifications or on the drawings, and such product or process shall be used in the base bid.

Any ***Contractor*** proposing to furnish products or processes other than those listed as base bid items shall make a written application for approval of the proposed substitution to the JWSC/Engineer at least 15 days prior to the date set for receipt of bids. The minimum information required in the application is listed below.

A. Documentation demonstrating that the item being proposed as a substitute will fit in the space allowed, perform the same functions and have the same capabilities as the product or process specified.

B. A letter signed by an officer of the company certifying compliance with the specifications without exception.

C. Installation list with contacts and phone numbers for the same minimum number of installations and years of experience as the specified product or process.

D. Complete descriptive and technical data addressing all specification requirements.

E. Complete list of deviations from the specifications as written.

F. Identification of accessory items required as a result of the proposed substitution.

G. Identification of all architectural, structural, mechanical, piping, electrical or other modifications required as a result of the proposed substitution.

Whenever a product specification includes minimum experience requirements which the proposed substitution cannot meet, a condition of approval will require that the manufacturer furnish the Owner with a cash deposit or bond acceptable to the Owner in an amount equal to the cost of the product or process which shall remain in effect until the experience requirement has been met.

The burden of proving equivalency of a proposed substitute to an item designated by trade name or manufacturer's name referenced on the drawings or in the specifications rests on the party submitting the request for approval. The JWSC/Engineer will give consideration to reports from reputable independent testing laboratories, verified experience records showing the reputation of the proposed product with previous users or any other written information that is reasonable under the circumstances. The degree of proof required for approval of a proposed substitute as equivalent to a named product is the amount of proof necessary to convince the JWSC/Engineer beyond all doubt. To be acceptable, a proposed substitute must meet or exceed all requirements of the drawings and specifications.

If the proposed substitution is approved, an addendum will be issued to all prospective bidders at least five days prior to the date set for the opening of bids listing any and all approved substitutions. If approved, the bidder may offer a price for the substitution in the bid form for the Owner's consideration. The bid offered shall include the cost of all additional architectural, structural, mechanical, piping, electrical or other modifications, including engineering and design costs, required as a result of the proposed substitution. The JWSC/Engineer shall be the final judge on questions of equivalence.

ARTICLE 4 - SUBMITTALS

The work under this Section includes submittal to the JWSC/Engineer of shop drawings, product data and samples required by the various sections of these specifications. The submittal contents required are specified under each Section.

4.0 Definitions

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

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

Samples: Samples include both fabricated and un-fabricated physical

examples of materials, products and units of work, both as complete units and smaller portions of units of work, either for limited visual inspection or more detailed testing and analysis.

4.1 Routing of Submittals

Submittals and routine correspondence shall be routed as follows:

- Supplier to Contractor
- Contractor to JWSC
- JWSC to Engineer
- Engineer to JWSC
- JWSC to Contractor
- Contractor to Supplier

4.2 Submittal Log

The Contractor shall submit to the Engineer a complete list of preliminary items for which shop drawings are to be submitted. Included in this list shall be the names of all proposed manufacturers furnishing specified items. Review of this list by the Engineer shall in no way expressed or implied relieve the Contractor from submitting complete Shop Drawings and providing materials, equipment, etc., fully in accordance with the Specifications. This procedure is required in order to expedite final review of Shop Drawings.

The Engineer will review the submitted preliminary shop drawing list and information and will develop a submittal log required for the project. The Contractor is to maintain an accurate updated submittal log and will bring this log to each scheduled progress meeting with the JWSC and the Engineer. This log should include the following items:

1. Submittal-Description and Number assigned.
2. Date to JWSC.
3. Date returned to Contractor (from JWSC).
4. Approval Status of Submittal.
5. Date of Resubmittal and Return (as applicable).
6. Date material release (for fabrication).
7. Projected date of fabrication.
8. Projected date of delivery to site.
9. Status of O&M manuals submittal.
10. Related Specification Section.
11. Related Drawings Sheet Number.

4.3 Contractor's Responsibilities

The Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall ensure that the material

or equipment shall be as described in the submittal. The Contractor shall verify in writing that all features of all products conform to the requirements of the drawings and specifications. **If the Contractor takes exception to the specifications, the Contractor shall note the exception in the letter of transmittal to the Engineer and the shop drawings shall clearly indicate any deviations in the submittal from the requirements of the Contract Documents.** Submittal documents shall be clearly edited to indicate only those items which are being submitted for review. All extraneous material shall be crossed out or otherwise obliterated. The Contractor shall ensure that there is no conflict with other submittals and shall notify the JWSC/Engineer in each case where his submittal may affect the work of another contractor or the Owner. The Contractor shall ensure coordination of submittals among the related crafts and subcontractors.

The transmittal letter which accompanies all submittals must include the following information:

1. Date.
2. Project Title and Number.
3. Contractor's name, address, phone and fax numbers.
4. The number of each Shop Drawing, Project Data, and Sample submitted.
5. Notification of Deviations from Contract Documents.
6. Submittal Log Number.

Before each submittal, the Contractor shall have determined and verified 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; and all information relative to the Contractor's sole responsibilities in respect of means, methods, techniques, sequences and procedures of construction and safety precautions and programs incident thereto.

Submittal documents common to more than one piece of equipment shall be identified with the appropriate equipment numbers and specification section and paragraph. Each submittal shall bear a stamp or written indication that the Contractor's obligations under the contract with respect to the Contractor's review and approval of that submittal have been met. Any deviations from the requirements of the drawings and specifications shall be noted on the submittals.

The Contractor shall submit six (6) copies of all specified information and/or submittals may be made electronically in PDF format. Submittals which do not have all the information required to be submitted including notification of deviations and the Contractor's stamp or written indication of review, are not acceptable and will be returned without

review.

The Contractor shall be responsible for and bear all costs of damages which may result from the ordering of any material or from proceeding with any part of work prior to the completion of the review by JWSC of the necessary Shop Drawings.

The Contractor shall be fully responsible for observing the need for and making any changes in the arrangement of piping, connections, wiring, manner of installation, etc., which may be required by the materials/equipment he proposed to supply both as pertains to his own work and any work affected under other parts, headings, or divisions of Drawings and Specifications.

4.4 Review Procedures

The JWSC/Engineer's review will not extend to means, methods, techniques, sequences or procedures of construction, or to verifying quantities, dimensions, weights, or fabrication processes, or to safety precautions or programs incident thereto. Unless otherwise specified, within fourteen days after receipt of a submittal, the JWSC/Engineer will review the submittal and return three (3) copies or an electronic PDF format of the review to the Contractor with comments. The returned submittals will indicate one of the following actions:

- If the review indicates conformance with the drawings and specifications, submittal copies will be marked **"NO EXCEPTIONS TAKEN"**. In this event, the Contractor may begin to implement the work or incorporate the material or equipment covered by this submittal.

- If the review indicates limited corrections are required, submittal copies will be marked **"MAKE CORRECTIONS NOTED".** The Contractor may begin implementing the work or incorporate the materials or equipment covered by the submittal in accordance with the noted corrections. Where submittal information will be incorporated into Operation and Maintenance data, a corrected copy shall be provided.

- If the review indicates that the submittal is insufficient or contains incorrect data, submittal copies will be marked **"AMEND AND RESUBMIT".** Except at his own risk, the Contractor shall not undertake work covered by this submittal until it has been revised, resubmitted, and returned marked either "NO EXCEPTION TAKEN" or "MAKE CORRECTIONSNOTED".

- If the review indicates that the submittal does not comply with the drawings and specifications, submittal copies will be marked **"REJECTED - SEE REMARKS".** Submittals with deviations that have not been clearly identified will be rejected. Except at his own

risk, the Contractor shall not undertake work covered by this submittal until it has been revised, resubmitted, and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED".

Review of drawings, submittals, or information regarding materials or equipment the Contractor proposes to provide, shall not relieve the Contractor of his responsibility for errors and omissions therein and shall not be regarded as an assumption of risks or liability by JWSC or Engineer or by any officer or employee thereof, and the Contractor shall have no claim under the contract on account of the failure or partial failure, or the method of work, material, or equipment so reviewed. A mark of "NO EXCEPTION TAKEN" or "MAKE CORRECTIONS NOTED" shall mean that the JWSC/Engineer has no objection to the Contractor, upon his own responsibility, using or providing the materials or equipment proposed.

ARTICLE 5 - INTERPRETATION OF PLANS AND SPECIFICATIONS

All questions regarding the meaning or intent of the plans, specifications and contract documents shall be directed in writing to the JWSC's Contract Project Representative identified in Paragraph 2.0 of the General Conditions. Reference may be made throughout the Contract Documents to the Standards for Water and Sewer Design and Construction of the Brunswick – Glynn County Joint Water and Sewer Commission. In the event of a conflict between the JWSC Standards and the project plans and specifications prepared by Roberts Civil Engineering, LLC, the JWSC Standards shall take precedence.

ARTICLE 6 - FIELD ENGINEERING

Field engineering shall include all surveying work required to layout the proposed facilities and control the location of the finished project. The Contractor shall be solely responsible for constructing the project to the correct horizontal and vertical alignment as shown on the drawings and as specified herein. The Contractor shall assume all costs associated with rectifying any work constructed in the wrong location.

The drawings provide the location and/or coordinates of principal components of the project.

6.0 wner's Responsibilities

The Owner will provide the following:

- At least one (1) vertical control point on the project site with its elevation
- A topographic survey (included on the drawings)

The Owner may, acting through the Engineer, order changes to the location

of some of the components of the project or provide clarification to questions regarding the correct alignment.

6.1 Contractor's Responsibilities

The Contractor's responsibilities include but are not limited to the following:

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

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

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

- Record drawing surveys shall be performed in accordance with Paragraph 7.0 of these Special Conditions.

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

ARTICLE 7 - RECORD DOCUMENTS

The work under this Section includes but is not limited to the compiling, maintaining, recording and submitting of project record documents as herein specified.

Record documents include but are not limited to the following:

- Drawings
- Specifications
- Change orders and other modifications to the Contract
- Engineer field orders or written instructions, including requests for information (RFI) and clarification memos
- Reviewed shop drawings, product data and samples
- Test records

The Contractor shall maintain on-site an up to date set of As-Built Drawings.

7.1 Record Drawings

The Contractor is solely responsible for proper and correct documentation of all work, and for meeting the following As-Built requirements. The Contractor shall plan ahead and have their surveyor on-site to record information and

data during construction. As-Built Drawings maintained by the Contractor shall provide dimensions, distances and coordinates to the nearest 0.1 foot. Elevations shall be provided to the nearest 0.01 foot.

Contractor shall provide Final As-Built drawings to the Engineer of Record in AutoCAD format, in Georgia State Plane East Zone Coordinates (Horizontal Datum NAD 83 and Vertical Datum NAVD88), conducted by a surveyor licensed in the State of Georgia of all installed components of the project from a post construction field run survey. As-Built data provided to the Engineer of Record for incorporation into the Record Drawings shall include Horizontal Directional Drill pipe installation information in plan and profile views in AutoCAD format with X, Y, and Z coordinates in Georgia State Plane East Zone Coordinates (Horizontal Datum NAD 83 and Vertical Datum NAVD88) conducted by a surveyor licensed in the State of Georgia. Directional Drill Bore Log shall be provided as part of the As-Built documentation and shall be in Georgia State Plane East Zone Coordinates (Horizontal Datum NAD 83 and Vertical Datum NAVD88) and be relative to the established surface survey bench mark and baseline stationing that is tied to existing, fixed and visible sight features. Directional Drill Bore Log shall show recorded X, Y, and Z locations of the drill head at minimum every 20 feet in the AutoCAD format documentation.

The Contractor shall pay all surveying and preparation costs associated with the Final As-Built Drawings. The Final As-Built Drawings shall provide elevations to the nearest 0.01 foot for all manhole inverts, manholes frames and all other pertinent items constructed by the Contractor. The Final As- Built Drawings shall provide dimensions, distances and coordinates to the nearest 0.1 foot and angles to the nearest 10 seconds.

Final As-Built Drawings shall be labeled “FINAL AS-BUILT DRAWINGS” and shall include the name of the licensed surveyor who prepared the drawings, the date the survey was conducted, certification statement with the horizontal and vertical datum used, and surveyor’s seal.

Final As-Built Drawings shall include the following:

- Horizontal and vertical location of all exposed and underground piping systems, valves, appurtenances, fittings, taps; etc., and all deviations from the design plans. Provide size, material, top of pipe elevations, invert elevations, slope percentages, length and type of all pipes, vertical clearances at each utility crossing.

- Location and dimensions of roadways and parking areas;

- Location of structures including finish floor elevations, tank depths, top and bottom elevations;

- Horizontal angle and distance between manholes;

- If profiles or cross-sections are part of the design plans, then As-Built data shall be shown on each profile or cross-section on the As-Built drawings.

The Engineer of Record shall review and utilize the Final As-Built information provided by the Contractor for the preparation of the Final Record Drawings. Contractor shall provide written certification of the accuracy and completeness of the Final As-Built information provided to the Engineer of Record.

7.2 Specifications

Legibly mark each section to record the manufacturer, trade name, catalog number and supplier of each product and item of equipment actually furnished. Also record all changes made by Requests for Information (RFI), field order, clarification memorandums of Contract change order.

7.3 Submittal

At the completion of the project, deliver Record Documents to the JWSC/Engineer. Include a signed transmittal letter which lists the title and number of each record document. Final As-Built Drawings shall be provided as noted in Section 7.1.

ARTICLE 8 - WARRANTY

Contractor shall warrant that the Work, workmanship and material furnished by Contractor shall be new and of specified quality, shall conform to the requirements of the Contract Documents, shall be free from defects, and shall be free from any security interest, lien, or other encumbrances. This warranty shall remain in effect for a period of twelve (12) months after FINAL ACCEPTANCE OF THE WORK, unless otherwise specified in the Contract Documents. Any defective Work, workmanship, or material corrected during the warranty period shall be similarly warranted for twelve (12) months following its correction or for such other period as specified herein. The express warranty set forth herein shall not be exclusive and shall not act as a limitation upon any statutory or other warranty of any kind, express or implied, including any implied warranty of merchantability or fitness for a particular purpose.

In the event of breach of this warranty, Contractor shall take the necessary actions to correct the breach in the most expedient manner as dictated by then-existing circumstances. All costs incidental to the repair, replacement, redesign, and testing incurred as a result thereof, including the removal, replacement, and reinstallation of equipment in place when the Work was started, shall be Contractor's responsibility. Upon written notification of a breach, Contractor shall promptly send the necessary personnel to the project site to assume responsibility for corrective action. Time is of the essence. Contractor shall be afforded necessary and reasonable access to

perform warranty work. If Contractor fails to promptly correct the breach, the JWSC may take corrective action without waiving any other rights or remedies it may have, and Contractor shall reimburse the JWSC for all expenses reasonably incurred in performing such corrective action.

ARTICLE 9 - SEWAGE SPILLS

9.0 Contractor Requirements

During the contract period the Contractor shall be responsible for repair of any damaged sewer system infrastructure and for any sewer system overflows or spills which result from the Contractor's activities. The Contractor shall be responsible for, at no cost to the Brunswick-Glynn County JWSC, the cleanup, notification, advertisement, monitoring, sampling and analysis, reporting, and other requirements as noted in the following section 8.2, of any sewer system overflows or spills which result from the Contractor's activities.

9.1 Georgia EPD Requirements for Sewage Spills

A. It shall be the duty of the person in charge of such substances at the time to forthwith notify EPD in person or by telephone of the location and nature of the danger, and it shall be such person's further duty to immediately take all reasonable and necessary steps to prevent injury to property and downstream users of said water.

1. Spills and Major Spills:

a. A "spill" is any discharge of raw sewage by a Publicly Owned Treatment Works (POTW) to the waters of the State.

b. A "major spill" means:

1) The discharge of pollutants into waters of the State by a POTW that exceeds the weekly average permitted effluent limit for biochemical oxygen demand (5-day) or total suspended solids by 50 percent or greater in one day, provided that the effluent discharge concentration is equal to, or greater than 25 mg/L for biochemical oxygen demand or total suspended solids.

2) Any discharge of raw sewage that 1) exceeds 10,000 gallons or 2) results in water quality violations in the waters of the State.

c. "Consistently exceeding effluent limitation" means a POTW exceeding the 30-day average limit for biochemical oxygen demand or total suspended solids for at least five days out of each seven day period during a total period of 180 consecutive days.

2. The following specific requirements shall apply to POTW's. If a spill or major spill occurs, the owner of a POTW shall immediately:

a. Notify EPD, in person or by telephone, when a spill or major spill occurs in the system.

b. Report the incident to the local health department(s) for the area affected by the incident. The report at a minimum shall include the following:

1) Date of the spill or major spill;

2) Location and cause of the spill or major spill;

3) Estimated volume discharged and name of receiving waters; and

4) Corrective action taken to mitigate or reduce the adverse effects of the spill or major spill.

c. Post a notice as close as possible to where the spill or major spill occurred and where the spill entered State waters and also post additional notices along portions of the waterway affected by the incident (i.e. bridge crossings, boat ramps, recreational areas, and other points of public access to the affected waterway). The notice at a minimum shall include the same information required in 8.2 A. 2. b. (1-4) above. These notices shall remain in place for a minimum of seven days after the spill or major spill has ceased.

d. Within 24 hours of becoming aware of a spill or major spill, the owner of a POTW shall report the incident to the local media (television, radio, and print media). The report shall include the same information required in 8.2 A. 2. b (1-4) above.

e. Within five (5) days (of the date of the spill or major spill), the owner of a POTW shall submit to EPD a written report which includes the same information required in 8.2 A. 2. b (1 -4) above.

f. Within 7 days (after the date of a major spill), the owner of a POTW responsible for the major spill, shall publish a notice in the largest legal organ of the County where the incident occurred. The notice shall include the same information required in 8.2 A. 2. b (1-4) above.

g. The owner of a POTW shall immediately establish a monitoring program of the receiving waters affected by a major spill or by consistently exceeding an effluent limit, with such monitoring being at the expense of the POTW for at least one year. The monitoring program shall include an upstream sampling point as well as sufficient downstream locations to accurately characterize the impact of the major spill or the consistent exceedance of effluent limitations described in the definition of "Consistently exceeding effluent limitation" above. As a minimum, the following parameters shall be monitored in the receiving stream:

1) Dissolved Oxygen;
2) Fecal Coliform Bacteria;
3) pH;
4) Temperature; and
5) Other parameters required by the EPD.

h. The monitoring and reporting frequency as well as the need to monitor additional parameters, will be determined by EPD. The results of the monitoring will be provided by the POTW owner to EPD and all downstream public agencies using the affected waters as a source of a public water supply. Within 24 hours of becoming aware of a major spill, the owner of a POTW shall provide notice of a major spill to every county, municipality, or other public agency whose public water supply is within a distance of 20 miles downstream and to any others which could be potentially affected by the major spill.

PART B
PERFORMANCE BOND

Contractor Name: **[Full formal name of Contractor]** Address *(principal place of business)*: **[Address of Contractor's principal place of business]**	**Surety** Name: **[Full formal name of Surety]** Address *(principal place of business)*: **[Address of Surety's principal place of business]**
Owner Name: **Brunswick-Glynn County Joint Water and Sewer Commission** Address: 1703 Gloucester Street Brunswick, GA 31520	**Contract** Description *(name and location)*: **PUMP STATION 4059 IMPROVEMENT PLANS – GLYNN COUNTY, GEORGIA, BGJWSC PROJECT NO. 2005** Contract Price: **[Amount from Contract]** Effective Date of Contract:

Bond

Bond Amount: **[Amount]**

Date of Bond: **[Date]**

(Date of Bond cannot be earlier than Effective Date of Contract)

Modifications to this Bond form:

☐ None ☐ See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Performance Bond, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

Contractor as Principal	Surety
_____ *(Full formal name of Contractor)*	_____ *(Full formal name of Surety) (corporate seal)*
By: _____ *(Signature)*	By: _____ *(Signature)(Attach Power of Attorney)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____
Attest: _____ *(Signature)*	Attest: _____ *(Signature)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.

PART C
PAYMENT BOND

Contractor Name: **[Full formal name of Contractor]** Address *(principal place of business)*: **[Address of Contractor's principal place of business]**	**Surety** Name: **[Full formal name of Surety]** Address *(principal place of business)*: **[Address of Surety's principal place of business]**
Owner Name: **Brunswick-Glynn County Joint Water and Sewer Commission** Mailing address *(principal place of business)*: **1703 Gloucester Street** **Brunswick, GA 31520**	**Contract** Description *(name and location)*: **PUMP STATION 4059 IMPROVEMENT PLANS – GLYNN COUNTY, GEORGIA, BGJWSC PROJECT NO. 2005** Contract Price: **[Amount, from Contract]** Effective Date of Contract: **[Date, from Contract]**

Bond

Bond Amount: **[Amount]**

Date of Bond: **[Date]**

(Date of Bond cannot be earlier than Effective Date of Contract)

Modifications to this Bond form:

☐ None ☐ See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Payment Bond, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

Contractor as Principal	Surety
_____ *(Full formal name of Contractor)*	_____ *(Full formal name of Surety) (corporate seal)*
By: _____ *(Signature)*	By: _____ *(Signature)(Attach Power of Attorney)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____
Attest: _____ *(Signature)*	Attest: _____ *(Signature)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.

PART D
AFFIDAVIT OF PAYMENT OF CLAIMS
(***Submitted with Final Invoice***)

_____ this the _____ day of _____, 2020,

appeared before me, _____, a Notary Public, in and for

_____, and being by me first duly sworn states that all subcontractors and suppliers of labor and materials have been paid all sums due them to date for work performed or material furnished in the performance of the Contract between:

Brunswick-Glynn County Joint Water and Sewer Commission (JWSC) and _____ (Contractor), last signed for the **PUMP STATION 4059 IMPROVEMENT PLANS – GLYNN COUNTY, GEORGIA, BGJWSC PROJECT NO. 2005**

CONTRACTOR **Company:** _____

By: _____

Title: _____

(SEAL)

Sworn to and subscribed before me this the _____ day of _____, 2020.

NOTARY PUBLIC:

Name: _____

My Commission Expires: _____

(NOTARY SEAL)

PART E
CERTIFICATE OF INSURANCE

This is to certify that _____
(Insurance Company)

of _____
(Insurance Company Address)

has issued policies of insurance, as identified by a policy number to the insured name below, and that such policies are in full force and effect at this time. Furthermore, this is to certify that these policies meet the requirements described in the General Conditions of this project; and it's agreed that none of these policies will be canceled or changed so as to affect this Certificate until thirty (30) days after written notice of such cancellation or change has been delivered to:

BRUNSWICK-GLYNN COUNTY JOINT WATER AND SEWER COMMISSION, EXECUTIVE DIRECTOR, 1703 GLOUCESTER STREET, BRUNSWICK, GEORGIA 31520

It is further agreed that Brunswick-Glynn County Joint Water and Sewer Commission shall be named as an additional insured on the Contractor's policy.

1. Insured: _____

2. Project: **PUMP STATION 4059 IMPROVEMENT PLANS**
BGJWSC PROJECT NO. 2005

3. Policy Number(s): _____

Date: _____ _____
(Insurance Company)

Issued At: _____ _____
(Authorized Representative)

Address: _____

_____

_____

Note: Please attach Certificate of Insurance form to this page.

PART F
CERTIFICATE OF DRUG FREE WORKPLACE

In order to have a drug- free workplace, a business shall:

Publish a statement notifying employees that the unlawful, manufacture, distribution, dispensing, possession, or use of controlled substances is prohibited in the workplace and specifying the actions that shall be taken against employees for violation of such prohibition.

Inform employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.

As a condition of working on the commodities or contractual services then under bid, the employee shall notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of any controlled substance law of the United States or any State, for a violation occurring in the workplace no later than five (5) days after such conviction.

Impose a sanction on, or require satisfactory participation in a drug abuse assistance or rehabilitation program if such in available in the employee's community, by any employee who is so convicted.

Make a good faith effort to continue to maintain a drug-free workplace through implementation of this section.

As the person authorized to sign this statement, I certify that this firm complies fully with the above requirements.

Company Name: _____

Authorized Signature: _____

Title: _____

Date: _____

PART G
E-VERIFY CONTRACTOR AFFIDAVIT AND AGREEMENT

Georgia Security Immigration and Compliance (GSIC) Act

The Brunswick-Glynn County Joint Water and Sewer Commission and Contractor agree that compliance with the requirements of O.C.G.A. § 13-10-91 and Rule 300-10-1-.02 of the Rules of the Georgia Department of Labor are conditions of this Agreement for the physical performance of services.

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. § 13-10-91, *stating affirmatively that the individual, firm, or corporation which is contracting with the Brunswick-Glynn County Joint Water and Sewer Commission has registered with and is participating in the federal work authorization program known as: "E-Verify", web address https://e-verify.uscis.gov/enroll/* operated by the United States Citizenship and Immigration Services Bureau of the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603], *in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91.* The undersigned Contractor also verifies that he/she/it is using and will continue to use the federal work authorization program throughout the contract period.

The undersigned Contractor agrees that, should it employ or contract with any subcontractor(s) in connection with the physical performance of services pursuant to the contract with the Brunswick-Glynn County Joint Water and Sewer Commission, Contractor will secure from each subcontractor(s) similar verification of compliance with O.C.G.A. § 13- 10-91 on the Subcontractor Affidavit provided in Rule 300-10-01-.08 or a substantially similar form. Contractor further agrees the Contractor will advise the Brunswick-Glynn County Joint Water and Sewer Commission of the hiring of a new subcontractor and will provide the Brunswick-Glynn County Joint Water and Sewer Commission with a Subcontractor Affidavit attesting to the Subcontractor's name, address, user identification number, and date of authorization to use the Federal Work Authorization Program within five (5) days of the hiring before the Subcontractor begins working on the Project. Contractor also agrees to maintain all records of such compliance for inspection by the Brunswick-Glynn County Joint Water and Sewer Commission at any time and to provide a copy of each such verification to the Brunswick-Glynn County Joint Water and Sewer Commission at the time the subcontractor(s) is retained to perform such services.

(Continued on Next Page)

E-Verify Employment Eligibility Verification User I.D. Number

Date of Authorization to Use Federal Work Authorization Program

Name of Contractor

Title of Authorized Officer or Agent of Contractor

Signature and Printed Name of Authorized Officer or Agent

Sworn to and subscribed before me this the_____day of_____, 2020.

NOTARY PUBLIC:

Name: _____

My Commission Expires: _____

(NOTARY SEAL)

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

PART H
E-VERIFY SUBCONTRACTOR AFFIDAVIT AND AGREEMENT

Georgia Security Immigration and Compliance (GSIC) Act

The Brunswick-Glynn County Joint Water and Sewer Commission and Subcontractor agree that compliance with the requirements of O.C.G.A. § 13-10-91 and Rule 300-10-1-.02 of the Rules of the Georgia Department of Labor are conditions of this Agreement for the physical performance of services.

By executing this affidavit, the undersigned subcontractor verifies its compliance with O.C.G.A. § 13-10-91, s*tating affirmatively that the individual, firm, or corporation which is contracting with* _____ *a Contractor contracting with the Brunswick-Glynn County Joint Water and Sewer Commission has registered with and is participating in the federal work authorization program known as: E-Verify", web address* *https://e-verify.uscis.gov/enroll/* operated by the United States Citizenship and Immigration Services Bureau of the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603], *in accordance with the applicable provisions and deadlines established in O.C.G.A. §13-10-91*. The undersigned Subcontractor also verifies that he/she/it is using and will continue to use the federal work authorization program throughout the contract period.

The undersigned Subcontractor agrees that, should it employ or contract with any other subcontractor(s) in connection with the physical performance of services pursuant to the contract with the Brunswick-Glynn County Joint Water and Sewer Commission, Subcontractor will secure from such subcontractor(s) similar verification of compliance with O.C.G.A. § 13- 10-91 on the Subcontractor Affidavit provided in Rule 300-10-01-.08 or a substantially similar form. Subcontractor further agrees the Subcontractor will advise the Brunswick- Glynn County Joint Water and Sewer Commission of the hiring of a new subcontractor and will provide the Brunswick-Glynn County Joint Water and Sewer Commission with a Subcontractor Affidavit attesting to the Subcontractor's name, address, user identification number, and date of authorization to use the Federal Work Authorization Program within five (5) days of the hiring before the Subcontractor begins working on the Project. Subcontractor also agrees to maintain all records of such compliance for inspection by the Brunswick-Glynn County Joint Water and Sewer Commission at any time and to provide a copy of each such verification to the Brunswick-Glynn County Joint Water and Sewer Commission at the time the subcontractor(s) is retained to perform such services.

(Continued on Next Page)

E-Verify Employment Eligibility Verification User I.D. Number

Date of Authorization to Use Federal Work Authorization Program

Name of Subcontractor

Title of Authorized Officer or Agent of Subcontractor

Signature and Printed Name of Authorized Officer or Agent

Sworn to and subscribed before me this the_____day of_____, 2020.

NOTARY PUBLIC:

Name: _____

My Commission Expires: _____

(NOTARY SEAL)

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

Brunswick – Glynn County Joint Water and Sewer Commission

TECHNICAL SPECIFICATIONS

FOR

PUMP STATION 4059 IMPROVEMENT PLANS
BGJWSC PROJECT NO. 2005
BRUNSWICK, GEORGIA

PREPARED BY

ROBERTS
CIVIL ENGINEERING

TECHNICAL SPECIFICATIONS

JWSC Standard Specifications

Section 1 - General Information
Section 3 - Gravity Sewer Systems
Section 4 - Sanitary Sewer Lift Stations and Force Mains

Roberts Civil Engineering Specifications

GENERAL REQUIREMENTS

01150 - Measurement and Payment

SITE WORK

02050 - Demolition
02210 - Erosion and Sedimentation Control
02221 - Excavation, Trenching & Backfill for Utility Systems
02451 - Chain Link Fence
02480 - Grassing and Sodding

SECTION 1
GENERAL
INFORMATION

TABLE OF CONTENTS

SECTION 1
GENERAL INFORMATION

1.1 INTRODUCTION

The Planning and Construction Division is the department within the Joint Water and Sewer Commission **(JWSC)** responsible for assisting in the planning, design, construction and acceptance of developer installed water and sewer utility systems as public infrastructure. The purpose of this document is to define the minimum requirements for the design and construction of such systems. The following documents form a part of these design and construction standards and are incorporated herein by reference:

Joint Water and Sewer Commission, Water and Sewer Ordinances, City of Brunswick

Joint Water and Sewer Commission, Water and Sewer Ordinances, Glynn County

Joint Water and Sewer Commission, Water and Wastewater Systems, Development Procedures

Joint Water and Sewer Commission, Record Drawing (As-Built) Standards.

Some JWSC Capital Improvement Projects (CIP's) and system rehabilitation projects may be designed and constructed in-house or by outside Engineers and Utility Contractors under contract to the JWSC. Such projects shall also conform to the requirements of these Design and Construction Standards and Specifications.

1.2 DEFINITIONS

Unless specifically stated otherwise, the meaning of the words and phrases used herein shall be as follows:

Joint Water and Sewer Commission: A body corporate and politic, a political subdivision of the State of Georgia and a public corporation created by an act of the General Assembly (Ga. L. 2006, p. 3661) acting by and through its commissioners, and responsible for the operations of the Utility.

City: The City of Brunswick, a municipal corporation, created and existing under the laws of the State of Georgia, acting by and through its Mayor and Commissioners.

County: Glynn County, a political subdivision of the State of Georgia, acting by and through its Board of Commissioners.

Developer/Owner: Any person or legal entity undertaking development.

Environmental Protection Division (EPD): The Environmental Protection Division, Department of Natural Resources, State of Georgia.

Infiltration/Inflow: Groundwater or surface water which leaks or otherwise enters into sanitary sewers through defective pipes, joints, manholes, yard drains, down spouts, sump pumps, or by other means or openings.

Planning and Construction Division: The department within the Joint Water and Sewer Commission **(JWSC)** responsible for assisting in the planning, design, construction, and acceptance of developer installed water and sewer utility systems as public infrastructure.

Residential Equivalent Unit (REU): That portion of a user's facility that has an impact on the water and/or wastewater systems equivalent to a single family unit.

Satellite System: A private and independently owned water and/or wastewater system, including infrastructure, appurtenances, structures, lift stations, and devices, which connect to the Utility's public water and/or wastewater systems.

Specials: Non-standard fitting.

Utility: The combined or unified water and wastewater systems of the City and County and any additions and extensions thereto, owned and operated by the Joint Water and Sewer Commission, acting by and through its commissioners.

Virgin: Not recycled.

Wall Castings: A component of ductile iron piping systems specifically designed and fabricated to be imbedded in poured-in-place concrete structures.

1.3 ABBREVIATIONS

The following abbreviations shall have the designated meanings:

AADF	Annual Average Daily Flow (Water Demand)
AASHTO	American Association of State Highway and Transportation Officials
ADWF	Daily Average Dry Weather Flow (Wastewater Demand)
ANSI	American National Standards Institute
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASSE	American Society of Safety Engineers
ASTM	American Society of Testing and Materials
AWG	American Wire Gauge
AWWA	American Water Works Association
DIP	Ductile Iron Pipe
EPD	Georgia Environmental Protection Division
FPS	Feet per second
FPVC	Fusible Polyvinyl Chloride
GDOT	Georgia Department of Transportation
GPD	Gallons per Day
GPM	Gallons per Minute
HDPE	High Density Polyethylene
IAPMO	International Association of Plumbing and Mechanical Officials
JWSC	Joint Water & Sewer Commission
MDF	Maximum Daily Flow (Water Demand)
MGD	Million Gallons per Day
MIG	Metal Inert Gas
NEMA	National Equipment Manufacturing Association
NPT	National Pipe Thread
NSF	National Sanitation Foundation
OSHA	Occupational Safety and Health Administration
PE	Polyethylene
PF	Peak Flow (Wastewater Demand)
PHF	Peak Hourly Flow (Water Demand)
PLC	Programmable Logic Controller
PVC	Polyvinyl Chloride
REU	Residential Equivalent Unit
RMS	Root Mean Square
RPZ	Reduced pressure zone
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition
VFD	Variable Frequency Drive
WPCF	Water Pollution Control Federation

1.4 PRELIMINARY INFORMATION REQUESTS

Upon request, the JWSC Planning and Construction Division will respond to questions regarding the availability of water and sewer service at a particular location. Such requests should be made in writing and include detailed information as to the size and location of the parcel to be served. Such information includes but is not limited to street address, Parcel ID Number, Owner's name, existing and proposed land use. A request form may be found on the JWSC website (http://bgjwsc.org) by clicking on the "Forms and Applications" tab.

Existing utility locations provided by the Planning and Construction Division shall be based upon the best available information from JWSC files such as GIS maps, record drawings, etc. No warranty is made by the JWSC, expressed or implied, as to the completeness or accuracy of such information.

Use of this information for planning and design purposes without proper field verification, shall be at the user's own risk.

For new and existing developments requesting water and sewer service, the JWSC reserves the right, to specify the point of service, the size and type of service, and the general layout of the overall system consistent with the standards and guidelines presented herein.

1.5 DEDICATION OF EXISTING PRIVATELY OWNED UTILITY SYSTEMS

Typically, the JWSC does not accept privately owned utility systems for dedication as public infrastructure. This includes but is not limited to private on- site water distribution systems, private on-site gravity sewer systems, and private wastewater pumping stations and force mains.

The JWSC Board of Commissioners, at its discretion, may consider exceptions to this policy provided that one or more of the following criteria are met.

a. Ownership of the system must be consistent with our service delivery strategy such that ownership of the system is necessary to extend water and sewer services to other potential customers.

b. JWSC's system reliability or capacity may be improved or increased as a result of the dedication.

c. Dedication of the system is warranted to eliminate or prevent potential environmental damage.

If accepted for ownership and maintenance the system must meet current design and construction standards of the JWSC or the standards of the City of Brunswick or Glynn County at the time of installation and the system must be functioning properly. The Planning and Construction Division will assist the utility owner in the identification of items of non-compliance with current standards. However, the burden of proof of compliance remains with the utility owner. To this end, the following events shall occur:

a. For water distribution systems, verification of the location, size, and materials of construction for all pipes, valves, hydrants, services, meters, and other appurtenances will be required. Any components which are found to be defective or not in compliance with current standards and specifications must be relocated, repaired, and/or replaced all at the expense of the existing utility owner. Adequate clearance must be maintained between all water lines and structures to allow future operation, maintenance, and repairs to be conducted without endangering the structural integrity of any existing dwelling or structure.

b. For the wastewater collection and transmission systems, verification of the location, size, and materials of construction for all gravity sewer pipes, manholes, service laterals and other appurtenances will be required. Pipe slopes must be verified to ensure adequate scouring velocity in the mains. Any components which are found to be defective or not in compliance with current standards and specifications must be relocated, repaired, and/or replaced all at the expense of the existing utility owner. Adequate clearance must be maintained between all sewer lines and structures to allow future operation, maintenance, and repairs to be conducted without endangering the structural integrity of any existing dwelling or structure.

c. The existing utility owner shall engage the services of a registered land surveyor to prepare and submit record drawings of the water and sewer infrastructure in accordance with the JWSC Record Drawing (As-Built) Standards.

d. Upon receipt of the preliminary record drawings, the JWSC will begin the confirmation process as outlined in the JWSC Development Procedures. This involves televising the wastewater collection system to determine system integrity and to confirm the slopes and location of manholes, mains, services, and service line cleanouts/stub-outs at properties to be served. During this process, a list of wastewater system defects, issues of non-compliance with standards and/or drawing errors and omissions that require correction and re- verification prior to submission of the record drawings for final inspection may be developed by the JWSC staff.

e. After the correction of any such defects or issues of non-compliance and verification of same by the JWSC, final record drawings with all applicable signatures and certifications shall be submitted and a final inspection of the water and wastewater systems shall be conducted. Upon the completion of the final inspection, the water and wastewater systems are determined either compliant or non-compliant. If compliant, the JWSC operational superintendents and project inspector endorse a JWSC statement on the record drawing to that effect. If non-compliant the process reverts to item (g.) above until all issues have been resolved.

Once the Record Drawings have been approved as compliant with applicable standards, the existing utility owner shall submit to the JWSC Executive Director the following as applicable:

a. Water/Wastewater Systems Dedication Application
b. Proposed easements, to include metes and bounds description of the property to be dedicated
c. A survey in recordable form signed and sealed by a duly licensed surveyor depicting the metes and bounds description stated above

Upon review and approval of the proposed easement documents by the JWSC legal counsel, the Executive Director places the acceptance of the dedication on the next regular meeting of the JWSC Board of Commissioners for acceptance.

1.6 PLAN SUBMITTAL REQUIREMENTS (NEW CONSTRUCTION)

After review and approval of the conceptual water and wastewater system drawings in accordance with the *Joint Water and Sewer Commission, Water and Wastewater Systems, Development Procedures,* one (1) complete set of detailed construction plans shall be prepared and submitted to the JWSC. The detailed construction plans shall be prepared on 24"x36" sheets and shall be signed and sealed by a professional engineer registered in the State of Georgia.

The construction plan submittal shall include the following information as a minimum:

a. An overall water and sewer master plan with proposed phases clearly indicated
b. A north arrow and graphic scale on all plan sheets
c. Vicinity map
d. Lot numbers and street names
e. Permanent or temporary benchmark
f. Horizontal datum to be based on the Georgia State Plan, East Zone, and NAD83 with sub-meter accuracy
g. Vertical datum to be based on NAVD88
h. Owner/Developer contact information including name, address, phone and fax numbers, e-mail address, etc.

i. Engineer's contact information including name, address, phone and fax numbers, e-mail address, etc.
j. Ownership of the proposed systems shall be clearly designated as` "Private" or "JWSC". See *Joint Water and Sewer Commission, Water and Wastewater Systems, Development Procedures* for additional information.
k. Plan sheets for proposed water and sewer facilities drawn at a maximum scale of 1"=50' (Exception: If requested and approved by the JWSC, certain projects may be drawn using up to 1"=100' scale provided that the information shown is legible.)
l. All facilities shall be clearly shown and labeled on the plan sheets including pipes, valves, fire hydrants, water services, sewer services, pumping stations and manholes (information to be shown includes but is not limited to size, station numbers, material of construction, slopes, appurtenances, etc.)
m. Plan sheets shall have all existing and proposed easements clearly marked with size and location.
n. Plan and profile sheets for proposed gravity sewers and forcemains drawn at a maximum scale of 1"=50' horizontal and 1"=5' vertical.
o. Plan and profile sheets shall include station numbers, pipe size, length, materials, slopes, manhole top and invert elevations. Profile sheets shall show both existing and proposed grades, storm drain crossings, water main crossings and other utility crossings as appropriate. Forcemain elevations shall be shown every 100' and at all grade changes.
p. Roadway cross sections with proposed utility locations depicted
q. Miscellaneous construction details in accordance with Appendix 2B; Appendix 3B and Appendix 4B of these Standards and Specifications
r. The following notes must appear on all construction plan submittals:

All water and sewer construction shall conform with the requirements of the Design and Construction Standards and Specifications of the Joint Water & Sewer Commission. In the event of a discrepancy between these construction plans and the aforementioned standards and specifications, the Design and Construction Standards and Specifications shall take precedence unless the deviation has been approved in writing by the JWSC.

The minimum horizontal and vertical separation between water lines, sewer lines and storm drains shall conform to the latest Georgia EPD requirements.

A minimum distance of 20' or two times the depth of the main, whichever is greater, shall be maintained from all buildings, foundations, and the top of bank of all ponds. Any deviation from this requirement must be approved in writing by the JWSC.

Pressure and leakage testing shall be performed in accordance with the Design and Construction Standards and Specifications of the JWSC.

Disinfection of water mains shall be performed in accordance with the Design and Construction Standards and Specifications of the JWSC.

At least 72 hours prior to commencement of the work, the contractor shall notify the Utilities Protection Center (UPC) at 1-800-282-7411 to request underground utility locate service.

In the event that a construction plan submittal is deemed "Non-Compliant" after JWSC review, the plans shall be revised and one (1) set resubmitted until the plans are deemed "Compliant". Construction plans which have been revised and submitted for final review and approval shall have the revisions listed in the revision block on all affected sheets and the revisions shall be clearly marked (clouded) to highlight the changes.

The JWSC requires and keeps three (3) sets of design plans that have been signed, sealed, and submitted on 24"x36" sheets with all plan review comments addressed. In addition, one (1) set of approved plans must be kept at the jobsite at all times. The Design Engineer is encouraged to submit, prior to the pre- construction conference, a sufficient number of plans in order to meet JWSC and the Developer/Owner's needs.

Any changes to the project which are made after final plan approval and that materially affect the system design shall require, additional plan submission, review and approval. JWSC approval shall be valid for a period of one year. If construction has not commenced within one year, a re-submittal is required.

1.7 PROTECTION OF EXISTING UTILITIES

The protection of existing utilities shall be solely the responsibility of the contractor. The location and size of existing utilities, if any, shown on the construction plans may not be complete or accurate as to horizontal or vertical location. The existence of buried or overhead utilities not shown shall not relieve the contractor of his responsibilities under this requirement. The contractor shall excavate and visually, verify the existence, size and location of all existing utilities. ***At least 72 hours prior to commencement of the work, the contractor shall notify the Utilities Protection Center (UPC) at 1-800-282- 7411 to request underground utility locate service.*** The contractor shall indemnify and hold harmless the JWSC, their officers, agents and employees from any claims or actions for damage to any existing utility or any liability which may arise there from.

1.8 PERMITTING

Glynn County R/W Permit

All work on City of Brunswick or Glynn County Rights-of-Way requires a permit from the appropriate Public Works Department. The Contractor is solely responsible for obtaining such permits and paying all required fees prior to commencement of the work.

GDOT Utility Encroachment Permit

All utility construction on the Georgia Department of Transportation (GDOT) Rights-of-Way requires a utility encroachment permit. The JWSC will obtain such permits. Certain information is required from the Developer/Contractor/Engineer before such applications are filed. Contact the JWSC for additional information.

The Contractor will be given a copy of the GDOT permit. The contractor shall perform all work within the GDOT right-of way in accordance with all applicable requirements of the permitting agency.

Railroad Crossing Permits

All utility construction on the CSX, Norfolk Southern and Colonel's Island Railroads rights-of-way require a utility encroachment permit from the appropriate agency if their respective form of ownership (easement, fee simple etc.) gives them the right to require same. Unless otherwise noted, the Developer/Contractor/Engineer shall obtain the utility encroachment permit from the appropriate agency and pay all required fees. The contractor shall perform all work within the railroad right-of way in accordance with all applicable requirements of the permitting agency.

NPDES Permit

Unless otherwise noted, the Developer/Contractor/Engineer shall prepare and file the Notice of Intent for Coverage under the applicable NPDES General Permit to Discharge Storm Water Associated with Construction Activity and pay all required fees. The Contractor shall be responsible for implementation of the Erosion, Sedimentation and Pollution Control Plan, including rainfall monitoring, inspections and all other requirements of the permit.

Land Disturbing Activity Permit (LDA)

If required and unless otherwise noted, the Developer/Contractor/Engineer shall obtain the Land Disturbing Activity Permit and pay all required fees. The contractor shall be responsible for implementing all requirements of said permit.

1.9 SURFACE RESTORATION

All disturbed areas shall be re-vegetated immediately after construction in a manner consistent with the *Manual for Erosion and Sediment Control in Georgia.* All erosion and sediment controls shall be installed prior to or concurrent with the start of construction.

Any reference points, right-of-way monuments, property corners, benchmarks or other monuments disturbed as a result of construction shall be restored by a Registered Land Surveyor licensed to practice in the State of Georgia, with all associated costs borne by the contractor. Likewise, all landscaping, street signs, mailboxes, traffic signs and other street furniture disturbed by construction operations shall be restored by the contractor to their original condition without additional compensation.

Existing pavements shall be removed to clean straight lines by saw cutting. See the standard construction details for additional information.

1.10 REFERENCE POINTS AND LAYOUT

The contractor shall be responsible for all construction lay-out and staking including setting of grades, lines and levels; and the location of existing and proposed easements and/or rights-of way. The contractor's surveyor shall provide centerline alignment for construction purposes and establish and maintain benchmarks and horizontal control points. The contractor shall assume all responsibility for the correctness of the grade and alignment stakes.

SECTION 3
GRAVITY SEWER SYSTEMS

TABLE OF CONTENTS

APPENDICES

SECTION 3
GRAVITY SEWER SYSTEMS

3.1 GENERAL

This section provides the minimum guidelines for the design of gravity sanitary sewer collection systems. The method of design and/or construction shall be according to these Design and Construction Standards and Specifications and the following:

Recommended Standards for Sewage Works (Ten State Standards) Latest Edition

Georgia Environmental Protection Division State of Georgia Regulations for Water and Sewerage Works, Latest Edition

Applicable Federal, State and Local Requirements

In the event of conflicts among the various sources cited above, the most stringent criteria shall take precedence.

3.2 DESIGN FLOWS

Each system component shall be designed to meet certain flow requirements. The various flow requirements are described below.

3.2.1 Daily Average Dry Weather Flow (ADWF)

Daily Average Dry Weather Flow (ADWF) shall be 300 gallons per day per Residential Equivalent Unit (REU) or 115 gallons per day per capita. The basis for one (REU) shall be a single-family unit occupied by an average of 2.6 persons. Where sewer service beyond the basis of the established REU is required, the Sewage Flow Table shown below (adapted from the Georgia Environmental Division Large Community Design Guidance Document, Pages 8 & 9, Appendix A) shall be used.

Figure GS-1
Sewage Flow Table

FACILITY	Gallons/Day (GPD)
Assembly Hall	5 per seat
Barber Shop/Beauty Parlor	125 per chair + 20/employee
Boarding House*	100 per room
Bowling Alley	75 per lane + 20/employee
Church w/o Day Care or Kindergarten	5 per sanctuary seat
Correctional Institution/Prison	250 per inmate
Country Club, Recreation Facilities Only	25 per member
Day Care Center, No Meals	15 per person
Dental Office	100 per chair + 20/employee
Department Store	10 per 100 SF
Factory Without Showers With Showers	 25 per employee 35 per employee
Food Service Establishments* Restaurants (Up to 12 hours per day) Restaurants (12 hours per day to 18 hours per day) Restaurants (Above 18 hours per day) Bar and Cocktail Lounge Drive-in Restaurant Carry-out Only	 35 per seat + 20/employee 50 per seat + 20/employee 75 per seat + 20/employee 30 per seat + 20/employee 50 per space + 20/employee 50 per 100 SF + 20/employee
Funeral Home	10 per 100 SF
Hospital Inpatient Outpatient	 300 per bed 275 per bed
Hotel*	100 per room
Kindergarten, No Meals	15 per person
Laundry, Commercial	1,000 per machine
Laundry, Coin	150 per machine
Lodges*	100 per room
Mobile Home Park	300 per site
Motel*	100 per room
Nursing Home*	150 per bed
Office	10 per 100 SF
Physician's Office	200 per exam room
Schools* Boarding Day, Restrooms Only Day, Restrooms and Cafeteria Day, Restrooms, Gym and Cafeteria	 100 per person 12 per person 16 per person 20 per person
Service Stations, Interstate Locations	425 + 150 per pump
Service Stations, Other Locations	300 + 100 per pump
Service Station Car Wash	500 per stall
Shopping Center (Not including food service or laundry)	10 per 100 SF
Stadium	5 per seat
Supermarket/Grocery Store	20 per 100 SF
Theater	5 per seat

FACILITY	Gallons/Day (GPD)
Travel Trailer Park* With Independent Water & Sewer Connection Without Independent Water & Sewer Connection	 175 per site 35 per site
Warehouse	10 per 100 SF
*Add 300 gallons per machine to amount indicated if laundry or dish washing machines are installed	

Note: Where historical data is available from flow monitoring or other approved devices as in the case of existing systems, ADWF shall be as averaged from seven (7) days within the monitoring period of flow with no rainfall event greater than .5 (5/10ths) inches of rain in any of the seven 24-hour periods being averaged.

3.2.2 Calculation of Peak Flow (PF)

For gravity systems, the Daily Average Dry Weather Flow (ADWF) to be conveyed must be adjusted to allow for the maximum diurnal or peak flow that is expected to occur as follows:

Peak Flow = PF x Average Dry Weather Flow (ADWF)

Where:

Peaking Factor = **PF** = $5 / P^{0.1667}$ as referenced in ASCE Manual and Reports of Engineering Practice #60 and WPCF Manual of Practice #FD- 5, (Babbitt Equation);

Population = **P** = used as P/1,000 in the equation with each 300 GPD (REU) considered as serving 2.6 persons as follows:

For residential use, (i.e. 5 single family residences times 2.6 persons/residence = 13 and 13/1,000 = P = 0.013);

For Commercial Use, by dividing the total calculated GPD from the EPD Sewage Flow Table (Figure GS-1) by 300 GPD/REU and multiplying the REU's by 2.6, (i.e. 4,000 GPD/300 GPD = 13.3 REU's X 2.6 persons/REU
= 35 and 35/1,000 = P = 0.035);

For Industrial Use, by employee count GPD from EPD Sewage Flow Table (Figure GS-1) divided by 300 GPD/REU and then multiplying the REU's by 2.6 persons/REU to approximate employee population, plus the maximum gallon per minute wastewater discharge capability, (as provided by the process design engineer), multiplied by 1,440 minutes/day and divided by 300 GPD to obtain REU's then multiplying the REU's by 2.6 to obtain an approximate equivalent population for process flow, (i.e. 25 factory employee @ 30 GPD = 900 GPD/300 GPD = 3 REU's X 2.6 persons/REU = 8 and peak process water discharge @ 150 GPM X 1,440min/day = 216,000 GPD/300 GPD per REU = 720 REU's X 2.6 persons/REU = 1,872, then 1,872 for process water population approximation + 8 factory employee population approximation = 1,880 and 1,880/1,000 = P = 1.88).

3.3 SIZING OF GRAVITY SEWER MAINS

3.3.1 Major Outfalls

The size of major outfall sewers or extensions to such mains, throughout the system shall be in accordance with JWSC Water and Sewer Master Plan, latest revision. Contact the Planning and Construction Division for additional information and guidance with regard to this requirement.

3.3.2 Collector Sewers

All gravity sewer mains shall be designed to convey the Design Peak Flow at a flow depth not to exceed 94% of the pipe inside diameter or less than 0.6 inches, and at a self-cleansing velocity of between 1.99 FPS and 2.01 FPS. Gravity sewer mains intended for public use and JWSC operation and maintenance shall be sized to meet these hydraulic guidelines with the minimum pipe size being 8-inches in diameter, unless specifically allowed subject to the 6-inch pipe diameter exceptions cited in paragraph 3.4.2 below.

3.4 GRAVITY SEWER MAIN PIPE SLOPE REQUIREMENTS

3.4.1 Discussion

The major items for consideration in the regulation of gravity sewer pipe slopes are carrying capacity at peak flow and self-cleansing velocity. The inability to convey peak flow results in system surcharging and potential sanitary sewer overflows. The lack in the development of self-cleansing velocity, at least during the flows diurnal peak, results in solids deposition, system odors, and the eventual reduction in pipe capacity leading to blockages and overflows.

An additional consideration in the JWSC jurisdictional area, and numerous other coastal areas, is wastewater piping system detention time. Lengthy wastewater detention or travel time through gravity piping systems encourages the development of corrosive and odorous gases that damage piping infrastructure, cause odor complaints and increase the cost of system operation by requiring the addition of chemicals to inhibit or mitigate the effects of aging wastewater. Therefore, design of gravity sewer systems in this standard shall stress the development of self- cleansing velocities as the most practical and effective method of minimizing wastewater detention times in sewer mains.

Standardized slopes, as recommended by Ten States Standards in concert with the minimum pipe diameters and minimum flow depths suggested in these guidelines, often forces the designer to hold to a pipe grade that does not provide adequate velocities at "projected" flow rates and/or forces a pipe grade that shortens the potential reach of a proposed sewer main when projected flow rates would develop self-cleansing velocity at a lesser grade.

In an effort to address these aforementioned issues, the JWSC's pipe slope design requirements are developed to provide a range of acceptable pipe slopes based on good hydraulic engineering practice using "projected" pipe flow rates based on REU's and peaking factors as defined by appropriate engineering literature, organizational experience, policy and regulatory guidelines.

3.4.2 Gravity Sewer Main Grades

Gravity sewer mains intended for public use and O&M by the JWSC or extensions to public systems which are to remain private shall be in accordance with the preferred slopes shown in Figure GS-2 for minimum pipe diameters. Where adherence to the minimum eight (8) inch pipe diameter will not develop self-cleansing velocities at "projected" ultimate contributory flows, six (6) inch diameter pipe may be used, if approved as an exception, defined as follows.

A six (6) inch diameter pipe exception shall only apply for limited reaches of gravity sewer where self-cleansing velocities cannot be developed in eight (8) inch pipes by "projected" flow peaks during the 24-hour diurnal cycle; and when such gravity mains are strategically located such that system expansion from those lines is highly improbable, as in the case of limited boundary development subdivisions.

The use of the Manning Equation indicates that flows in excess of 12,000 gpd and peak flows of 61 gpm, using the Babbitt Peaking Equation, are needed to develop self-cleaning velocities at the diurnal peak in an eight
(8) inch line on a grade of 0.40%. This equates to 39 single family residences or REU's. The six (6) inch pipe diameter exception shall be considered valid when this quantity of "projected" contributory flow for any gravity sewer reach is not available.

Grades for pipe diameters greater than the cited six (6) inch and eight (8) inch minimums shall be based on the same design criteria as stated above in article 3.3.2, and in consideration of "projected" flows. Alternatives to the six (6) inch exception include low pressure systems, step systems, vacuum systems or on-site treatment systems.

The maximum slope for all pipe diameters shall be such that the velocity in the pipes does not exceed 5 fps at 94% of the pipe inside diameter when calculated using Manning's Equation and projected flow peaks.

Figure GS-2
Gravity Sewer Main Pipe Slope Table for six (6) inch and eight (8) inch Pipes Using Manning Flow and Babbitt PF Equations

Nominal Diameter	Pipe Material	Projected Flow (REU's)	Projected Population	Calculated Peaking Factor	Projected ADWF (GPD)	Projected Peak Flow (GPM)	Self Cleansing Minimum Slope (%)	Flow Depth (Inches)	Maximum Capacity @ Minimum Slope (GPM)
6	PVC HDPE	4	10.4	10.7	1,200	9	1.75	0.61	467
6	PVC HDPE	5	13.0	10.3	1,500	11	1.53	0.68	437
6	PVC HDPE	6	15.6	10.0	1,800	13	1.35	0.75	410
6	PVC HDPE	7	18.2	9.7	2,100	14	1.25	0.80	395
6	PVC HDPE	8	20.8	9.5	2,400	16	1.11	0.88	372
6	PVC HDPE	9	23.4	9.3	2,700	18	1.02	0.94	357
6	PVC HDPE	10	26.0	9.2	3,000	19	0.95	1.00	344
6	PVC HDPE	11	28.6	9.0	3,300	21	0.89	1.05	333
6	PVC HDPE	12	31.2	8.9	3,600	22	0.86	1.09	328
6	PVC HDPE	13	33.8	8.8	3,900	24	0.80	1.15	316
6	PVC HDPE	14	36.4	8.7	4,200	25	0.76	1.20	308
6	PVC HDPE	15	39.0	8.6	4,500	27	0.72	1.26	300
6	PVC HDPE	16	41.6	8.5	4,800	28	0.69	1.30	293
6	PVC HDPE	17	44.2	8.4	5,100	30	0.66	1.35	287
6	PVC HDPE	18	46.8	8.3	5,400	31	0.64	1.39	283

Nominal Diameter	Pipe Material	Projected Flow (REU's)	Projected Population	Calculated Peaking Factor	Projected ADWF (GPD)	Projected Peak Flow (GPM)	Self Cleansing Minimum Slope (%)	Flow Depth (Inches)	Maximum Capacity @ Minimum Slope (GPM)
6	PVC HDPE	19	49.4	8.3	5,700	33	0.62	1.44	278
6	PVC HDPE	20	52.0	8.2	6,000	34	0.59	1.49	271
6	PVC HDPE	21	54.6	8.1	6,300	36	0.57	1.54	267
6	PVC HDPE	22	57.2	8.1	6,600	37	0.55	1.59	262
6	PVC HDPE	23	59.8	8.0	6,900	38	0.54	1.62	260
6	PVC HDPE	24	62.4	7.9	7,200	40	0.52	1.67	255
6	PVC HDPE	25	65.0	7.9	7,500	41	0.51	1.70	252
6	PVC HDPE	26	67.6	7.8	7,800	42	0.50	1.73	250
6	PVC HDPE	27	70.2	7.8	8,100	44	0.48	1.79	245
6	PVC HDPE	28	72.8	7.7	8,400	45	0.48	1.80	245
6	PVC HDPE	29	75.4	7.7	8,700	46	0.47	1.83	242
6	PVC HDPE	30	78.0	7.6	9,000	48	0.45	1.90	237
6	PVC HDPE	31	80.6	7.6	9,300	49	0.44	1.94	234
6	PVC HDPE	32	73.2	7.6	9,600	50	0.44	1.96	234
6	PVC HDPE	33	85.8	7.5	9,900	52	0.42	2.03	229
6	PVC HDPE	34	88.4	7.5	10,200	53	0.42	2.04	229
6	PVC HDPE	35	91.0	7.5	10,500	54	0.41	2.07	226
6	PVC HDPE	36	93.6	7.4	10,800	56	0.40	2.12	223
6	PVC HDPE	37	96.2	7.4	11,100	57	0.39	2.17	221
6	PVC HDPE	38	98.8	7.4	11,400	58	0.39	2.19	221
6	PVC HDPE	39	101.4	7.3	11,700	59	0.38	2.22	218
6	PVC HDPE	40	104.0	7.3	12,000	61	0.38	2.25	218
8	PVC HDPE	40	104.0	7.3	12,000	61	0.40	2.00	481
8	PVC HDPE	41	106.6	7.3	12,300	62	0.40	2.01	481
8	PVC HDPE	42	109.2	7.2	12,600	63	0.39	2.04	475
8	PVC HDPE	43	111.8	7.2	12,900	65	0.39	2.07	475
8	PVC HDPE	44	114.4	7.2	13,200	66	0.38	2.10	469
8	PVC HDPE	45	117.0	7.1	13,500	67	0.38	2.12	469
8	PVC HDPE	46	119.6	7.1	13,800	68	0.37	2.15	463
8	PVC HDPE	47	122.2	7.1	14,100	69	0.37	2.17	463
8	PVC HDPE	48	124.8	7.1	14,400	71	0.36	2.21	456

Nominal Diameter	Pipe Material	Projected Flow (REU's)	Projected Population	Calculated Peaking Factor	Projected ADWF (GPD)	Projected Peak Flow (GPM)	Self Cleansing Minimum Slope (%)	Flow Depth (Inches)	Maximum Capacity @ Minimum Slope (GPM)
8	PVC HDPE	49	127.4	7.0	14,700	72	0.35	2.25	450
8	PVC HDPE	50	130.0	7.0	15,000	73	0.34	2.28	444
8	PVC HDPE	51	132.6	7.0	15,300	74	0.34	2.30	444
8	PVC HDPE	52	135.2	7.0	15,600	76	0.34	2.32	444
8	PVC HDPE	53	137.8	7.0	15,900	77	0.34	2.34	444
8	PVC HDPE	54	140.4	6.9	16,200	78	0.33	2.38	437
8	PVC HDPE	55	143.0	6.9	16,500	79	0.33	2.39	437
8	PVC HDPE	56	145.6	6.9	16,800	80	0.32	2.43	430
8	PVC HDPE	57	148.2	6.9	17,100	82	0.32	2.45	430
8	PVC HDPE	58	150.8	6.9	17,400	83	0.32	2.47	430
8	PVC HDPE	59	153.4	6.8	17,700	84	0.31	2.51	424
8	PVC HDPE	60	156.0	6.8	18,000	85	0.31	2.52	424
8	PVC HDPE	61	158.6	6.8	18,300	86	0.31	2.54	424
8	PVC HDPE	62	161.2	6.8	18,600	88	0.30	2.60	417
8	PVC HDPE	63	163.8	6.8	18,900	89	0.30	2.61	417
8	PVC HDPE	64	166.4	6.7	19,200	90	0.30	2.62	417
8	PVC HDPE	65	169.0	6.7	19,500	91	0.29	2.66	410
8	PVC HDPE	66	171.6	6.7	19,800	92	0.29	2.68	410
8	PVC HDPE	67	174.2	6.7	20,100	93	0.29	2.69	410
8	PVC HDPE	68	176.8	6.7	20,400	95	0.28	2.75	403
8	PVC HDPE	69	179.4	6.7	20,700	96	0.28	2.76	403
8	PVC HDPE	70	182.0	6.6	21,000	97	0.28	2.78	403
8	PVC HDPE	71	184.6	6.6	21,300	98	0.28	2.79	403
8	PVC HDPE	72	187.2	6.6	21,600	99	0.27	2.83	395
8	PVC HDPE	73	189.8	6.6	21,900	100	0.27	2.85	395
8	PVC HDPE	74	192.4	6.6	22,200	101	0.27	2.86	395
8	PVC HDPE	75	195.0	6.6	22,500	103	0.27	2.89	395
8	PVC HDPE	76	197.6	6.6	22,800	104	0.26	2.94	388
8	PVC HDPE	77	200.2	6.5	23,100	105	0.26	2.96	388
8	PVC HDPE	78	202.8	6.5	23,400	106	0.26	2.97	388
8	PVC HDPE	79	205.4	6.5	23,700	107	0.26	2.98	388

Nominal Diameter	Pipe Material	Projected Flow (REU's)	Projected Population	Calculated Peaking Factor	Projected ADWF (GPD)	Projected Peak Flow (GPM)	Self Cleansing Minimum Slope (%)	Flow Depth (Inches)	Maximum Capacity @ Minimum Slope (GPM)
8	PVC HDPE	80	208.0	6.5	24,000	108	0.26	3.00	388
8	PVC HDPE	81	210.6	6.5	24,300	109	0.26	3.01	388
8	PVC HDPE	82	213.2	6.5	24,600	111	0.25	3.08	380
8	PVC HDPE	83	215.8	6.5	24,900	112	0.25	3.10	380
8	PVC HDPE	84	218.4	6.4	25,200	113	0.25	3.11	380
8	PVC HDPE	85	221.0	6.4	25,500	114	0.25	3.13	380
8	PVC HDPE	86	223.6	6.4	25,800	115	0.24	3.18	373
8	PVC HDPE	87	226.2	6.4	26,100	116	0.24	3.19	373
8	PVC HDPE	88	228.8	6.4	26,400	117	0.24	3.21	373
8	PVC HDPE	89	231.4	6.4	26,700	118	0.24	3.22	373
8	PVC HDPE	90	234.0	6.4	27,000	119	0.24	3.23	373
8	PVC HDPE	91	236.6	6.4	27,300	121	0.24	3.26	373
8	PVC HDPE	92	239.2	6.3	27,600	122	0.23	3.32	365
8	PVC HDPE	93	241.8	6.3	27,900	123	0.23	3.33	365
8	PVC HDPE	94	244.4	6.3	28,200	124	0.23	3.35	365
8	PVC HDPE	95	247.0	6.3	28,500	125	0.23	3.36	365
8	PVC HDPE	96	249.6	6.3	28,800	126	0.23	3.37	365
8	PVC HDPE	97	252.2	6.3	29,100	127	0.23	3.39	365
8	PVC HDPE	98	254.8	6.3	29,400	128	0.23	3.40	365
8	PVC HDPE	99	257.4	6.3	29,700	129	0.22	3.47	357
8	PVC HDPE	100	260.0	6.3	30,000	130	0.22	3.48	357
8	PVC HDPE	101	262.6	6.2	30,300	131	0.22	3.49	357
8	PVC HDPE	102	265.2	6.2	30,600	133	0.22	3.52	357
8	PVC HDPE	103	267.8	6.2	30,900	134	0.22	3.54	357
8	PVC HDPE	104	270.4	6.2	31,200	135	0.22	3.56	357
8	PVC HDPE	105	273.0	6.2	31,500	136	0.22	3.57	357
8	PVC HDPE	106	275.6	6.2	31,800	137	0.22	3.58	357
8	PVC HDPE	107	278.2	6.2	32,100	138	0.21	3.65	349
8	PVC HDPE	108	280.8	6.2	32,400	139	0.21	3.66	349
8	PVC HDPE	109	283.4	6.2	32,700	140	0.21	3.68	349
8	PVC HDPE	110	286.0	6.2	33,000	141	0.21	3.68	349

Nominal Diameter	Pipe Material	Projected Flow (REU's)	Projected Population	Calculated Peaking Factor	Projected ADWF (GPD)	Projected Peak Flow (GPM)	Self Cleansing Minimum Slope (%)	Flow Depth (Inches)	Maximum Capacity @ Minimum Slope (GPM)
8	PVC HDPE	111	288.6	6.2	33,300	142	0.21	3.70	349
8	PVC HDPE	112	291.2	6.1	33,600	143	0.21	3.72	349
8	PVC HDPE	113	293.8	6.1	33,900	144	0.21	3.73	349
8	PVC HDPE	114	296.4	6.1	34,200	145	0.21	3.75	349
8	PVC HDPE	115	299.0	6.1	34,500	146	0.21	3.76	349
8	PVC HDPE	116	301.6	6.1	34,800	148	0.20	3.85	340
8	PVC HDPE	117	304.2	6.1	35,100	149	0.20	3.87	340
8	PVC HDPE	118	306.8	6.1	35,400	150	0.20	3.88	340
8	PVC HDPE	119	309.4	6.1	35,700	151	0.20	3.90	340
8	PVC HDPE	120	312.0	6.1	36,000	152	0.20	3.91	340
8	PVC HDPE	121	314.6	6.1	36,300	153	0.20	3.92	340
8	PVC HDPE	122	317.2	6.1	36,600	154	0.20	3.94	340
8	PVC HDPE	123	319.8	6.0	36,900	155	0.20	3.95	340
8	PVC HDPE	124	322.4	6.0	37,200	156	0.20	3.97	340
8	PVC HDPE	125	325.0	6.0	37,500	157	0.20	3.98	340
8	PVC HDPE	126	327.6	6.0	37,800	158	0.20	4.00	340
8	PVC HDPE	127	330.2	6.0	38,100	159	0.20	4.01	340
8	PVC HDPE	128	332.8	6.0	38,400	160	0.19	4.09	332

Notes For Table GS-2:

1. REU (GPD) = 300
2. Plastic Pipe Manning "n" = 0.010 (For clean pipe with little deposits/debris
3. Metal Pipe Manning "n" = 0.013 (For clean pipe with little deposits/debris
4. Required Self-Cleansing Velocity = 1.99 to 2.01 feet per second
5. Minimum Pipe Flow Depth = 0.6 inches

3.5 MATERIAL SPECIFICATIONS

The contractor shall furnish gravity sewer piping systems in accordance with the material specifications detailed below. All references to industry standards (ASTM, ANSI, AWWA, etc.) shall be to the latest revision unless stated otherwise. All materials shall be new. These material specifications include a list of acceptable manufacturers for the various water system components. The contractor may choose freely from the manufacturers list and ***material submittals for such items are not required.*** Only products and materials from the acceptable manufacturer's lists herein may be used in the work.

Any item required but not specified herein, or any product or manufacturer other than those listed will be considered a substitution. ***Material submittals are required for such items.*** Substitutions will not be allowed without the prior written approval of the JWSC Planning and Construction Division. Substitutions, if allowed, shall meet all criteria of the detailed specifications. The burden of proof of compliance for any proposed substitution rests with the Contractor/Developer/Owner. The JWSC Planning and Construction Division will be the sole judge as to the acceptance of a proposed substitution and such decisions will be final.

3.5.1 General Considerations

The type, class, grade, and alignment of sewer pipe may be changed only at manholes. The only exception to this being where a gravity sewer main crosses under a storm drain and the invert of the storm drain is less than 3 feet above the crown of the sewer main. In such cases, a full twenty (20) foot joint of ductile iron pipe shall be centered under the storm drain and joined to PVC or HDPE pipe with a mechanical joint or stress resistant coupling.

Gravity sewer mains shall be ASTM 3034, SDR-26 heavy wall sewer pipe or DR-17 HDPE. Gravity sewer mains within steel casings or PVC DR18 casing pipes shall be ASTM 3034, SDR 26 heavy wall sewer pipe and shall be installed with approved skids or spacers to hold grade and prevent flotation in accordance with these specifications.

Ductile iron pipe is only permitted for gravity sewer use where the mains or laterals are above ground as in ditch crossings. The only exception being storm drain crossings as cited above.

All material shall be free from defects impairing strength and durability, shall be of the best commercial quality for the purpose specified, shall have structural properties sufficient to safely sustain or withstand strains and stresses to which it is normally subjected and be true to detail.

Pipe to be installed underground using open-cut methods shall be PVC push-on joint type as described in these specifications, or as accepted within these specifications for storm drain crossings. Pipe installed above ground shall be Sewer-Safe restrained joint ductile iron pipe or flanged ductile iron pipe as described in these specifications.

For pipe bursting or horizontal boring construction, the pipe shall be high density polyethylene (HDPE) or Fusible PVC of a suitable ASTM Standard, classification and pressure rating as described in these specifications. The "depth of cut" shall be defined as the vertical distance from pipe invert to finish grade.

3.5.2 Polyvinyl Chloride (PVC) Pipe and Fittings

Each length shall be clearly marked with the name of the manufacturer, location of the plant, pressure rating, nominal pipe diameter and length. All PVC sanitary sewer pipe shall be green. Storage and handling of PVC pipe shall be in accordance with Chapter 6 of AWWA Manual M23.

PVC 1120, Class 160, SDR 26 Pipe shall conform to ASTM D3034 for sizes four (4) inch thru fifteen (15) inch diameter pipe and ASTM F679 for 18 inch through 36 inch diameter pipe.

The pipe material shall be clean, virgin, National Sanitation Foundation approved, Class 12454-B PVC compound conforming to ASTM resin specification D1784 with wall thickness T-1. Pipe shall have a bell type coupling with a thickened wall section integral with the pipe barrel in accordance with ASTM D3212. Elastomeric seals shall meet ASTM F477 or ASTM F913. The pipe shall be designed to pass without failure a sustained pressure test of 340 psi in conformance with ASTM D1598 and a quick burst test of 400 psi in conformance with ASTM D1599.

Fittings shall meet the requirements of ASTM D3034 and ASTM F1336 for sizes four (4) inch through fifteen (15) inch in diameter and ASTM F679 and ASTM F1336 for eighteen (18) inch through thirty six (36) inch in diameter with minimum wall thickness of SDR 26. Fittings shall be gasket joint type meeting the requirements of ASTM D3212. Elastomeric gaskets shall conform to ASTM F477 or ASTM F913. PVC material shall have a cell classification of 12454-B in accordance with ASTM D1784.

PVC 1120, Pressure Class (PC) 235 of DR-18 for twenty-four (24) inch diameter or less and DR-21 for greater than twenty-four (24) inch diameter pipe (used as casing pipe for easements and allowed rights-of-way) shall conform to AWWA Standard C900 or C905, as appropriate for pipe diameter. All pipes shall be hydrostatically proof tested at the factory in conformance with UNI-B-11 standards. In case of conflict between standards specified herein, the requirements of AWWA Standard C900 and C905 shall prevail. Pipe is to be manufactured to ductile iron pipe equivalent outside diameters. The pipe material shall be clean, virgin, National Sanitation Foundation approved, Class 12454-B PVC compound conforming to ASTM resin specification D1784.

Pipe shall have a bell type coupling with a thickened wall section integral with the pipe barrel in accordance with ASTM D3139. Elastomeric seals shall meet ASTM F477. The pipe shall be designed to pass without failure a sustained pressure test of 500 psi in conformance with ASTM D1598 and a quick burst test of 755 psi in conformance with ASTM D1599. Where PVC Casing Pipes can be installed using horizontal directional drilling techniques, equivalently rated fusible PVC pipe may be approved.

PVC Fittings six (6) inches through twelve (12) inches may be used with PVC C900 pipe. Fittings shall be PVC injection molded, made from materials meeting or exceeding the requirements of cell class 12454-B material as defined in ASTM D1784. All PVC fittings must comply with or exceed, AWA C907. All fittings must be designed to the pressure class of the pipe used, with a pressure rating of 150 psi and a 2.5 to 1 factor of safety. Virgin materials only shall be used in the manufacture of PVC pressure fittings. These fittings must have UL-FM approval and shall comply with or exceed all ASTM Standards for PVC fittings. All fittings must have NSF-61 approval. The elastomeric gasket shall comply with the requirements specified in ASTM F477.

3.5.3 Ductile Iron (D.I.P.) Pipe and Fittings

D.I.P. wall thickness and pressure class shall conform to ANSI Specification A21.50 (AWWA C150) and ANSI A21.51 (AWWA C151) with pressure class 350 as a minimum. Pipe shall also be certified by ISO 9000 by an accredited registrar.

Pipe shall be clearly marked with the name of the manufacturer, location of the foundry, pressure rating, thickness or pressure class, nominal pipe diameter, weight of pipe without lining, maximum depth of bury and length.

All pipe furnished by the manufacturer shall be cast and machined at one foundry location to assure quality control and provide satisfactory test data. All ductile iron pipe shall be color coded green by field painting a green stripe, three (3) inches wide, along the crown of the pipe barrel.

All ductile iron pipes and fittings shall be externally coated with a bituminous coating as specified in ANSI A21.51 and be continuous smooth, neither brittle when cold or sticky when exposed to the sun and be strongly adherent to the fitting. If the pipe is installed in a corrosive soil, then all bolts, nuts, studs, and other uncoated parts of joints for underground installation shall be coated with asphalt or coal-tar prior to backfilling.

All ductile iron pipes and fittings shall be Sewer Safe internally lined with an approved amine cured novalac epoxy coating containing at least 20% by volume of ceramic quartz pigment.

Ductile iron fittings shall have a minimum working pressure of 350 psi. Fittings shall conform to ANSI Specifications A21.10 (AWWA C110), A21.11 (AWWA C111), A21.15 (AWWA C115) and/or A21.53 (AWWA C153). Fittings shall also be certified by ISO 9000 by an accredited registrar. Compact fittings shall normally be installed. Long body fittings shall be used where the drawings specifically call for long body fittings, where compact fittings are not available, or at the option of the contractor when the laying length is not controlled by compact fittings patterns. All fittings shall be UL/FM approved and shall conform to NSF Standard 61, as applicable. All fittings furnished by the approved manufacturer shall be cast and machined at one foundry location to assure quality control and provide satisfactory test data. Fittings shall have cast on them the pressure rating, nominal diameter of openings, manufacturer's name, foundry location, plant code and degrees or fraction of the circle. Cast letters and figures shall be on the outside body of the fitting. All ductile iron fittings shall be externally coated and internally lined as specified in this specification.

3.5.4 High Density Polyethylene (HDPE) Pipe and Service Connections

For Horizontal Directional Drilling or Pipe Bursting, HDPE Pipe shall be ductile iron pipe size outside diameter, SDR 11 high performance, high molecular weight, high density polyethylene pipe, and shall conform to ASTM D 1248 (Type III C, Category 5, P34).

Minimum cell classification values shall be 345434C as referenced in ASTM D 3350. All pipe resin shall be manufactured by the same company that manufactures the pipe itself in accordance with these specifications to insure complete resin compatibility and total product accountability.

Fittings for service connections shall be Inserta-Tee or electro-fusion type fittings only.

3.5.5 Fusible Polyvinyl Chloride (FPVC) Pipe and Service Connections

For Horizontal Directional Drilling or Pipe Bursting, Fusible C-900, C-905, DR-18 FPVC and 1120, SDR-26 FPVC pipe shall be cast iron pipe size outside diameter, conforming to ASTM D3034. All piping shall be made from a PVC compound conforming to cell classification 12454 per ASTM D1784. Pipe shall be extruded with plain ends which shall be square to the pipe and free of any bevel or chamfer.

There shall be no bell or spigot gasket of any kind incorporated into the pipe. Pipe shall be manufactured in standard 40 foot nominal lengths, with other lengths available upon request. For gravity sewer use, pipe shall be green in color. The pipe shall be marked per industry standards. The pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.

Fittings for service connections shall be Inserta-Tee or watertight stainless steel saddle type fittings suitable for use on C-900 pipe.

3.5.6 Manholes

3.5.6.1 Manhole Diameter

The minimum manhole inside diameters for gravity sewer lines six (6) inch through sixteen (16) inch shall be four (4) feet; for lines eighteen (18) inches through thirty (30) inches – five (5) feet; for lines thirty six (36) inch through forty eight (48) inch – six (6) feet; and for lines greater than forty eight (48) inches – eight (8) feet. Where the depth of a manhole, (from finished grade to lowest pipe invert), is fifteen (15) feet or greater, the minimum manhole diameter shall be five (5) feet.

3.5.6.2 Precast Concrete Manholes

Precast concrete manholes or calcium aluminate cement concrete manholes used shall conform to all requirements of ASTM Designation C478 at minimum and be provided with "O" ring gasket type joints, conforming to ASTM Designation C443-77, or flexible joint sealant roping of butyl rubber conforming to Federal Specification SS-S-210A, AASHTO M-198, Type B-Butyl Rubber with a minimum cross section of 1 ¼ inches, and shall be:

(a) constructed using a top section cast monolithically and shaped as an eccentric cone, or for manhole depths five (5) feet or less be a concentric cone, joint systems must match associated riser or base sections; the clear opening for the manhole frame & cover shall not be less than twenty four (24) inches for main sewers six (6) inches through eighteen (18) inches in diameter, and not less than thirty two (32) for main sewers greater than eighteen (18) inches in diameter;

(b) constructed using riser sections cast monolithically having a minimum lay length of sixteen (16) inches and of joint systems matching associated base and cone sections;

(c) constructed using a base section cast monolithically having a minimum lay length of sixteen (16) inches and a joint system matching associated riser and cone sections;

(d) constructed, where depth permits, using a precast eccentric transition section to reduce base section diameters of six (6) foot or greater, to five (5) foot diameter at finish grade. Such transitions shall not be made less than four (4) vertical feet above the invert bench;

(e) constructed, where manhole depth will not permit a diameter transition section, using a precast flat slab top section with centered thirty two (32) diameter hole for the manhole frame & cover opening;

(f) constructed using precast inverts providing clearance for pipe projecting a minimum of two (2) inch inside the manhole wall, troughs formed and finished to provide a minimum slope of 1.25% from the pipe outlet to the inlets, minimum concrete thickness from the bottom of the lowest invert to the bottom of the base not less than eight (8) inches, invert benches with a uniform 2:1 slope from the high point at the manhole wall to the lip of the invert trough; trough depth from the lip of the invert trough to the invert of the pipe to be 50% of the main pipe diameter; inverts shall be free from depressions, high spots, voids, chips or fractures over one fourth (¼) inch in diameter or depth;

(g) hand-formed inverts, when approved for use, shall meet or exceed the durability, strength, configuration and hydraulic "smoothness" as required for precast inverts. Filler for inverts shall be holed burned brick;

(h) steps, on the vertical or straight wall of four (4) foot and five (5) foot diameter manholes shall be aligned vertically on sixteen (16) inch centers, secured to the wall with a compression fit in tapered holes or cast in place, coated with a copolymer polypropylene plastic coating, reinforced with one-half (½) inch diameter grade 60 bar with serrated treads and tall end lugs; step pullout strength shall be 2000 lbs. minimum when tested according to ASTM C497; steps shall begin no less than eighteen (18) inches from the manhole rim and end no closer than sixteen (16) inches above the manhole bench;

(i) steps shall not be used on manholes greater than five (5) foot in diameter or where a concentric cone or flat-slab top is the final section;

(j) lifting, devices for handling precast manhole section components shall comply with OSHA Standard 1926.704;

(k) manhole entrance couplings with the entry pipes greater than eighteen (18) inch in diameter shall be fitted with pipe entrance connectors conforming to ASTM C923, and for eighteen
(18) inch pipes and smaller to ASTM C-425 using neoprene boot inserts tightened to the pipe using a stainless steel adjustable band, ("A-Loc" or approved equal), rigid cement or synthetic type grout collars are not acceptable as a seal between the manhole and entry pipe in new construction.

3.5.6.3 *Fiberglass Manholes*

Watertight fiberglass manholes shall be reinforced polyester manufactured from commercial grade polyester resin or other suitable polyester or vinyl ester resins with fiberglass reinforcements. Manhole shall be a one piece unit manufactured to meet or exceed all specifications of A.S.T.M. D-3753 latest edition or approved equal.

Fiberglass manholes shall be bedded and fully encased in a Class I gravel envelope from the base to the top of the fiberglass structure to insure lateral support; the thickness of the gravel envelope shall be no less than six (6) inches around the entire circumference of the structure.

(a) Resin: The resins used shall be a commercial grade unsaturated polyester resin or other suitable polyester or vinyl ester resin.

(b) Reinforcing Materials: The reinforcing materials shall be commercial Grade "E" type glass in the form of continuous roving and chop roving, having a coupling agent that will provide a suitable bond between the glass reinforcement and the resin.

(c) Interior Surfacing Material: The inner surface exposed to the chemical environment shall be a resin-rich layer of 0.010 to 0.020 inch thick. The inner surface layer exposed to the corrosive environment shall be followed with a minimum of two passes of chopped roving of minimum length 0.5 inch (13 mm) to maximum length of 2.0 inch (50.8 mm) and shall be applied uniformly to an equivalent weight of 3 oz/ft. Each pass of chopped roving shall be well rolled prior to the application of additional reinforcement. The combined thickness of the inner surface and interior layer shall not be less than 0.10 inch (2.5 mm).

(d) Wall Construction Procedure: After the inner layer has been applied the manhole wall shall be constructed with chop and continuous strand filament wound manufacturing process, which insures continuous reinforcement and uniform strength and composition. The cone section, if produced separately, shall be affixed to the barrel section at the factory with resin-glass reinforced joint resulting in a one-piece unit. Seams shall be fiber-glassed on the inside and the outside using the same glass-resin jointing procedure. Field joints shall not be acceptable by anyone other than the manufacturer or approved equal.

(e) Exterior Surface: For a UV inhibitor the resin on the exterior surface of the manhole shall have gray pigment added to a minimum thickness 0.125 inches.

(f) Stub-outs and Connections: Upon request stub-outs may be installed. Installation of SDR, PVC, or sewer pipe must be performed by sanding, priming, and using resin fiber-reinforce hand lay-up. The resin and fiberglass shall be the same type and grade as used in the fabrication of the fiberglass manhole. Inserta-Tee fittings may be requested and installed per manufacturer's instructions. Kor-N-Seal boots may be installed by the manhole manufacturer using fiberglass reinforced pipe stub-outs for the Kor-N-Seal boot sealing surface.

(g) Manhole Bottom: Fiberglass manholes will be required to have resin fiber-reinforced bottom. Deeper manholes may require a minimum of two fiberglass channel stiffening ribs. All fiberglass manholes manufactured with a fiberglass bottom will have minimum three (3) inch wide anti-flotation rings as required based on the depth of the manhole, the weight of the gravel backfill and the groundwater uplift forces anticipated at the site. The manhole bottom shall be a minimum of one-half (½) inch thick.

(h) Fiberglass enclosed invert and bench area: A fiberglass enclosed invert and bench area shall be installed in the manhole by the manufacturer. The invert will be formed using a non-corrosive material and completely enclosed in a minimum one-fourth (1/4) inch layer of fiberglass chop.

(i) Height Adjustment: Fiberglass manholes must have the ability to be height adjustable with the use of a height adjustment ring. Height adjustment can be made as a field operation without the use of uncured resins or fiberglass lay-ups. Fiberglass manholes must maintain all load and soundness characteristics required by ASTM D3753 after height adjustment has occurred.

(j) Fillers and Additives: Fillers, when used, shall be inert to the environment and manhole construction. Sand shall not be accepted as approved filler. Additives, such as thixotropic agents, catalysts, promoters, etc., may be added as required by the specific ASTMD- 3753 standard. The resulting reinforced-plastic material must meet the requirements of this specification.

(k) Manufacture: Manhole cylinders, man-way reducers, and connectors shall be produced from fiberglass-reinforced polyester resin using a combination of chop and continuous filament wound process.

(l) Interior Access: All manholes shall be designed so that a ladder or step system can be supported by the installed manhole.

(m) Man-way Reducer: Man-way reducers will be concentric with respect to the larger portion of the manhole diameters through 60 inches. Larger manholes may have concentric or eccentric man- way reducer openings.

(n) Cover and Ring Support: The manhole shall provide an area from which a grade ring or brick can be installed to accept a typical metal ring and cover and have the strength to support a traffic load without damage to the manhole.

(o) Exterior Surface: The exterior surface shall be relatively smooth with no sharp projections. Handwork finish is acceptable if enough resin is present to eliminate fiber show. The exterior surface shall be free of blisters larger than 0.5 inch in diameter, de- lamination, or fiber show.

(p) Interior Surface: The interior surface shall be resin rich with no exposed fibers. The surface shall be free of crazing, de- lamination, and blisters larger than 0.5 inch in diameter, and wrinkles of 0.125 inch or greater in depth. Surface pits shall be permitted if they are less than 0.75 inch in diameter and less than 0.0625 inches deep.
Voids that cannot be broken with finger pressure and are entirely below the resin surface shall be permitted if they are less than 0.5 inch in diameter and less than 0.0625 inch thick.

(q) Wall Thickness: Fiberglass manholes forty eight (48) inch in diameter and up to twenty (20) feet in depth will have a minimum wall thickness of .3125 inches. Fiberglass manholes forty eight (48) inch in diameter and twenty (20) feet to thirty (30) feet in depth will have a minimum wall thickness of .5 inches.

(r) Repairs: Any manhole repairs are subject to meet all requirements of this specification.

(s) Manhole Length: Manhole lengths shall be in six (6) inch increments +/- two (2) inches.

(t) Diameter Tolerance: Tolerance of inside diameter shall be +/- 1% of required manhole diameter.

(u) Load Rating: The complete manhole shall have a minimum dynamic-load rating of 16,000 lbs. when tested in accordance with ASTM 3753 8.4 (note 1). To establish this rating the complete manhole shall not leak, crack, or suffer other damage when load tested to 40,000 lbs. and shall not deflect vertically downward more than 0.25 inch at the point of load application when loaded to 24,000 lbs.

(v) Stiffness: The manhole cylinder shall have the minimum pipe-stiffness values shown in the table below when tested in accordance with A.S.T.M. 3753 8.5 (note 1).

Figure GS-3
Pipe-Stiffness Table

LENGTH (FT)	F/AY (PSI)
3.0 to 6.5	0.75
7.0 to 12.5	1.26
13.0 to 20.5	2.01

(w) Soundness: In order to determine soundness, the manufacturer shall apply an air or water pressure test to the manhole test sample. Test pressure shall not be less than 3 psig or greater than 5 psig. While holding at the established pressure, inspect the entire manhole for leaks. Any leakage through the laminate is cause for failure of the test. Refer to ASTM 3753 8.6.

(x) Chemical Resistance: The fiberglass manhole and all related components shall be fabricated from corrosion proof material suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with the wastewater collection system.

(y) PHYSICAL PROPERTIES:

	Hoop	**Axial**
Tensile Strength (PSI)	18,000	5,000
Tensile Modulus (PSI)	600,000	700,000
Flexural Strength (PSI)	26,000	4,500
Flexural Modulus (PSI)	1,400,000	700,000
Compressive (PSI)	18,000	10,000

(z) TEST METHODS/QC/CERTIFICATION: All tests shall be performed as specified in ASTM 3753 latest edition, section 8. Test method D-790 (see note 5) and test method D-695; each completed manhole shall be examined by the manufacturer for dimensional requirements, hardness, and workmanship. All required A.S.T.M. 3753 testing shall be completed and records of all testing shall be kept and copies of test records shall be presented to customer upon formal written request within a reasonable time period; and as a basis of acceptance the Manufacturer shall provide an independent certification which consists of a copy of the manufacturer's test report and accompanied by a copy of the test results stating the manhole has been sampled, tested, and inspected in accordance with the provisions of this specification and meets all requirements.

3.5.6.4 Manhole Frames and Covers

Manhole frames and covers shall be Gray Cast Iron conforming to specification ASTM-A48 Class 35B. Castings shall be of uniform quality, and free from blowholes, porosity, hard spots, shrinkage distortion and other defects. Frames and covers shall be smooth, well-cleaned by shot blasting and shall remain unpainted. All castings shall be manufactured true to pattern, and component parts shall fit together in a satisfactory manner. The frame and cover shall be designed to withstand an AASHTO H-20 wheel loading. The frame and cover shall have an "O" Ring type rubber seal or neoprene gasket designed to eliminate or significantly reduce surface water infiltration, have two non-penetrating pick-holes in the cover and four one (1) inch diameter anchor holes in the frame flange. The cover shall read "Sanitary Sewer"

(a) manhole frames and covers on four (4) foot diameter manholes shall have a minimum inside opening diameter of not less than twenty three (23) inches and no more than twenty four (24) inches and considered a standard twenty four (24) inch frame & cover;

(b) manhole frames and covers on five (5) foot diameter manholes and greater shall have a minimum inside opening diameter of not less than thirty (30) inches and not more than of thirty one (31) inches and considered a standard thirty two (32) inch frame & cover;

(c) manhole frames and covers within easements and in areas where security is an issue shall be equipped with manhole locking devices or bolt down covers.

3.6 INSTALLATION OF SEWER MAINS AND APPURTENANCES

The contractor shall install gravity sewer systems in accordance with the installation specifications detailed in this section. All references to industry standards (ASTM, ANSI, AWWA, etc.) shall be to the latest revision unless stated otherwise.

3.6.1 Gravity Sewer Main Depth

Gravity sewer mains shall be designed meeting minimum depth requirements of thirty six (36) inches as measured from finished grade to pipe crown. This depth is based on the minimum height of standard precast manhole sections commonly available; however, where manholes are made of fiberglass or other approved materials where manhole depths can be manufactured to specified heights, this depth restriction may be waived and a minimum depth of thirty (30) inches approved.

Gravity sewer mains with service laterals shall not be constructed at any depth greater than fifteen (15) feet as measured from finished grade to pipe crown.

Gravity sewer mains without service laterals shall not be constructed at any depth greater than twenty (20) feet as measured from the finished grade to pipe invert. Where such deep lines must be constructed, a gravity sewer high-line with services connecting directly into the deep manholes will be allowed. Such high-lines must be off-set at least ten (10) foot laterally from the deep line. Major sanitary sewer transmission mains eighteen (18) inch diameter and greater may be excepted from depth restrictions upon approval by the JWSC.

3.6.2 Gravity Sewer Main Location and Alignment

Gravity sewer mains shall be designed for installation on the centerline of roadways as much as possible where landscaping, trees or other obstruction to manhole access is anticipated or probable.

At no time, shall gravity sewer mains or manholes be less than ten (10) feet inside of road rights-of-way lines. Gravity sewer manholes may not be designed or constructed to be less than four (4) feet off roadway curb & gutters. No gravity sewer manholes may be designed or constructed to lie within ditch lines.

Gravity sewer mains shall be installed with a straight alignment between manholes.

Gravity sewer mains up to twelve (12) feet in depth that are not in public rights-of-way shall be centered in a twenty (20) foot wide exclusive easement dedicated to the JWSC. The JWSC retains the right to require additional or less easement width where maintenance or access circumstances warrant.

Gravity sewer mains greater than twelve (12) feet in depth that are not in public rights-of-way shall be centered in a thirty (30) foot wide exclusive easement dedicated to the JWSC. The JWSC retains the right to require additional or less easement width where maintenance or access circumstances warrant.

All gravity sewer main easements shall be accessible and unobstructed to JWSC maintenance vehicle traffic with a stabilized twelve (12) foot wide access with a minimum Load Bearing Ratio (LBR) of 30. The access must be adequately graded for service vehicle use and provided with adequate drainage. The access travel area may, at minimum, be composed of a sturdy grassed surface to prevent erosion from storm runoff and maintainable by mowers or bush hogs.

Easements interrupted by wetlands, streams or ditches that would preclude the travel of maintenance equipment from end to end must be provided with auxiliary lateral ingress/egress easements to permit access to the sewer line easement so that each line segment and manhole is accessible to maintenance service vehicles. A truck turnaround area should be provided at the intersection of all ingress/egress and sanitary sewer line easements.

A horizontal distance of six (6) feet minimum shall be maintained from all gravity sewer mains or manholes to drainage structures, telephone duct banks, electrical transformers, signal relays, power poles and other structures in the right-of-way as well as any other parallel underground utilities. Gravity sewer mains crossing other underground utilities, (with the exception of water mains), shall have a minimum vertical separation of six
(6) inches. All distances shall be measured from the outside edge of the pipes. Exceptions must be approved by JWSC.

Gravity sewer mains located adjacent to storm water retention, ponds, lakes and water courses shall be designed with sufficient easement and spacing from bank crowns. The potential for side slope collapse shall be based on 3 to 1 side slopes and the pipe's depth of bury. The JWSC reserves the right to require casing pipe in such situations where inadequate spacing can be demonstrated.

3.6.3 Gravity Sewer and Water Main Separation Requirements

There should be no physical connections between a public or private potable water supply system and a sanitary sewer, or appurtenances which would permit the passage of any sewage or polluted water into the potable supply. No water pipes shall pass through or come in contact with any part of a sewer manhole.

Sanitary sewers shall be laid at least ten (10) feet horizontally from an existing or proposed water main. On a case by case basis, when this separation is not possible or practical, a deviation may be allowed if the water main is in a separate trench or on an undisturbed earth shelf located on one side of the sewer and at an elevation so that the bottom of the water main is at least eighteen (18) inches above the top of the sanitary sewer.

At crossings, pipe joints shall be as far as possible and equidistant from the point of crossing. Water main preferred on top. Separation shall be measured from the outside edge of the pipe to the outside edge of the pipe. A full length of water main pipe must be centered at the crossing. Water pipe joints shall be arranged so that all water main joints are at least six (6) feet from all gravity sewer line joints. Where a water main must cross under a gravity sanitary sewer, adequate structural support shall be provided for the sewer to prevent damage to the water main.

3.6.4 Encasements and Casing and Aerial Crossings

Reaches of gravity sewer located in easements that cross wetlands, which are to be restored as wetlands, shall be sub-aqueous, shall be encased in corrosion resistant coated steel or Fusible PVC casing and treated for leakage. Those runs which include manholes, located across wetlands, shall be accessible to maintenance vehicles. A stabilized access road, twelve (12) foot wide with a minimum Load Bearing Ratio (LBR) of 30 shall be provided and indicated on the Record Drawings for easements requiring multiple manholes. The access road should be designed to provide for adequate drainage and to prevent erosion from storm runoff. A truck turnaround area should be provided at the end of all access roads.

Reaches of gravity sewer located in easements that cross under streams or within three (3) vertical feet of the bottom of canals, ponds, lakes or ditches that may be considered Waters of the State or otherwise environmentally sensitive due to local recreational use, shall be sub- aqueous, shall be encased in a corrosion resistant coated steel or Fusible PVC casing and tested for leakage.

Casing ends shall extend a minimum of twenty five (25) feet beyond stream banks and be electronically marked using an approved method or signed to show the casing end points. Such crossings shall be limited in length as much as possible and no reach of gravity sewer across such water body shall exceed four hundred (400) linear feet between manholes.

Reaches of gravity sewer crossing public rights-of-way on State, County and City Primary Roads or railroads shall be encased in corrosion resistant coated steel or Fusible PVC casing (if allowed by the Railroad or Department of Transportation Authority) and tested for leakage. Casing ends shall extend a minimum of ten (10) feet beyond the furthermost edge of pavement, curb and gutter, storm drain systems or sidewalks, whichever is greater, and be electronically marked using an approved method to allow the positive identification of casing end points. Such crossings shall be limited in length as much as possible and no reach of gravity sewer shall exceed four hundred (400) linear feet between manholes.

Reaches of gravity sewer crossing streams, ditches and canals where sub-aqueous crossings are not practical by system design due to grade considerations may be aerial crossings. Where stream width allows, one pipe joint of Sewer Safe DIP shall be used with precast concrete pipe piers having saddle type top sections and anchored galvanized pipe straps. Such piers shall be set a minimum of ten (1) feet beyond the existing stream banks with bases set a minimum of two (2) feet below the existing stream bottom. Where the stream width dictates that more than one joint of Sewer Safe DIP be used, the crossing pipe shall be Sewer Safe DIP flanged joint with piers set adjacent to each pipe joint and end piers set and as specified for single joint crossings. Attachment to stream bridges and or other stream crossing structures will not be permitted.

3.6.5 Gravity Main Stub-outs

Gravity sewer main stub-outs shall be provided to all undeveloped property and/or future phases of the project in accordance with the sewer master plan for the collection system service area.

Where gravity stub-outs are required, they shall be extended to within four (4) feet of the property line, plat line or phase line and shall extend a minimum of ten (10) feet past the edge of pavement or a distance of 1.5 times the sewer depth whichever is greater. The stub-out shall be terminated with a "no-invert" manhole with the effluent line plugged by a mechanical plumber's plug. ***(See JWSC Standard Detail)***

Where gravity sewer extensions are made where there is no reasonable definition of undeveloped or un-subdivided property to be served with a stub-out, as specified above, the end of line manhole shall be set so as not to accept any wastewater contribution from the installed system and be constructed without an invert or any influent line wall core or hole.

3.6.6 Sewer Services

Single gravity services shall be provided to each lot or parcel provided that adequate and accessible utility corridors are also provided for maintenance.

Each residential lot shall have only one connection point to the public sanitary sewer system main.

Where commercial developments require multiple connection points to a sanitary sewer main, an internal privately owned piping system shall be installed that will drain to the public main at only one connection point.

Where services must be constructed through private property to access the public sanitary sewer system, it is the property owner's responsibility to secure a private sewer utility easement with the owner of the property through which the line will be constructed and provide documentation of such filed easement with the JWSC.

Gravity sewer services shall be at least one nominal diameter less than the size of the gravity main to which it is connected. Where the size of the service must be the same size of the main a sanitary sewer manhole shall be installed. No sanitary sewer service that is larger than the diameter of the serving sewer main shall be permitted unless specific plans by the JWSC to upgrade the sewer main allow a temporary connection to be approved.

Gravity sewer services shall be a minimum of four (4) inches in diameter where serving a single unit or six (6) inches in diameter where serving two lots with a common connection to the main. All service laterals shall be constructed from the main to the lot to be served at a one-eighth (1/8) inch per foot slope (1%).

Gravity sewer service stub-outs shall be marked with a two (2) inch diameter pressure treated pine post. The bottom of the post shall be set two (2) to three (3) inches above the top and directly over the end of the stub-out and protrude approximately two (2) feet above finished grade. The post shall be painted green.

A service shall be designed to connect to the gravity main with an inline wye fitting rotated 45 degrees up. The invert elevation of the service at the wye connection shall be at or above the crown of the mainline pipe and the sewer flow shall enter the main through the wye positioned at 10 o'clock or 2 o'clock on the main. No service connections made at the 12 o'clock position on a main will be acceptable ***(See JWSC Standard Details).***

Single/Multiple Family Residential Gravity Sewer Services:

(a) Where a service is to serve a single lot or a lot on which an indivisible duplex, triplex or quadraplex unit is being constructed, the service shall be installed at the center of the lot and front the property being served. Such services shall be perpendicular to the main. All service stub-outs shall be properly marked as noted above and shall have a clean-out installed within one foot of the property or easement line and within private property, to separate private from public responsibility upon connection. The responsibility for the clean-out shall be the owners ***(See JWSC Standard Details).***

(b) Where adjacent residential properties can share a common service line the service wye that splits the discharge between the users must be constructed completely within the public rights-of- way corridor or easement using a six by four (6X4) inch double- wye fitting with the four (4) inch branching service lines from the wye ending at a point at the property line that will not conflict with other utility components such as transformers, phone pedestals, water meters, light poles, etc. Each four (4) inch branch stub-out shall be properly marked as noted in this Section and shall have a clean-out installed within one foot of the property or easement line and within private property, to separate private from public responsibility upon connection. The responsibility for the clean- out shall be the owners. Such double services may be approved for light commercial properties upon approval of the JWSC ***(See JWSC Standard Details).***

Double services, as described above may be applicable for certain commercial properties upon approval by the JWSC.

Services shall be limited to 60’ maximum length from either the sewer main or the manhole to the property line.

All services shall run perpendicular to the gravity sewer main line; no services shall be constructed parallel to the rights-of-way or easement line or run diagonally across rights-of-ways or easements with the exception of cul-de-sacs or where sharp curves in roadways or easements occur..

Services shall be marked with an “**S**” inscribed in the curb face, directly over the service line, and painted green.

Services shall terminate no less than thirty (30) inch deep and no greater than sixty (60) inch deep at the property line and where not expected to be in conflict with other crossing underground utilities.

Services that cross under storm drain structures or ditches, and do not have a minimum one and one half (1 1/2) foot vertical clearance between the invert of the storm drain pipe or the ditch bottom, shall be constructed with one joint of sewer safe D.I.P. centered under the storm pipe or ditch.

Private clean-outs shall not be installed in the Rights-of-way or easements. The responsibility for the protection and repair of clean-out shall be the owners.

Service connections are not permitted on trunk sewers larger than 15" in diameter.

Service Connections to manholes are allowed as follows:

(a) Inline manhole connections are limited to 2 services, one from each side of the rights-of-way or easement and installed perpendicular to the Rights-of-Way or easement.

(b) Terminal manholes located in residential cul-de-sacs are allowed 3 service connections. The invert of each service connection shall be a minimum of five (5) inches above the invert of the manholes effluent (outgoing) main line.

Services shall not be connected to main line stub-outs without a manhole.

3.6.7 Sewer Manholes

3.6.7.1 Location

Manholes shall be installed at the end of each main and at all changes in grade, pipe size, pipe material, or alignment and at all pipe intersections. The only recognized exception shall be where pipe material changes are allowed on a particular reach of main by this standard (i.e. D.I.P installed under storm drains, water mains, etc.).

Manholes where pipe diameter changes occur shall establish invert elevations by matching pipe crowns. Where the vertical difference in pipe inverts, caused by matching crowns occurs, are less than 1.5 feet in 4' diameter manholes and 2 feet in 5' or larger manholes between influent and effluent lines, transitional flow slides may be used so long as they do not interfere with the smooth flow through the primary manhole trough or other influent line flows.

Manholes shall be located on the centerline of roadways or out of the wheel lane and a minimum of four (4) feet from the edge of the manhole to the curb and gutter; but never installed in ditch lines.

Manholes shall not be installed in the flow line of inverted crown roads or within the design high water limits of gutters, swales, or retention/detention areas.

Manholes located within easements shall have the ring and cover set six (6) inches to eight (8) inches above final grade.

3.6.7.2 Spacing

The maximum spacing of manholes shall be four hundred (400) feet for sewer mains less than or equal to fifteen (15) inches diameter and five hundred (500) feet for sewer mains greater than fifteen (15) inches diameter. A gravity main exceeding the maximum length may be allowed where a practical and sufficient reason can be demonstrated; however, such additional length shall not exceed the allowed maximum distance by more than fifty (50) feet.

3.6.7.3 Clearance Requirements

Manholes shall have three (3) feet minimum clearance from outside edge to outside edge of other utility components, such as storm drains and storm drain boxes, utility poles, transformers, phone pedestals and cable systems.

3.6.7.4 Depth

The design depth for all manholes is to be at no less than thirty six (36) inches from the top of the manhole to the pipe crown.

3.6.7.5 Drop Connections

Outside and Inside drop connections are only allowed within limited boundary subdivision developments to be dedicated as public infrastructure, where the potential for gravity system extensions from the manhole to adjacent properties is blocked or unanticipated by the sewer master plan, and the main line pipe size is eight (8) inches or greater. Where outside drops are acceptable, they shall be required where the vertical difference between inverts is greater than one and one-half (1 ½) feet in four (4) foot diameter manholes or two (2) feet in manholes greater than four (4) feet in diameter ***(See JWSC Standard Details).*** Inside drops will only be approved where connections are being made to an existing system where depth restraints preclude the practical installation of an outside drop.

Outside drops, where the vertical distance of the drop is ten (10) feet or less, shall be constructed of SDR-35 PVC pipe, bedded and backfilled along with the entire manhole structure to within ten (10) inches of the final grade with Class I material; where the vertical distance of the drop is greater than ten (10) feet, the drop shall be encased in a concrete column of a minimum two (2) inches thickness around all pipe walls, and poured so as to provide a concrete base as a foundation for the drop bottom connection; the entire concrete structure shall be tied to the manhole wall with rebar studs for the full depth of the drop.

Inside drops, where approved, must enter the manhole with a PVC tee fitting with a gasketed cap cut to one-half (½) of the host pipe diameter attached to the branch following the slope of the pipe reach being drained, the down leg placed closely against the manhole wall fastened with (316) stainless steel anchor bolts and bands on two (2) foot centers, an angled fitting and invert trough at the base to direct the flow smoothly into the existing flow line; all PVC piping and fittings shall be SDR-35 ***(See JWSC Standard Details).***

3.6.7.6 Grade Rings

Grade rings, where necessary to serve as spacers between the top cone of the manholes and the base of the manhole cover frame to bring the manhole design or finish grade, shall be hard rubber or approved equal to absorb vibration in paved areas and high density polyethylene or cement rings in off road applications. Adjustments using clay or cement brick are not acceptable.

On new construction, an adjustment using metal riser rings to extend the manhole cover frame to grade is not permitted. No adjustment using grade rings between the top cone section and the manhole cover frame shall exceed sixteen (16) inches.

3.6.7.7 Corrosion Protection

Manhole corrosion protection shall be provided for manholes in accordance with the following schedule based on detention time of sewer flow from the uppermost region of the contributing pipe reach using an average velocity of two (2) feet/sec.

Vapor H2S	Corrosion Risk Level	Detention Time	Corrosion Protection
0-10 PPM	No or Low Risk	<2 Hours	None
11-50 PPM	Moderate Risk	2 - 4 Hours	Coal Tar Epoxies
>50 PPM	High Risk	>4 Hours	Calcium Aluminates Epoxy Coatings Approved Lining Systems
FM Discharge Manhole	High Risk	N.A.	Calcium Aluminates Epoxy Coatings Approved Lining Systems

(a) Corrosion protection for *High Risk* manholes shall be hydrogen sulfide resistant cementious products containing calcium aluminates applied at a minimum of one-half (½) inch to three- fourths (¾) inch in thickness or epoxy coatings applied a minimum of 150 mil thickness onto all interior manhole surfaces, excluding the trough, after proper substrate preparation; or precast manholes manufactured of calcium aluminate cement concrete; or manholes manufactured of fiberglass. Alternatives that provide equal or better protection may be approved.

(b) Any manholes receiving the discharge from upstream lift stations shall be considered a *High Risk* manhole and the 2nd and 3rd manholes downstream shall be considered *Moderate Risk* manholes and protected per this standard.

3.6.8 Pipe Trench Construction, Bedding, Backfill and Workmanship

At no time shall the bedding, haunching, initial backfill or final backfill be less than, or in contradiction to the pipe manufactures recommendations for the pipe materials being used.

3.6.8.1 Rigid Pipe

Rigid Pipe Materials (DIP) shall be laid in a Type 2 (flat bottomed) trench with a pipe bedding of Class I gravel or naturally occurring clean compacted sand, as necessary to provide a firm unyielding pipe foundation; or where the natural trench foundation is weak, on a Class I (#57 or #64 stone) gravel of sufficient depth to provide a firm and unyielding foundation, (in both cases, the compacted bedding shall extend across the entire width of the trench to undisturbed trench walls on either side of the pipe); initial backfill (from bedding to pipe crown) shall be hand tampered gravel or sand material free from cinders, ashes, refuse, vegetable, or organic material, boulders, rocks, or stones, frozen soil or other materials that, in the opinion of the JWSC is unsuitable. Final backfill in non-traffic areas, (from pipe crown to final grade), shall be Class IV material or better and free of boulders, rocks and stones greater than twelve (12) inches in their greatest dimension, tree trunks or limbs, brush from clearing, refuse or trash, frozen soil or any organic materials which may decompose and create voids. Final backfill in traffic areas shall be Class III material mechanically compacted in two (2) foot lifts to 95% modified proctor to within ten (10) inches of final grade, eight (8) inches of crusher run gravel compacted to 95% modified proctor, and two (2) inches of Type III asphalt pavement to final grade or other pavement type or dimension as required by the road authority on the encroachment permit.

3.6.8.2 Flexible Pipe

Flexible Pipe Materials (PVC, HDPE) shall be laid in a Type 2 trench with Class I gravel or naturally occurring clean compacted sand bedding material as necessary to provide a firm unyielding pipe foundation; or, where the naturally existing foundation is weak, on a Class I gravel bedding of sufficient depth to provide a firm and unyielding foundation; initial backfill (from bedding to crown of the pipe) shall be Class I material placed with shovel slicing (hauching) or clean naturally occurring hand- tamped sand along the sides of the pipe to insure firm side support and that no voids exist along the pipe barrel or between the pipe barrel and the undisturbed trench walls. Final backfill for traffic areas and non-traffic areas shall be as specified for rigid pipe materials.

3.6.8.3 Unsuitable Materials

Where rock or other unsuitable material is encountered at pipe grade, such rock or unsuitable material shall be removed to a minimum of six (6) inches below the proposed pipe grade line, refilled with Class I material to the correct pipe grade to protect the pipe from point loadings from below and provide base material for adjustment to grade and trench drainage; initial backfill and final backfill shall follow as per standards herein delineated.

3.6.9 Gravity Sewer System Testing and Inspection

All gravity sanitary sewer lines up to thirty (30) inches in diameter, to include connected services and/or main stub-outs shall be low pressure air tested in accordance with ASTM F1417 and conducted in substantial conformance with the procedures below.

a. air testing shall be performed as soon as possible after completing a reasonable length of gravity sewer installation, and before scheduling Preliminary Record Drawing Line Televising;

b. the system installer shall furnish all equipment, material, and personnel to conduct the test using low pressure air;

c. the test equipment shall be approved, and the test conducted in the presence of a JWSC Construction Inspector;

d. testing shall be conducted after backfilling has been completed but before finish grading or surface improvements;

e. all wye's, tees, and lateral stubs or other fittings shall be suitably capped to withstand the internal test pressures;

f. after a manhole-to-manhole section of line has been cleaned, it shall be plugged at each manhole with pneumatic plugs inflated to 25 psi internal pressure; plug bracing may be used as necessary to keep plugs from being blown out of lines;

g. one of the test plugs shall have two factory equipped hole connections in addition to the hose connection used to inflate the plug. One connection shall be used to continuously monitor the rising air pressure in the sealed line. The other connection shall be used only for introducing the low pressure air into the sealed line;

h. three and one-half (3 ½) inch diameter, 0-30 psi air gauge shall be supplied for reading the internal pressure of the line being tested. Calibrations from the 0-10 psi range shall be in tenths;

i. low pressure air shall be introduced into the sealed line until the internal pressure reaches 3.5 psi greater than the average back pressure of any ground water that may be above the pipe, but not greater than 9.0 psi. At least two (2) minutes shall be allowed for the air pressure to stabilize.

After this period the hose used to introduce the pressure shall be disconnected from the air source in such a manner as to retain the pressure in the sealed line and the compressor shut down;

j. the portion of the line being tested shall be accepted if it does not loose air at a rate greater than 0.0015 cfm per square foot of internal pipe surface when tested at an average pressure between 3.5 and 4.0 psi greater than any back pressure exerted by ground water that may be over the pipe at the time of the test;

k. time requirements for pressure drop of 1.0 psi or 0.5 psi 3.5 to 2.5 or 3.5-3.0 psi greater than the average back pressure of any ground water that may be over the pipe) shall not be less than the time shown for the given diameter in the tables provided in the ASTM Standards;

l. where high ground water is known to exist, the height in feet of ground water above the invert of the sewer shall be divided by 2.31 and added to 3.5 psi to establish the amount of pressure to be used for the test;

m. if, the line fails to meet the requirements of the test, the source of leakage shall be identified and corrected and the line retested.

3.6.9.1 Low Pressure Air Test

Gravity sewer mains greater than thirty (30) diameter shall be low pressure air tested at the joints and/or noted defects using equipment capable of isolating each joint or defect from the rest of the pipe. Testing pressures and passing values shall be the same as cited above.

3.6.9.2 Infiltration Test

Where gravity sewer lines cannot be low pressure air tested in accordance with this Standard, the system shall be subjected to an infiltration test to establish leakage less than 100 gallons per inch per day per mile (gal/in/day/mile) using a V-notch weir; however, where ground water conditions are not favorable for testing, (ground water levels less than eight
(8) feet over the pipe invert for any individual line segment), the end of the line to be checked shall be plugged at the downstream manhole, the upstream manhole partially filled to place a 3.5 psi head on the subject line at the lowest end, and the change in water depth noted during the test period converted to a volume; such volume and test time duration shall be compared against the 100 gal/in/day/mile Standard.

3.6.9.3 Vacuum Test

All sanitary sewer manholes shall be vacuum tested in accordance with ASTM C 1244-93 and conducted in substantial conformance with the following procedures:

a. The entire manhole structure, to include the joint between the cast iron frame & cover and the top cone or adjustment ring, shall be tested as a unit;

b. All lift holes shall be plugged

c. All pipes entering the manhole shall be temporarily plugged, taking care to securely brace the pipes and plugs to prevent them from being drawn into the manhole

d. Place vacuum test head on the top of the manhole structure, setting the sealing face so that the joint between the manhole frame & cover and the main structure is included in the area to be tested;

e. Draw a vacuum of ten (10) inches of mercury on the manhole, shut the valve on the vacuum line of the test head and turn off the vacuum pump;

f. Measure the time in seconds that it takes for the vacuum to drop to nine (9) inches of mercury;

g. Compare the time of the pressure drop from ten (10) inches to nine (9) inches of mercury with the allowable time value for the manhole diameter and depth as shown on the table in the Section appendix;

h. If the manhole fails the initial test, necessary repairs shall be made by an approved method and the manhole retested until a satisfactory test is obtained.

3.6.9.4 Visual Inspection

All sanitary sewer mains will be visually inspected using color CCTV provided equipment by a PACP (Pipeline Assessment Certification Program) certified operator using PACP certified software. This service will be provided by the JWSC upon demonstration by the installer that the sewer lines and manholes have passed air and vacuum tests, the lines have been hydraulically cleaned using a combination cleaner and presentation of a Preliminary Record Drawing of the sanitary sewer system as installed.

The CCTV equipment shall include inclinometer capabilities that capture the line grade values in percent as the camera proceeds along the line and also provides a chart showing the average line grade from pipe start to pipe end for verification of Record Drawing slopes. The system installer is responsible for providing adequate trafficable access to the system components to perform this work.

A CCTV re-inspection of any and all defects found in mains during any previous test shall be required prior to acceptance.

3.6.9.5 Deflection Testing

Deflection testing shall be performed on any flexible pipe reach installation where CCTV inspection observations indicate that the pipe may be deflected or ovalized in any dimension beyond allowable values. Where required, deflection testing shall be performed in substantial compliance with the following procedures:

a. Deflection testing shall be accomplished by pulling a five (5%) mandrel through the line if it has been installed for less than thirty days, or a seven and one-half (7 ½ %) mandrel on any line which has been installed longer than thirty days.

b. An approved mandrel, proving ring, pulling ropes and cables shall be provided by the installer for testing PVC pipe.

c. The mandrel shall be hand pulled through the pipe using no wenches or other mechanical devices except a pulley at the manhole invert. The pulley allows the mandrel to be pulled from ground level rather than from inside the manhole.

d. If, at any point in the pipe one (1) man is unable to hand pull the mandrel through the pipe, then the pipe will be deemed unacceptable.

e. The failed pipe shall be repaired by the installer, the mandrel re-pulled and the line re-televised at the Contractor's expense.

APPENDIX 3A
ACCEPTABLE MANUFACTURERS

APPENDIX 3A

GRAVITY SEWER SYSTEMS
ACCEPTABLE MANUFACTURERS

PARAGRAPH	PRODUCT	MANUFACTURERS
3.5	**Material Specifications**	
3.5.2	*PVC 1120, Class 160, SDR 26* *PVC 1120, Pressure Class (PC) 235*	Vulcan Plastics JM Eagle
	SDR 26 Gasketed Fittings	Multi-Fittings GPK Products Plastic Trends
	PVC 1120, Class 118, SDR 35	Vulcan Plastics JM Eagle
	SDR 35 Gasketed Fittings	Multi-Fittings GPK Products Plastic Trends
	No Hub Fittings	Fernco LDR
	PVC 1120, Class 150, DR 18	Vulcan Plastics JM Eagle
	DR 18 Sewer Safe Mechanical Joint Fittings	Star Pipe Sigma Corp.
3.5.3	*Ductile Iron Pipe*	Griffin Pipe US Pipe
	Ductile Iron Pipe Sewer Safe Mechanical Joint Fittings	Star Pipe Sigma Corp.
3.5.4	*High Density Polyethylene (HDPE) Pipe*	Performance Pipe JM Eagle Lamson & Sessions
3.5.5	*Fusible Polyvinyl Chloride (PVC) Pipe*	Underground Solutions Inc. (ONLY MANUFACTURE)
	Sewer Safe Coupling	HyMax Star Pipe Sigma Corp.
3.5.6	**Manholes**	
3.5.6.2	*Precast Concrete Manholes*	Hanson Pipe and Precast MegaCast MST Concrete Products
3.5.6.3	*Fiberglass Manholes*	L.F. Manufacturing, Inc.
3.5.6.4	*Manhole Frame and Covers*	U.S. Foundry and Manufacturing
3.6.7	**Sewer Manholes**	
3.6.7.6	*Grade Rings*	Sealing Systems, Inc. Custom Concrete
3.6.7.7	*Corrosion Protection*	
	Moderate Risk	Raven Epoxy Sewer Shield Parsonpoxy Hydro-Pox Epoxy

PARAGRAPH	PRODUCT	MANUFACTURERS
3.6.7	**Sewer Manholes**	
	High Risk	Spectra Shield SewperCoat Green Monster
	Significant Risk	SewperCoat Green Monster

SECTION 4
SANITARY SEWER LIFT STATIONS AND FORCE MAINS

TABLE OF CONTENTS

APPENDICES

SECTION 4

SANITARY SEWER LIFT STATIONS AND FORCEMAINS

4.1 GENERAL

This section provides the minimum guidelines for the design of wastewater lift stations and their associated forcemains that are considered an integral component of the facility's pumping system. The method of design and/or construction shall be according to, these Design and Construction Standards and Specifications and the following:

Recommended Standards for Sewage Works (Ten State Standards) Latest Edition

Georgia Environmental Protection Division State of Georgia Regulations for Water and Sewerage Works, Latest Edition

Applicable Federal, State and Local Requirements

In the event of conflicts among the various sources cited above, the most stringent criteria shall take precedence.

4.2 DESIGN FLOWS

Each system component shall be designed to meet certain flow requirements. The various flow requirements are described below.

4.2.1 Daily Average Dry Weather Flow (ADWF)

Daily Average Dry Weather Flow (ADWF) shall be 300 gallons per day per Residential Equivalent Unit (REU) or 115 gallons per day per capita. The basis for one (REU) shall be a single-family unit occupied by an average of 2.6 persons. Where sewer service beyond the basis of the established REU is required, the Sewage Flow Table shown below (Adapted from the Georgia Environmental Division Large Community Design Guidance Document, Pages 8 & 9, Appendix A) shall be used.

ADWF estimates for existing facilities that are scheduled for **rehabilitation** shall be made using data obtained from flow monitoring the existing system over a period of not less than seven (7) days, from which an average daily flow is to be developed. If any rainfall event measuring more than .5 (5/10ths) inches of rain in any of the seven (7) twenty-four
(24) hour periods occurs, the monitoring shall continue to provide at least seven (7) days without rainfall.

Flow monitored data shall be adjusted for other potential loadings as appropriate, (i.e. seasonal usages, tourist loading, etc.) as may be developed or estimated from water use records, percentage of increased occupancy or other rational methods approved by the JWSC.

ADWF for existing facilities that may be scheduled for **upgrading to accommodate additional flows** from proposed developments shall be made using a combination of flow monitoring and REU calculations.

Figure LS-1
Sewage Flow Table

FACILITY	Gallons/Day (GPD)
Assembly Hall	5 per seat
Barber Shop/Beauty Parlor	125 per chair + 20/employee
Boarding House*	100 per room
Bowling Alley	75 per lane + 20/employee
Church w/o Day Care or Kindergarten	5 per sanctuary seat
Correctional Institution/Prison	250 per inmate
Country Club, Recreation Facilities Only	25 per member
Day Care Center, No Meals	15 per person
Dental Office	100 per chair + 20/employee
Department Store	10 per 100 SF
Factory	
Without Showers	25 per employee
With Showers	35 per employee
Food Service Establishments*	
Restaurants (Up to 12 hours per day)	35 per seat + 20/employee
Restaurants (12 hours per day to 18 hours per day)	50 per seat + 20/employee
Restaurants (Above 18 hours per day)	75 per seat + 20/employee
Bar and Cocktail Lounge	30 per seat + 20/employee
Drive-in Restaurant	50 per space + 20/employee
Carry-out Only	50 per 100 SF + 20/employee
Funeral Home	10 per 100 SF
Hospital	
Inpatient	300 per bed
Outpatient	275 per bed
Hotel*	100 per room
Kindergarten, No Meals	15 per person
Laundry, Commercial	1,000 per machine
Laundry, Coin	150 per machine
Lodges*	100 per room
Mobile Home Park	300 per site
Motel*	100 per room
Nursing Home*	150 per bed
Office	10 per 100 SF
Physician's Office	200 per exam room
Schools*	
Boarding	100 per person
Day, Restrooms Only	12 per person
Day, Restrooms and Cafeteria	16 per person
Day, Restrooms, Gym and Cafeteria	20 per person

FACILITY	Gallons/Day (GPD)
Service Stations, Interstate Locations	425 + 150 per pump
Service Stations, Other Locations	300 + 100 per pump
Service Station Car Wash	500 per stall
Shopping Center (Not including food service or laundry)	10 per 100 SF
Stadium	5 per seat
Supermarket/Grocery Store	20 per 100 SF
Theater	5 per seat
Travel Trailer Park* With Independent Water & Sewer Connection Without Independent Water & Sewer Connection	 175 per site 35 per site
Warehouse	10 per 100 SF
*Add 300 gallons per machine to amount indicated if laundry or dish washing machines are installed	

Note: Where historical data is available from flow monitoring or other approved devices as in the case of existing systems, ADWF shall be as averaged from seven (7) days within the monitoring period of flow with no rainfall event greater than .5 (5/10ths) inches of rain in any of the seven(7) twenty-four (24) hour periods being averaged.

4.2.2 Peaking Factors

Upon calculation of the anticipated ADWF in gallons per day for the basin that is to discharge to the pumping facility, a peaking factor of 2.0 shall be applied to the average daily flow expressed in gallons per minute, (ADWF in gpd / 1,440 minutes per day = ADWF in gpm), to account for the daily (diurnal) peak flow in gallons per minute. This gpm figure with the Peaking Factor being applied shall be the required pump rate for the facility; (i.e. 46,080 gpd/1,440 minutes per day = 32 gpm ADWF * 2.0 = 64 gpm = required pump rate). This factor has been determined adequate for pump sizing in the JWSC jurisdictional area and is based on a series of flow monitoring studies conducted on existing lift station basins ranging in size from 25 REU's to 200 REU's (per capita populations of 65 to 520, respectively).

4.3 SIZING OF FORCE MAINS

The discharge piping, to include valves, bends and the force main is to be considered an integral part of the lift station pumping system whether the facility is new or being upgraded to handle additional flows.

Force mains and associated discharge piping for a single family use lift station discharging to gravity shall be sized for peak flow (required pump rate) at a minimum velocity of 2.0 fps with one pump running and a maximum velocity of
5.0 fps with both pumps running in a duplex station.

For triplex or quadraplex facilities velocity shall not exceed 5.0 fps with two or three pumps running respectively.

Common force mains for low pressure or STEP type systems shall be sized for the flow of the planned system based on the probability analysis of simultaneous pump operation in each pressure zone and line segments common to pressure zones. Line velocities, based on this analysis, shall be a minimum of 2.5 fps at least once during the 24 hr diurnal cycle and no greater than that velocity necessary to discharge the highest head pump on the pressure zone at 11 gpm.

4.4 WETWELL DESIGN CRITERIA

4.4.1 Wetwell Volume

The minimum required wet well storage volume between the SCADA High Water Alarm Level and the all pumps "off" level (top of the submersible pump motor or the required submergence of a self-priming pump suction leg) shall be calculated as follows:

$$\textbf{Required Volume} = V_R = .25TQ + V_L + V_A$$

Where:

T = Minimum Cycle Time (see table below) Q = Required Pump Rate
V_L = Lag Level Volume
V_A = SCADA High Water Alarm Level Volume

Pump Hp	Minimum Cycle Time (T)
<20	15 Minutes
20 to 100	20 Minutes
>100	25 Minutes

The distance/volume between the pump "off" level, mid-motor pump housing elevation to the wet well bottom is subject to pump dimensions and is not considered useable volume. The designer shall be responsible for calculating this additional vertical distance and adding this additional wet well depth.

4.4.2 Wetwell Level Control Settings

To reduce wetwell turbulence caused by cascading influent that results in odor/corrosion problems and air entrainment, and to provide wet well structures that are in large degree self-cleaning, this Standard requires that the invert of the wet well influent line coming from the contributing system influent manhole be set at the mid-motor elevation of submersible pumps or at the required submergence elevation of suction lift pumps plus
0.5 feet. This vertical increment will ensure a reasonable time period of free flow through the gravity influent line and influent manhole at the design pump rate and thereby the full development of self-cleansing velocity, through these structures as required in this standard.

Based on this requirement, the design settings for level control in wet wells shall be as follows:

Low Water Level (LWL) Alarm: Top of submersible pump volute.

Pump "Off" Level (Pump Off): 50% immersion of submersible pump motor mid-point of pump motor housing or pump manufacturers minimum water level, whichever is greater.

Lead Pump "On" Level (Pump On): The vertical dimension in the design wetwell from the Pump "Off" level needed to store the volume required by V=0.25TQ.

Lag Pump "On" Level (Lag On): Pump On Level + 0.5 vertical feet (6 inches) Lag Pump On settings for triplex or quadraplex pump installations shall follow the same dimensional protocol of 6 inch increments and be labeled as **Lag2 On**, **Lag3 On**, etc.

SCADA High Water Level (SHW): Highest Lag On level + 0.5 vertical feet (6 inches). This elevation shall not exceed the influent manhole lowest invert elevation or lowest invert elevation in the wetwell if an influent manhole is not used.

Audio/Visual High Water Level (AVHW): SCADA HW elevation +
0.5 feet (6 inches). This level setting is intended to mitigate neighborhood alarm noise complaints and the only setting that allows a surcharge of the lowest contributing gravity sewer system main entering the influent manhole.

Where primary level control is provided by a Level Transducer, the AVHW float ball and installation shall be as specified for all such devices in this Standard.

Note: Where flow matching pumping systems are approved for use, (either by VFD or mechanical flow matching technology using pre-rotation basin technology), level control settings shall be by specific facility design and as approved by the JWSC.

4.5 DEDICATED WASTEWATER LIFT STATIONS

Lift stations to be dedicated shall have a minimum required pumping rate of 22 gallons per minute (gpm) at peak diurnal flow and a minimum upstream contributory loading of 16,000 gallons per day (gpd) as calculated in Paragraph 4.2 of this Standard.

Lift stations not meeting this standard, shall be privately owned, operated and maintained under the supervision of a Licensed Georgia Wastewater Collections System Operator. Such privately owned facilities and their contributing gravity systems shall be considered Satellite Systems of the JWSC requiring an agreement with the JWSC to discharge to the Public System.

Any future consideration by the JWSC to accept Public ownership of a privately owned facility shall be precedent upon such facility's adherence to this Standard or upgrade to this Standard.

4.5.1 Lift Station Types

4.5.1.1 Low Flow Lift Stations

Low Flow Lift Stations shall be defined as those facilities whose loading requires pumping capacities between 22 gpm and 79 gpm. These facilities are intended to serve limited areas where the service area cannot be expanded, and wastewater service cannot be otherwise provided by on- site (septic) systems or low pressure systems capable of discharging to Public gravity. Such facilities, where approved, shall be grinder pump duplex stations meeting all criteria of this Standard.

4.5.1.2 Standard Lift Stations

Standard Duplex Lift Stations shall be defined as those facilities whose loading requires pumping rates between 80 gpm and 749 gpm.

Standard Triplex Lift Stations shall be defined as those facilities whose loading requires pumping rates between 750 gpm and 3,000 gpm. Triplex facilities shall be flow proportional and be equipped with an automatic standby power generator.

Standard Quadraplex Lift Stations shall be defined as those facilities whose loading requires pumping rates greater than 3,000 gpm. Quadraplex facilities shall be flow proportional and be equipped with an automatic standby power generator.

4.5.1.3 Initial/Ultimate Lift Stations

Initial/Ultimate Lift Stations shall be defined as those facilities whose initial loading requirement is significantly less than the ultimate loading requirement as determined by a submitted and approved build-out plan. Such facilities shall be designed to meet all criteria of this Standard with exceptions as noted herein.

4.5.2 Site Requirements

The property, on which the facility is constructed, is to include the influent manhole and all related lift station appurtenances.

4.5.2.1 Site Dimensions

Minimum site dimensions of the property shall be as follows:

a. Four (4) foot and five (5) foot diameter wet wells – minimum 30’ x 30’ (restricted to Low Flow Stations)

b. Six (6) foot and eight (8) foot diameter wet wells – minimum 50’ X 50’

c. Ten(10) foot diameter and greater – minimum 60’ X 60’

d. Rectangular structures – minimum 60’ X 60’

e. Irregular sites and site sizes may be considered by the JWSC where atypical conditions exist.

4.5.2.2 Fencing

Fencing is required on all sites and shall be placed a minimum of two (2) feet inside of all site property lines and constructed as follows:

a. The fence shall be six (6) feet high, consisting of two (2) inch mesh by nine (9) gauge aluminum coated steel fabric with green PVC coating, conforming to the latest revision of ASTM A-491. The fence shall have a seven (7) gauge aluminum coated steel coil spring tension wire along the bottom of the fence fabric.

Three strands of twelve and one-half (12-½) gauge aluminum coated steel of barbed wire with four (4) point aluminum barb spaced five (5) inches apart mounted on the barbed wire support arms shall be installed along the top of the fence fabric.

b. The posts shall be galvanized line posts, two and a half (2 ½) inch O.D. (3.65 lbs per ft); galvanized corner posts, three (3) inch O.D. (2.27 lbs per ft) with extra-long pressed steel sleeves. Corner and gate post shall have necessary struts and tie bracing. Provide watertight closure caps on all posts.

c. Gate shall be a pair of 8'-0" long (sixteen (16) foot total width) six (6) feet high sections and shall be equipped with a prop post center latch and hasp assembly. A ground anchor cast in concrete shall be provided. Gates shall be factory fabricated, green PVC coated conforming to the latest revision of ASTM A-429 and equipped with gate holders. Duckbill backstops shall be provided for swing side of both gate sections.

d. The gate entrance shall be set back at least twenty feet from a public or private road in order to allow vehicles to pull off the road before opening the gate.

e. Where aesthetics are a concern, the fencing cloth may be interwoven with vinyl stripping to obscure the site from public view. The color of stripping shall be dark green.

4.5.2.3 *Site Access, Ground Cover and Drainage*

a. The entire site shall be covered with a geotextile filter fabric covered with six (6) inches of compacted crusher run (GAB) stone. Stone shall be clean with no soil or foreign material present.

b. The graveled area shall be treated with a high quality, long lasting, EPA environmentally approved weed killer.

c. Site shall be serviced by a twelve (12) foot wide all weather road with top of road above the two (2) year flood elevation.

d. Drainage structures and conveyances shall not be allowed, and no catch basin shall be located within the pumping station site. The entire site shall be graded such that storm water runoff sheet flows outwards and away from structures and other appurtenances and into proper drainage channels.

e. No site shall be located within the backwater of any lake, pond, ditch, canal or other water body without such flood level being taken into consideration by raising the site grade, the structure openings or providing watertight structure hatches above such backwater levels. The twenty-five year flood elevation shall be the governing factor if backwater levels are not historically available or known.

f. Pump stations shall be designed and located on the site so as to minimize the effects resulting from odor, noise, and lighting.

g. Where the location of the facility would require backing onto a public road to leave the site an area along the access or at the facility gate shall be wide enough to provide a service vehicle turnaround.

h. Any proposed on-site landscaping or specialized ground cover being considered to improve the aesthetics of the site or block the site from view shall be approved by the JWSC. No trees will be permitted within the property boundary.

4.5.2.4 Site Electrical Power

a. All power lines within the site shall be underground. No overhead power line will be allowed to cross the site.

b. All facilities shall be served with three-phase power. If three-phase power is not available, the Design Engineer shall submit a copy of written communication from the commercial power provider stating at what cost three-phase power would be available. In cases where pump station location has been optimized for both elevation and power supply and providing three-phase power costs are disproportionally high, variable frequency drives (VFD's) will be considered to operate the three phase motors. Prior written approval will be required from the JWSC to utilize single-phase power. Add-a- phase units are not allowed.

c. A facility yard light and pole shall be provided for night operations and security purposes. The light shall be a 120V 500W Quartz or Halogen floodlight pointed at the control panel. The light shall be placed on a switch with a 24-hour timer capable of illuminating the facility on a selectable periodic basis. The switch and timer shall be housed in a weather-proof enclosure on the light pole. The light pole shall extend a minimum of twelve (12) feet from grade with the light fixture mounted within one (1) foot of its top for maximum coverage.

4.5.2.5 Facility Water Supply

a. The facility shall be provided with a one (1) inch water service line for clean-up use and testing.

b. The water service line shall be protected with the installation of a reduced pressure backflow assembly installed within the fenced enclosure. The RPZ shall be in accordance with Paragraph 2.4.6.2 of these Standards and Specifications.

   Where requested by the JWSC, the backflow preventer piping shall be provided with a 4-20 milli-amp pressure transducer to sense area potable water pressures.

c. The water service line shall incorporate a frost-proof yard hydrant. Yard hydrants are to be stainless steel and have locking capability. No water meter will be required for water use at lift stations.

4.5.2.6 Facility Bypass Pumping Connection

A facility bypass pumping connection shall be provided in accordance with the ***JWSC Standard Details.***

a. The facility shall be provided with an external connection to the force main serving the station for use during emergency and maintenance situations.

b. The bypass connection shall be sized to the diameter of the main pumps discharge line and be set downstream from the isolation valves of the main pump piping header.

c. The bypass connection shall be provided with a plug valve, set on the underground horizontal run to the bypass connection, and a check valve and CAM Lock with cap set on the aboveground horizontal run to the pump connection point.

d. The bypass connection shall be placed and oriented on the site to facilitate the setting of a bypass pump between the influent manhole and the bypass connection.

e. The bypass connection shall be provided with a 3'x3'x6" concrete slab base.

f. The point of attachment to the bypass connection shall be oriented horizontal and not protrude above its concrete slab more than 1 foot.

g. The bypass connection piping and fittings shall be epoxy lined "Sewer-Safe" D.I.P. with exterior coating the same as the lift station discharge header piping.

4.5.2.7 Facility Elevation Benchmark

A Standard Brass Benchmark shall be set into the wet well slab top with the NAVD88 Mean Sea Level Elevation stamped on the face of the benchmark by a Georgia Registered Land Surveyor. An alternate location for the benchmark may be approved where structure configuration is atypical.

4.5.3 Wetwell Configuration

4.5.3.1 Size and Depth

a. The maximum wetwell depth, as measured from the wet well rim to the lowest point of the sump, shall not exceed 20 feet.

b. The minimum circular wetwell diameter shall be 6 feet; (surface area 28ft^2), for all but low flow stations for which wet well diameters of five (5) feet shall be used.

c. The minimum rectangular wetwell dimensions, where approved for special applications where wetwell depth is critical, shall be 6 feet by 6 feet or other dimension providing an equal or larger surface area; (surface area 36ft^2).

d. Where the JWSC has approved a facility having an initial and an ultimate flow design, the wetwell shall be sized for the ultimate pump rate whereas the storage height (and consequent level control settings) shall be established on the initial pump rate. The level settings shall be as stipulated in Paragraph 4.4.2 of this Standard.

4.5.3.2 Piping and Equipment Layout

a. All wetwell inverts and pump intake sumps shall be configured to provide self-cleaning characteristics. Water surface levels at low water level shall be minimized to allow the removal of debris before the pump loses prime during a manual maintenance pump-down by operators.

b. The wetwell shall have only one (1) influent line with its invert set 0.5 feet above the "Pump-Off" (mid-point of pump motor housing elevation), and it shall enter the wetwell coplanar, (aligned parallel and in-line), with the pump discharge lines in accordance with the ***JWSC Standard Details.***

c. The wetwell inverts shall be sloped downward from the top of the submersible pump motor toward the wet well pump sump at a 60 degree angle from the vertical. Flat areas for pump connection discharge elbows shall be eliminated or sloped with coated grout materials as much as possible to shed debris **(*See the JWSC Standard Details).***

d. The wetwell pump sump geometry shall provide for the required spacing between pumps, sump walls and floor as required by the manufacturer while simultaneously minimizing the water surface area at the "lowest" water level (top of pump) to allow the vortex to engulf floating solids quickly before the pump loses prime during periodic cleaning cycles in manual operation.

e. The wetwell shall be provided with appropriately placed adjacent sleeves, 24 inches below finished grade, for access of the power and control conduits. The sleeves shall be of proper size to accommodate all necessary power and control conduits.

f. Where the design flow of the station requires a pressure transducer for level control, an additional sleeve shall be required. It shall be placed 24" below finished grade and centered between the discharge legs. The sleeve shall be 2" in diameter. A slotted 6" PVC/HDPE joint of pipe shall be installed within the wet well, between the discharge legs, to serve as the housing and stilling well for the transducer. The stilling well shall terminate at the level of the pump intakes and be securely fastened to the discharge piping. The transducer shall be set within the stilling well at the low water level elevation of the station **(*See JWSC Standard Details).***

4.5.3.3 Ventilation

The ventilation for the wet well shall be designed as a passive gravity ventilation system where the air volume in the wet well is either increased or decreased as the wastewater level fluctuates due to inflow and outflow. The passive ventilation shall be sized to vent at a rate equal to the maximum pumping rate of the station, not to exceed maximum permissible design airflow through the vent pipe of 600 feet per minute (fpm). Passive "gooseneck" vents shall be turned down so that the opening faces the top slab of the wet well.

The minimum allowable passive vent diameter shall be 6 inches. Stainless steel screens shall be required to prevent birds and/or insects entry into the wet well. The vent shall be placed diametrically opposite of the control panel. Vent piping shall be 304 stainless steel.

4.5.3.4 Access Hatches

Access hatches shall provide the required clear opening for pump removal and be set in the concrete top so as to allow the pump to be removed through the approximate center of the hatch. The hatch material shall be Aluminum Alloy 6063-T5 & T6, one-fourth (¼) inch plate, with flush type lock and inside spoon handle having a live load capacity of 300 pounds per square foot. The frame shall be equipped with a stainless steel hinged and hasp-equipped cover, two (2) upper guide bar holders and stainless steel chain holders. The door shall be torsion bar loaded for ease of lifting, shall have a safety locking handle in the open position and safety grate. All fastening hardware used inside the wet well shall be stainless steel.

a. Pump access covers shall be suitably sized to provide adequate clearances for installation and removal of the pumping units.

b. Hatches should be sized for the ultimate pump design. The access hatch should be designed for a minimum width of 36" or 6" beyond the manufacturer's minimum required width, whichever is greater.

c. The minimum hatch length should be forty-eight (48) inches for standard duplex stations and ninety-six (96) inches for triplex stations or the sum of the pump width, centerline pump separation, plus twelve (12) inches, whichever is greater.

d. Low Flow Station hatches shall be sized to adequately remove the pumps and shall not be required to adhere to the minimum requirements.

4.5.4 Precast Concrete Structures

4.5.4.1 Materials

Precast wet well bases, sections and related structures shall conform to the requirements of ASTM C478 (specification for precast concrete manhole sections and structures) except as modified herein. Cement shall be minimum 4,000 psi concrete meeting the requirements of ASTM C150 (specification for Portland cement, type II).

Minimum wall thickness shall be $1/12^{th}$ the inside diameter in inches plus one (1) inch. Ring reinforcement shall be custom-made with openings to meet indicated pipe alignment conditions and invert elevations. Bases for wet wells shall be cast integrally with the bottom section.

A Flexible Neoprene-EPDM pipe connector, conforming to ASTM C443 shall be used to connect the sewer influent pipe to the precast concrete wet well. The connector shall be a minimum of three-eighths (3/8) inches thick or greater and resistant to ozone, weathering, aging, chemicals and petroleum products. The securing bands shall be stainless steel and screw assembly and totally non-magnetic Series 304 stainless steel. The connector shall be of a size specifically designed for the specified pipe material and size. The interior annular space between the exterior of the pipe and the interior of the connector shall be filled with a Type II lean cement grout. The exterior (below grade) of precast concrete wet wells shall be given two coats of an approved bituminous water proofing materials.

4.5.4.2 Corrosion Protection

The interior corrosion protection for precast concrete wet wells shall be in accordance with the following schedule based on detention time of sewer flow from the uppermost region of the contributing pipe reach using an average velocity of two (2) feet/sec.

Figure LS-1
Interior Corrosion Protection Table

Vapor H2S	Corrosion Risk Level	Detention Time	Corrosion Protection
0-10 PPM	No or Low Risk	<2 Hours	None
11-50 PPM	Moderate Risk	2 - 4 Hours	Coal Tar Epoxies
>50 PPM	High Risk	>4 Hours	Calcium Aluminates Epoxy Coatings Approved Coating Systems

a. Corrosion protection for *High Risk Wet Wells* shall be hydrogen sulfide resistant cementious products containing calcium aluminates applied one-half (½) inch to three-fourths (¾) inches of thickness onto all interior surfaces after proper substrate preparation; precast wet well structures manufactured of calcium aluminate cement concrete or precast structures with approved epoxy coatings applied a minimum of 150 mil thickness.

Alternatives that provide equal or better protection may be approved. A (ten 10) year warranty will be required.

b. All wet wells designed with the intention of being used as a receiving wet well from upstream lift stations or considered by the JWSC to be Regional Lift Stations, shall be considered *High Risk Wet Wells.*

4.5.4.3 Installation

The base section shall be set in a twelve (12) inch (minimum) leveling course of granular material (57 stone). Precast concrete sections shall be set so the wet well will be vertical and with sections in true alignment.
All holes in sections used for their handling and the annular space between the wall and entering pipes shall be thoroughly plugged with an approved, non-shrinking mortar or grout, applied and cured in strict conformance with the manufacturer's recommendations, so that there will be zero leakage through openings and around pipes. The mortar shall be finished smooth and flush with the adjoining interior and exterior wall surfaces.

Joint contact surfaces shall be formed with machined castings and shall be exactly parallel and sealed with a joint sealer over the entire joint surface. Joints shall be watertight. Excess joint sealer shall be trimmed flush with the inside and outside surface of the structure.

All exterior joints of precast concrete wet well shall be sealed with one twelve (12) inch wide exterior joint sealant membrane centered on the joint. The tape shall be capable of sealing joints against groundwater infiltration. The installation of the membrane shall be in conformance with the recommendations of the manufacturer. The concrete surface must be smooth, clean, dry and free of voids, loose aggregate, dirt or other matter that will hinder the adhesion of the membrane. A primer shall be used in accordance with the recommendations of the membrane manufacturer.

4.5.5 Fiberglass Structures (Alternate Construction Material)

Fiberglass wet wells, when approved for use by the JWSC, shall meet the following requirements.

4.5.5.1 Materials

Unless otherwise noted by the JWSC, a circular fiberglass wet well may be used in lieu of a precast concrete wetwell. The fiberglass wet well shall be designed (signed and sealed) by a Georgia Professional Engineer and meet all applicable configuration criteria as shown in Paragraph 4.5.3 of this Standard.

The wet well shall include a twenty four (24) inch (minimum) thick twelve (12) inch thick inside the wet well and twelve (12) inch thick outside the wet well reinforced concrete hold-down base which extends twenty four (24) inches beyond the outside of the wet well, a six (6) inch (minimum) thick reinforced concrete top slab, pump access frame and cover and other standard wet well features. Pumps shall be anchored to a one (1) inch thick steel plate.

Fiberglass reinforced polyester wet wells shall be manufactured from commercial grade polyester resin or vinyl ester resin, with fiberglass reinforcements. The resin system shall be suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with the wastewater collection systems. The wetwell shall be a one-piece unit unless otherwise approved by the JWSC.

The resins used shall be a commercial grade unsaturated polyester resin.

The reinforcing materials shall be commercial Grade "E" type glass in the form of mat, continuous roving, chopped roving, roving fabric or a combination of the above, having a coupling agent that will provide a suitable bond between the glass reinforcement and the resin.

If reinforcing materials are used on the surface exposed to the contained substance, they shall be a commercial grade chemical-resistant glass that will provide a suitable bond with the resin and leave a resin rich surface.

Fillers, when used, shall be inert to the environment and wetwell construction. Additives, such as thixotropic agents, catalysts, promoters, etc., may be added as required by the specific manufacturing process to be used. The resulting reinforced plastic material must meet the requirement of this specification.

The exterior surface shall be relatively smooth with no sharp projections. Handwork finish is acceptable if enough resin is present to eliminate fiber show. The exterior surface shall be free of blisters larger than one-half (1/2) inch in diameter, delamination and fiber show.

The interior surface shall be resin rich with no exposed fibers. The surface shall be free of grazing, delamination, and blisters larger than one-half (1/2) inch in diameter, and wrinkles of one-eighth (1/8) inch or greater in depth. Surface pits shall be permitted up to six (6) square feet if they are less than three-fourths (3/4) inch in diameter and less than one-sixteenth (1/16) inch deep.

The bottom to be fabricated using fiberglass material as stated in Paragraph 4.5.5.1 with material and installation to meet all physical requirements of Paragraph 4.5.5.4 below. The Bottom shall be attached to wetwell pipe with fiberglass layup to comply with ASTM D3299 specifications. When reinforcement is necessary for strength, the reinforcement shall be fiberglass channel laminated to wet well bottom.

The fiberglass wet well top shall be fabricated using fiberglass material as stated in Paragraph 4.5.5.1 with material and installation to meet all physical requirements of Paragraph 4.5.5.4 below. The top is to be attached to wetwell pipe with fiberglass layup to comply with ASTM D3299 specifications. When reinforcement is necessary for strength, the reinforcement shall be fiberglass channel laminated to wetwell top.

4.5.5.2 Pipe Connections

Effluent, service, or discharge lines may be factory installed. Approved methods are PVC sewer pipe, Inserta-Tee fittings, or Kor-N-Seal boots. The installation of stub outs shall be fiberglass layup to comply with ASTM D3299 specifications.

4.5.5.3 Defects Not Permitted

Any of the following defects observed or present in the finished structure shall be cause for rejection.

a. Exposed fibers: glass fibers not wet out with resin.

b. Resin runs: runs of resin and sand on the surface.

c. Dry areas: areas with glass not wet out with resin.

d. Delamination: separation in the laminate.

e. Blisters: light colored areas larger than one-half (1/2) inch in diameter.

f. Crazing: cracks caused by sharp objects.

g. Pits or Voids: air pockets.

h. Wrinkles: smooth irregularities in the surface.

i. Sharp projection: fiber or resin projections necessitating gloves for handling.

4.5.5.4 Physical Requirements

LOAD RATING: The complete wet well shall have a minimum dynamic- load rating of 16,000 ft-lbs. To establish this rating, the complete wetwell shall not leak, crack, or suffer other damage when load tested to 40,000 ft- lbs and shall not deflect vertically downward more than one-fourth(1/4) inch at the point of load application when loaded to 24,000 lbs.

STIFFNESS: The wet well cylinder shall have a minimum pipe-stiffness value shown in the following table when tested in accordance with this Article of the Standard:

LENGTH (FT)	F/AY (PSI)
0 TO 10	1.26
10 TO 20	2.01

PHYSICAL PROPERTIES:

	HOOP	AXIAL
Tensile Strength (PSI)	18,000	5,000
Tensile Modulus (PSI)	800,000	700,000
Flexural Strength (PSI)	26,000	4,500
Flexural Modulus (PSI)		
Without Ribs 48",60", 72"	1,400,000	700,000
With Ribs 96", 144"	700,000	700,000

TEST METHODS: Tests shall be performed as specified in ASTM D3753, Section 8

4.5.5.5 Backfill Material

Unless shown otherwise on the drawings, sand or crushed stone shall be used for backfill around the wetwell for a distance of two feet from the outside surface and extending from the bottom of the excavation to the bottom of the top slab. Suitable material chosen from the excavation may be used for the remainder of the backfill. The material chosen shall be free of large lumps or clods, which will not readily break down under compaction. This material will be subject to approval by the JWSC. Backfill material shall be free of vegetation or other extraneous material. Excavated materials which are to be used for fill or backfill may be stockpiled on the site. Top soil should be stockpiled separately and used for finish grading around the structure.

a. Backfill operations shall not begin until the concrete has been allowed to cure and the forms removed.

b. Backfill shall be placed in layers of not more than twelve (12) loose measure inches and mechanically tamped to at least 95% Standard Proctor Density. Flooding will not be permitted. Backfill shall be placed in such a manner as to prevent any wedging action against the structure.

4.5.5.6 Documentation

Each wetwell shall be marked with the following information.

a. Manufacturer's name or trademark

b. Manufacturing special number

c. Total length and nominal diameter

Marking shall be placed on the interior wall of the wetwell near the top so as to be readable after installation.

4.5.6 Influent Manhole and Wetwell Influent Line

All lift stations shall be equipped with only one influent line to the wetwell to serve as an approach pipe to the self-cleaning wet well pump sump, and one influent manhole to facilitate bypass pumping.

4.5.6.1 Influent Manhole

The influent manhole shall be located within the fenced lift station enclosure area or extension thereof and placed on the same side of the wetwell as the bypass pump connection. The horizontal distance between the wet well and the influent manhole shall be the greatest possible horizontal distance within the confines of the site; however, at a minimum the horizontal distance shall be one (1) foot of horizontal separation for every one (1) foot of vertical wet well depth to avoid taking both structures out if construction work on either is necessary in the future.

All influent manholes shall be outside drop manholes with the influent line being a minimum of two (2) vertical feet above the manhole invert to provide a nominal pumping range during bypass operations. The influent manhole shall be five (5) foot in diameter minimum. Where a wetwell diameter less than the 6 foot minimum is approved, the influent manhole may be four (4) foot in diameter.

The corrosion protection on the influent manhole shall be the same as that required on the wetwell at the site. The manhole frame & cover on the influent manhole shall be a JWSC Standard thirty-two (32) inch frame & cover.

4.5.6.2 Wet Well - Influent Line

The effluent line from the influent manhole to the wet well shall enter the wet well 0.5 feet above the "Pump-Off" (mid-point of pump motor housing) elevation, be at least one nominal diameter larger than the largest diameter influent line coming from the basin gravity sewer system and be sloped no greater than 2% and no less than needed to provide self- cleansing velocity at the facility design pump rate. Larger diameter lines between the influent manhole and wet well may be considered where pump range volume is an issue so long as self-cleaning velocity at the pump-off level is obtained.

4.5.7 Wetwell and Discharge Header Piping

4.5.7.1 Interior Piping

All interior wet well discharge piping shall be epoxy lined/exterior coated Class 53 Flange by Flange Ductile Iron Pipe (DIP) with 316 Stainless Steel nuts, bolts and washers; or, IPS DR 11.0 (160 psi) Flange by Flange High Density Polyethylene (HDPE) with 316 Stainless Steel backup rings, nuts, bolts and washers. Each discharge leg shall be one continuous pipe joint. All nuts, bolts and accessories within the wet well shall be 316 Stainless Steel.

4.5.7.2 Exterior Piping

All pipe and fittings outside of the wet well and above ground shall be epoxy lined "Sewer-Safe" Class 53 Flange by Flange Ductile Iron Pipe (DIP). All bolts, washers and nuts shall be 316 Stainless Steel. Bolt threads shall be coated with "Never Seize" type coating. All above ground pipe, fittings and valves shall receive two coats of an exterior coating of "moisture cured aluminized urethane" or epoxy paint with surface preparation in accordance with the paint manufacturer's recommendation. The paint color shall be tan.

All header discharge piping, fittings and valves shall be constructed approximately three (3) feet above grade and horizontal to the top of the wet well.

Adjustable pipe stands constructed of 304 Stainless Steel – one and one- half (1 ½) inch all thread into a two and one-half (2 ½) inch SCH 40 pipe w/ nine (9) inch by nine (9) inch by a quarter (¼) inch base plate fixed with four (4) seven-sixteenth (7/16) inch X three (3) inch lag bolts at the corners shall be provided as support. The strength and number of pipe stands may vary depending on header length and weight.

4.5.8 Valves and Appurtenances

All lift station pumps shall be equipped with an isolation valve, check valve and discharge gauge fitting on its discharge header. The common manifold header for the pumps shall be equipped with combination air/vacuum air release valve and an isolation valve to isolate the entire pumping system from the serving force main.

4.5.8.1 Isolation (Plug) Valves

Lift Station Isolation valves on submersible pump installations shall be Plug Valves mounted horizontally on the discharge header.

a. All plug valves shall be of non-lubricated, eccentric plug type with Buna "N" neoprene, epoxy or fusion bonded, nylon faced plugs. Valve bodies shall be ASTM A126, Class B cast iron with all exterior mounted bolts and nuts to be stainless steel.

b. Port areas of four (4) inch through twelve (12) inch valves shall be 100% of full pipe area.

c. The valve seat material shall consist of either a welded in one- eighth (1/8) inch overlay of 90% pure nickel, or 316 Stainless Steel screwed into the cast iron body.

d. Upper and lower plug stem bearings shall be sleeve-type of a stainless steel or other non-corrosive bearing material.

e. The packing shall be adjustable and the bonnet shall be bolted.

f. All bolts, nuts and washers shall be 316 Stainless Steel.

g. The valves shall be rated for a minimum of 150 psi, and shall provide drip-tight shut off with this pressure in either direction.

h. The interior of all plug valves shall be epoxy coated.

i. All plug valves eight (8) inches and larger shall be equipped with totally enclosed worm gear actuators complying with AWWA C504. All gearing shall run in oil. The actuator housing shall be semi-steel with seals to prevent dirt or water from entering the housing. Shaft bearings shall be permanently lubricated bronze bushings. Appropriately sized hand wheel operators shall be provided for each gear-actuated valve.

4.5.8.2 Check Valves

Lift Station Check Valves on submersible pump installations shall be swing check valves mounted horizontally on the discharge header.

a. All check valve interiors shall be fully coated with a liquid thermosetting epoxy suitable for use in wastewater applications.

b. Swing Check valves shall conform to the requirements of AWWA C508.

c. Swing Check valves larger than two (2) inch nominal size shall be cast iron body with stainless steel bolts and nuts, flanged ends, 316 Stainless Steel shaft connected to a steel outside lever and stainless steel spring, swing-type with straight-away passageway of full pipe area. The valve shall have renewable bronze seat ring and rubber-faced disc.

d. Swing Check valves larger than two (2) inches shall be 150 psi working pressure.

e. Swing Check valves two (2) inches and smaller nominal size shall be all brass swing check valves, 200 psi working pressure.

f. All check valves shall be placed upstream of the pump isolation valve.

4.5.8.3 Air Release Valves

Lift Station Air Release Valves on submersible pump installation discharge headers shall be combination (air release and vacuum release) type valves placed on the discharge header manifold piping upstream of the manifolds station isolation valve on the common header.

a. Combination air release valves shall be two (2) inch inlet (minimum), stainless steel internal trim (including float, lever arm, leakage, etc.), stainless steel assembly bolts, stainless steel backwash accessories including quick disconnects and stainless steel ball valves (gate valve are also acceptable). The body of the air valve shall be 316 Stainless Steel or iron or steel body with fusion bonded epoxy (twelve (12) Mils thickness, minimum) or ceramic coating (inside and outside surfaces) or nylon plastic.

4.5.8.4 Discharge Gauge Fittings

Discharge Gauge fittings shall be installed on the discharge header pipe of each submersible pump.

a. The gauge fitting shall be installed on discharge header pipe a minimum of six (6) inches upstream from each pumps check valve.

b. The gauge fitting shall be installed by drilling and tapping a one- fourth (¼) inch NPT hole, installing a 316 Stainless Steel nipple (approximate two (2) inches in length), attaching a one-fourth (¼) inch Stainless Steel ball valve, another 316 Stainless Steel nipple (approximately two (2) inches in length) to the ball valve, and attaching a one-fourth (¼) inch NPT Quick Connect coupler to the nipple.

c. One (1) four and one-half (4 ½) inch diameter face glycerin filled Wika discharge gauge, graduated in 1 psi increments (0 – 60 psi) and one (1) foot increments of H_2O (0 – 140 feet H_2O) scale range, with quick-disconnect, shall be provided for each submersible pump. Gauges shall be provided in plastic protective cases and equipped with quick disconnects.

4.5.9 Pumping Equipment

Lift station pumps shall be submersible pumps and shall meet the following requirements.

4.5.9.1 General Requirements

All pumps designed and selected shall be within +/- 20% of the pumps best efficiency point. When possible, the pump selection shall be made in the center of the family of curves.

Where the JWSC has approved the station to be designed as an initial/ultimate facility, the pump's base elbow should be sized for the ultimate pumps. The pump manufacturer shall provide an adapter plate for the initial pumps.

4.5.9.2 Submersible Pumps

Submersible Pumps and installation shall be in accordance with the follow minimum standards:

a. Pumping equipment shall be premium quality submersible non-clog pumps for sewage service. Wet-pit pumps shall be complete with a submersible electric motor, floor-mounted discharge base and elbow, guide rails, motor electrical cable (minimum forty (40) feet in length) to connect at the demarcation box (no splicing allowed) and all other appurtenances specified or otherwise required for proper operation.

b. Equipment furnished and installed shall be fabricated, assembled, erected and placed in proper operating condition in full accordance with drawings, specifications, engineering data, instructions and recommendations of the equipment manufacturer, unless exceptions are noted and approved by the JWSC.

c. Pump performance shall be stable and free from cavitations and noise throughout the specified operating head range at minimum suction submergence. Pump shall be designed so that reverse rotation at rated head will not cause damage to any component.

d. Major pump components shall be of gray cast iron. All exposed nuts, bolts, washers, anchor bolts and other fastening devices coming in contact with sewage shall be 316 Stainless Steel.

e. The impeller casing shall have well-rounded water passages and smooth interior surfaces free from cracks, porosity, blowholes, or other irregularities. The impeller shall be semi-open or enclosed one-piece casting with no more than two non-clog passages and must pass a minimum three (3) inch solid. The interior water passages shall have uniform sections and smooth surfaces and shall be free from cracks and porosity. The impeller shall be dynamically balanced and securely locked to the shaft. All interior water passages and impeller shall be coated with an approved epoxy coating to increase efficiency and resist wear.

f. Pumps shall have mechanical seals, which shall require neither maintenance nor adjustment and shall be readily accessible for inspection and replacement. The seals shall not rely upon the pumped media for lubrication and shall not be damaged if the pump is run un-submerged for extended periods while pumping under load. Mechanical seals shall be solid hard faced, (not laminated type). The bottom seal shall be tungsten carbide or silicon carbide material. The top seal may be carbon-ceramic, tungsten carbide or silicon carbide material. Replaceable or adjustable wear rings shall be provided for all pumps.

g. All mating surfaces (pump assembly), of major components shall be machined and fitted with o-rings where watertight sealing is required.

h. The pump manufacturer shall furnish a discharge base and discharge elbow for the pump supplied. The base shall be sufficiently rigid to firmly support the guide rails, discharge piping and pump under all operating conditions. The base shall be suitable for bolting to the floor, (bolting to a standard one (1) thick metal plate), of the wet well. The face of the discharge elbow inlet flange shall make contact with the face of the pump discharge nozzle flange. The pump and motor assembly shall be a "quick disconnect" type connected to and supported by the discharge base and guide rails allowing the pump to be removed from the wet well and replaced without the need for unbolting any flange, lowering the liquid level or requiring operating personnel to enter the wet well. Pump shall be provided with a sealing flange and guide rail sliding bracket. The bracket shall be designed to obtain a leak proof seal between flange faces as final alignment of the pump occurs in the connected position. The bracket shall maintain proper contact and a suitably sealed connection between flange faces under all operating conditions. Metal to metal mating surfaces are acceptable, if machined finished.

i. The pump shall be driven by a totally submersible electric motor. Pump motor shall be of sufficient horsepower as to be non- overloading over the entire length of the pump curve. The stator housing shall be a watertight casing. Motor insulation shall be moisture resistant, Class F, 155 degree C. at a minimum. Motors 25 HP and larger shall be VFD rated including Class H winding insulation. Motor shall be NEMA Design B for continuous duty at
40 degree C ambient temperature and designed for at least 10 starts per hour.

All motors shall be 3 phase. Motor bearings shall be anti-friction, permanently lubricated type. Motor shall be designed to operate in a totally, partially or non-submerged condition without damage to the motor. Pump cable assembly shall bear a permanently embossed code or legend indicating the cable is suitable for submerged use. Cable sizing shall conform to NEC requirements. The cable shall enter the pump(s) through a heavy-duty stainless steel assemble with grommet. The system used shall ensure a watertight submersible seal. Cable shall terminate in a junction chamber. Junction chamber shall be sealed from the motor by a compression seal.

j. All rotating parts shall be machined and in near perfect rotational balance as possible. Excessive vibration shall be sufficient cause for rejection of the equipment. The pump impellers shall be re- balanced after being trimmed.

k. Pump shall be equipped with two guide rails (no cable wire assembly). Guide rails shall be a minimum of two (2) inch diameter and sized to fit the discharge base and the sliding bracket and shall extend upwards from the discharge base to the access hatch cover at the top of the wet well. Intermediate rail braces shall be supplied and solidly secured to the wet well wall. Braces secured to the discharge piping shall not be accepted. Guide rails and brackets shall be 316 Stainless Steel.

l. A heavy duty chain and shackle appropriately sized (3/8" minimum) for removing and installing the pump shall be selected and provided by the pump manufacturer. Unless approved otherwise by the JWSC, the lift chains shall be shackled to a heavy duty 316 Stainless Steel lifting bail attached to the pump/motor housing for removal and reinstallation. Three feet of excess chain above the top of the wet well shall be provided to expedite removal. A chain/motor electric cable holder shall be provided and appropriately sized to accommodate the lift chains and motor electrical cables provided without deformation. Chain/electric cable holder shall include extra heavy duty three-eighths (3/8) inch rod hooks for attaching control floats, lifting chains, and other wet well accessories (6 hooks minimum) and be located on the side of the wet well hatch opening opposite to the discharge piping. The chain, shackles, lifting bail, and cable holder shall be 316 Stainless Steel.

m. Exterior of pump shall be coated with manufacturer's standard finish.

n. Pump discharge base shall be leveled, plumbed and aligned into position to fit connecting piping. The discharge base shall be solidly secured to the wet well floor using a one (1) inch thick steel hold-down plate and appropriately sized 316 Stainless Steel anchors then grouted after initial fitting and alignment and before final bolting of the discharge piping. This work shall be inspected by the JWSC prior to any liquid being allowed into the wet well. After final alignment and bolting, pump discharge base and all connections shall be inspected. If any movement or opening of any joints is observed, any and all piping, including pump discharge base, shall be corrected.

4.5.9.3 Grinder Pumps

Grinder Pumps and installation (for Low Flow Stations only) shall be in accordance with the follow minimum standards:

a. Pump shall be of the centrifugal type with an integrally built grinder unit and submersible motor. The grinder unit shall be capable of macerating all material in normal domestic and sewage including reasonable amounts of foreign objects such as small wood, sticks, plastic, thin rubber, sanitary napkins, disposable diapers and the like into fine slurry that will pass freely through the pump and two
(2) inch discharge pipe connection.

b. Stator winding shall be of the open type with Class F insulation rated for 130°C (266°F) maximum operating temperature. All motors shall be 3 phase. Motors shall have two heavy duty ball bearings to support the pump shaft and take the radial and thrust loads. Ball bearings shall be designed for 50,000 hours L-10 life. Stator shall be heat shrunk into the motor housing.

c. The common motor, pump and grinder shaft shall be of 416 Stainless Steel, threaded, on the pump end, to accept the impeller and grinder assembly.

d. The motor shall be protected by two mechanical seals mounted in tandem in a seal chamber. The seal chamber shall be oil filled to lubricate the seal faces and transmit the heat from the shaft to the outer motor shell. The bottom seal shall be tungsten carbide or silicon carbide material. The top seal may be carbon-ceramic, tungsten carbide or silicon carbide material. Seal faces shall be carbon ceramic and lapped to a flatness of one light band. An electrode shall be mounted in the seal chamber to detect any water entering the chamber through the lower seal.

Water in the chamber shall create an alarm condition. The alarm condition signal shall not stop the motor but act as a warning only, indicating that service is required.

e. The pump impeller shall be of the recessed type to provide an open and unobstructed passage through the volute for the ground solids. The impeller shall be constructed of cast iron and shall be threaded onto a stainless steel shaft. The grinder assembly shall consist of a grinder, an impeller and a shredding ring and shall be mounted directly below the volute passage. Grinder impeller shall be threaded onto a stainless steel shaft and shall be locked to the shaft with a screw and a washer. The shredding ring shall be pressed into an iron holding flange for easy removal and replacement. Shredding ring shall be reversible for double life without disassembly of the pump unit. The holding flange shall be provided with tapped holes such that screws can be used to push the shredding ring from the housing. All grinding of solids shall be from the action of the impeller against the shredding ring. Both the grinder and the shredding ring shall be constructed of 440C stainless steel hardened to 58 to 60 on the Rockwell C scale.

f. All iron casting shall be pre-treated with a phosphate and chromic rinse and shall be painted before machining. All machined surfaces exposed to sewage shall be repainted. All pump and motor fasteners shall be 316 Stainless Steel.

g. All mating surfaces of the pumps major components shall be machined and fitted with o-rings where seating is required.

h. The motor power cord shall be rubber coasted wire and shall be fastened by means of a cord grip in the top of the pump. The motor shall contain a waterproof junction box, which will provide space to connect the power cord to the motor leads. The motor leads shall seal between the motor housing and the junction box by means of a rubber compression fitting around each wire. The power cord shall have a green carrier ground conductor that attaches to the motor flange.

i. The pump manufacturer shall furnish a discharge base and discharge elbow for the pump supplied. The bases shall be sufficiently rigid to firmly support the guide rails, discharge pipe and pump assembly under all pumping conditions. The base shall be bolted to the well floor and sealed on the wet well exterior to prohibit any intrusion or leakage from the wet well. The face of the discharge elbow inlet flange shall make contact with the face of the pump discharge nozzle flange.

The pump and motor assembly shall be a quick disconnect type connected to and supported by the discharge base and guide rails allowing the pump to be removed from the wet well and replaced without the need of unbolting any flange, lowering the liquid level or requiring operating personnel to enter the wet well. Pump shall be provided with a sealing flange and a guide rail sliding bracket. The bracket shall be designed to obtain a leak proof seal between the flange faces as final alignment of the pump occurs on the connected position. The bracket shall maintain proper contact and suitably sealed connection between flange faces under all operating conditions.

j. All rotating parts shall be machined and in near perfect rotational balance. Excessive vibration shall be sufficient for rejection of the equipment. The impellers shall be rebalanced after being trimmed.

k. Pump shall be equipped with two (2) guide rails. Guide rails shall be a minimum of one (1) inch diameter and sized to fit the discharge base and the sliding bracket and shall extend upwards from the discharge base to the access hatch cover at the top of the wet well. Guide rails and brackets shall be 316 Stainless Steel.

l. A heavy duty chain and shackle appropriately sized (one-fourth (1/4) inch minimum) for removing and installing the pump shall be selected and provided by the pump manufacturer. The chain shall be 316 Stainless Steel and attached.

4.5.9.4 Pump Warranty

PUMP WARRANTY (Solids Handling and Grinder Pumps):

a. The manufacturer shall warrant to the JWSC, for permanent installation in municipal sewage service, submersible pump and motor against defects in materials and workmanship including normal wear and tear to the following parts:

i. mechanical seals
ii. bearings, shafts
iii. motor electrical cables
iv. motor stators.

The warranty shall include no less than 100% coverage for original equipment manufactured (OEM) parts and in-shop labor for pump/motor repairs for a minimum of eighteen (18) months at NO COST to the JWSC. This warranty shall not apply to parts that fail due to abuse, neglect, mishandling, or acts of God. The warranty period shall commence upon the date of final acceptance for use of the pumping station and/or of a replacement pump by the JWSC and upon completion of manufacturers startup.

b. During the warranty period, the pump distributor shall, at no cost to the JWSC, transport and repair the defective pump/motor within forty eight (48) hours or provide a loaner capable of maintaining the operation of the JWSC site. Where, due to the size of the pump/motor a forty-eight (48) hour repair is not feasible and/or a loaner is not available, the distributer shall cover the cost of an appropriately sized engine driven back-up pump to be installed at the site to maintain the station until the pump is repaired and reinstalled or until a loaner is provided. This clause shall only be invoked where the lift station site is considered critical and the availability of only one operating pump at the facility would create a high liability situation. This judgment call shall be at the sole discretion of the JWSC.

4.5.10 Site Electrical Work

4.5.10.1 General

All wiring shall meet the requirements of the National Electrical Code. All wiring outside the control panels shall be enclosed in rigid PVC conduit sized for 40% fill unless indicated otherwise. A separate conduit shall be used for each pump power cable sized for not more than 40% fill. Each conduit shall be sealed gas tight with duct seal putty at motor control panel entry.

4.5.10.2 Electrical Service

The pumping station incoming service shall consist of type THW or XHHW copper conductors in rigid PVC conduit installed a minimum of forty-eight (48) inches below final grade. Electric service shall be sized as required by ultimate station electrical loadings.

Electric service shall be routed within Public rights-of-way, or if approved due to special considerations, within dedicated easements. As-Built documentation shall include a diagram indicating actual routing from utility transformer/s to station meter and to control panel.

If overhead service, an electrical pole shall be set outside of the pump station fencing then installed underground within the pump station's fenced enclosure.

4.5.10.3 Control Panel Connections

The power line and each motor line shall enter the bottom of the motor control panel separately and each in SCH 40 PVC sized as per National Electric Code. Each line shall travel directly from motor control panel to the pump motors and contain only one pulling 90 degree elbow at the base of each panel/box.

The motor control panel and service shall be grounded per NEC Article 250 and utilize a minimum of two grounding electrodes at least six (6) feet apart and eight (8) feet deep. The neutral conductor shall not serve as the grounding conductor to the main breaker panel. A separate conductor shall be used for this purpose. Grounding system shall be zinc coated and buried so as not to present a trip hazard above vapor barrier and below gravel.

4.5.11 Electrical Equipment and Controls

Controls shall be compatible with pumps supplied meeting both pump manufacturer requirements and the minimum standard below pump supplier shall assume sole source responsibility for pumps and controls.

4.5.11.1 General Requirements

Pump motors greater than or equal to 20 Hp shall require a 480 volt service. If a pump motor is less than 20 Hp, but the kilo-volt-amps (kVA) as determined by the equation:

$$kVA = (\text{Total Load}) \times (\text{Voltage}) \times (1.73/1000)$$

is greater than 150, a 480 volt service shall be used. Otherwise, a 230 volt service may be used.

If the pump motor is less than 25 Hp, across the line starters can be used. Therefore, pump breakers are sized by multiplying the full load amperage (FLA) for the specific motor at the appropriate voltage by 300% and rounding up to the nearest breaker size.

If the pump motor is over 25 Hp, VFD’s are required. Therefore, pump breakers are sized by multiplying the full load amperage (FLA) for the specific motor at the appropriate voltage by 200% and rounding up to the nearest breaker size.

If the JWSC has approved the station to be designed as an initial/ultimate station, the pump breakers shall be sized for the initial pumps. The dimensions of the control panel shall accommodate the ultimate size components.

The Main and Emergency breaker sizes shall be determined by adding the pump breaker size, the FLA of additional pump motors (beyond the one), and any auxiliary loads and rounding down to the nearest breaker size. If the total load for a 240-volt service is less than or equal to 100 Amps, 100 Amp emergency and main breakers should be used. If the total is greater than 100 and less than 200 Amps, round down to the nearest available breaker size, but, set the service size to 200 Amps. If the total is greater than 200 Amps, the service size shall be the same as the emergency and main breaker size. Where the JWSC has approved an initial/ultimate station, the main and emergency breakers, as well as service size shall be designed for ultimate design conditions.

Starters shall be sized corresponding to the NEMA ratings.

If the JWSC has approved the station to be designed as an initial/ultimate station, the starters shall be sized for the ultimate pumps with a note added to the drawings stating: "***Heater coil sized to protect the initial pumps".***

4.5.11.2 Submersible Lift Station Motor Control Center

Submersible Lift Station Motor Control Center (MCC) shall be constructed in accordance with UL 508A requirements for enclosed industrial control panels and shall bear the UL508A serialized label.

A. *Enclosure*

i. Minimum submersible lift station enclosure size for Motor Control Panel shall be forty-eight (48) inches high, thirty-six (36) inches wide and twelve (12) inches deep.

ii. Minimum low flow submersible lift station enclosure size for Motor control Panel shall be thirty-six (36) inches high, thirty (30) inches wide and twelve (12) inches deep.

iii. All control components hall be housed in a NEMA 12/4x316 stainless steel enclosures rated NEMA 12 with dip shield resulting in a NEMA 12/4 x rating. The enclosure shall have a single handle and a 3 point latch system with padlock feature (no keyed locking handles will be accepted.)

iv. The enclosure shall have a brushed finish and collar studs. The enclosure shall also have 90 degree flanged lip all around where the outer door makes contact with enclosure to make a more efficient seal.

v. The enclosure shall have a hinged inner door(s) (dead front) fabricated from 0.125 inch thick marine alloy grained aluminum. The inner door shall have an adjustable latching mechanism to keep door firmly closed and shall be comprised of captive hardware. The inner door(s) shall have stainless steel hardware to be secured open for service.

vi. The enclosure shall have a twelve gauge steel, formed, removable sub panel. The sub-panel shall be degreased, cleaned, treated with phosphate process, then primed and painted with white industrial grade baking enamel.

vii. The enclosure and mounting system shall be devices to keep them open when service is being rendered. Mounting system to be as shown in the JWSC Standard Detail.

viii. Enclosures shall be sized to enable all breakers and controls to be located not more than five (5) feet zero (0) inches above grade or the walkway.

ix. Construction of MCC III type panels shall have VFD manufacturer recommended cooling as part of overall panel construction.

B. *Panel Components*

At a minimum, the panel shall consist of the following components:

i. Motor Starter/Controller - one per pump

ii. Thermal Magnetic Circuit Breakers - one per pump

iii. Circuit breaker operators (thru inner door type) - one per pump

iv. Power Monitor - one

v. Alarm Light - one

vi. Duplex GFI Receptacle – two (2)

vii. Generator Receptacle and Manual Transfer - one (if not equipped with a generator set and automatic transfer switch

viii. Hand-Off-Automatic Selector Switch - one per pump

ix. Moisture Sensors - one per pump

x. Heat Sensors - one per pump

xi. Audible Alarm Device

xii. Relays - six (11 pin 120 VAC with matching sockets)

xiii. Indicator Lights (LED Type) for "Run", "Seal Fail", and "Over Temperature" - one set for each pump

xiv. RTU Circuit Breaker

xv. Power Distribution Block

xvi. Lightning Arrestor - one

xvii. Elapsed Time Meter - one per pump

xviii. Thermostatically Controlled Panel Heater

xix. Control Transformer when 480 Volt, 3-phase power is used

C. *Motor Starter/Controller*

To extend the useful life of the pump station components including the pump and motors, one of the following two (2) starter/controllers is required for each pump/motor based upon the motor horsepower. A minimum eighteen (18) month warranty is required on all starter/controllers (including VFD equipment). The warranty shall include materials or workmanship which does not conform to these specifications.

i. **Type "one" (MCC I):** 0-25 HP 208/230 VAC started across the line shall be protected at 300% of nameplate FLA (full load amperage), using NEMA motor starters.

ii. **Type "two" (MCC II):** 26 HP and above 460/480 VAC, requires a variable frequency drives with an internal bypass protected at 200 % of motor nameplate FLA.

*Motor Starters (MCC-I Only***):** Motor Starters shall be NEMA rated Magnetic Motor Starter with solid state overload relay with life time coil warranty.

Overload relay includes phase loss and phase unbalance. Device must be manufactured to ensure full voltage is applied to coil even at 85% of nominal eliminating contact chatter and premature contact failure. When lower than acceptable voltages are applied the motor starter will not start or will break the circuit to prevent contact chatter. Starters shall be mounted twelve (12) inches (minimum) from the bottom of the cabinet.

Variable Frequency Drive (VFD) Controllers (MCC II Only): The Variable Frequency Drive shall be rated for input voltage. The variable frequency drive shall be microprocessor based control for three phase induction motors. The VFD's shall be Pulse Width Modulated (PWM) design. Adjustable current source VFD's are not acceptable. Insulated Gate Bipolar Transistors shall be used in inverter section. Bipolar Junction Transistors, GTOs or SCRs are not acceptable. The VFD's shall have efficiency at full load speed that exceeds 97% for motors over 40HP. The VFD's shall limit harmonic distortion onto the utility system to a voltage and current level as defined by IEEE 519 for general systems applications, by using the standard 3% nominal impedance integral ac three phase line reactor.

The system containing the VFD's shall comply with the 5% level of total harmonic distortion of line voltage and the line current limits as defined in IEEE 519-1992. If the system cannot meet the harmonic levels with the VFD provided with standard input line re actor or optional input isolation transformer, the VFD manufacturer shall supply a multiple bridge rectifier AC to DC conversion section with phase shifting transformer for all drives above 100 horse power. The multiple rectifier converters shall cause multiple pulse current waveforms that will more neatly approximate a true sine wave to reduce voltage harmonic content on utility line. Harmonic filters are not acceptable above 100HP. The device shall be capable of communicating with JWSC approved programmable logic controller with optional Profibus communication capability. The VFD's shall be mounted a minimum of twelve (12) inch from bottom of cabinet.

D. *Thermal Magnetic Circuit Breakers*

i. Protector operators are to be quick make, quick break and trip free. The thermal and magnetic elements shall operate independently and multiple pole breakers be designed with common trip bar breaking all poles when a fault is received on any pole.

ii. All "Normal Main" breakers shall be minimum "E" frame. "E" frame circuit breakers shall contain a self-test "Trip Selector" permitting a mechanical simulation of the over current tripping device and shall be rated a minimum of a 460 Volt @ 14 KAIC for 240 Volt systems

and 600 Volt @ 18KAIC for 460/480 Volt systems. The use of Q- frame breakers is not acceptable.

iii. All "Emergency Main" breakers shall be minimum "E" frame. "E" frame circuit breakers shall contain a self-test "Trip Selector" permitting a mechanical simulation of the over current tripping device and shall be rated a minimum of 460Volt @ 14KAIC for 240 Volt systems and 600 Volt @ 18 KAIC for 460/480 Volt systems. The "Emergency Main" breaker current rating must be equal to or less than the current rating of the generator receptacle. The use of Q-frame breakers is not acceptable.

iv. All "Pump" breakers shall be minimum "E" frame. "E" frame circuit breakers shall contain a self-test "Trip Selector" permitting a mechanical simulation of the over current tripping device and shall be rated a minimum of 460 Volt @ 14 KAIC for 240 Volt systems and 600 Volt @ 18 KAIC for 460/480 Volt systems. The use of "MCP", Motor Circuit Protectors or Q-frame breakers is not acceptable.

v. All "Control" breakers shall be rated for 120/240 @ 20 KAIC (Q Frame).

E. *Circuit Breaker*

Each circuit breaker shall be mounted with breaker handles extending through the dead front panel door.

F. *Audible Alarm*

A horn shall be provided on the left hand upper side of enclosure and shall sound upon high level at 90db at ten (10) feet. A silenced push button shall be mounted on exterior bottom left of cabinet to energize a relay to disconnect the horn when pressed. Horn will be wired to allow remote silencing via the local RTU and radio link.

G. *Alarm Light*

A red alarm light shall be provided and shall be mounted using threaded stainless steel pipe to top of panel.

H. *Duplex GFI Receptacle*

Two GFI duplex receptacles shall be provided, one to be mounted on the appropriate weatherproof enclosure and the other to be mounted on the outside bottom right hand side of the cabinet. The receptacle face shall be flush with front of cabinet and be supported as required by NEC. The receptacles shall be rated 20 amps, 125vac.

I. *Generator Receptacle*

A generator receptacle shall be mounted in accordance with the standard detail. A 30° panel mounting adapter and flip cover shall be supplied. The generator receptacle must be sized equal to or greater than the current rating of the Emergency Main breaker. The generator receptacle shall not be required if a generator set is installed on the site.

J. *Manual Transfer Switch*

If Automatic Generator is not specified, a manual transfer switch shall be provided with one normal power circuit breaker and one emergency power circuit breaker interlocked mechanically to prevent both breakers from being closed at the same time. The emergency breaker will be fed from the generator receptacle. Panel manufacturer is to size breaker and receptacle per facility requirements.

K. *Hand-Off-Automatic Selector Switches*

A three position selector switch shall be provided for each pump and be mounted on the inner door. The switches shall be heavy duty 30mm devices.

L. *Moisture Sensors*

The panel shall be equipped with moisture sensing relays for each pump energizing red status indicator lights mounted on the dead front and send a signal to the PLC. Relays shall not disconnect control power to the pumps. Indicator lights shall remain energized until manually reset.

M. *Heat Sensors*

The panel shall be equipped with heat sensing relays for each pump energizing red status indicator lights, mounted on the dead front and send a signal to the PLC. Relays shall not disconnect control power to the pumps. Indicator lights shall remain energized until manually reset.

N. *Power Monitor*

A power monitor relay shall be installed and connected to the control circuits. When the power to the RTU is deactivated it shall disconnect control power from the motor starters and open the 24vdc monitor circuit to the RTU and shall have a dedicated set of contacts to provide input for the RTU. The power monitor relay shall be deactivated in the event that any of the following two (2) conditions occur and shall have a dedicated set of contacts to provide input to RTU.

i. Phase loss (single Phasing) when one of any three lines drops to 83% of nominal voltage.

ii. Low voltage (brown out) when all three line voltages drop to 85% or less of nominal voltage.

O. *Relays*

All relays shall be large ice cube style case and be 3 poles double throw octal type relays for all 120 volt applications. Relays must be standard 11 pin octal type relays with contacts rated 10 amps @ 120VAC. Relays are to have internal LEDs and test push button as standard. Matching 11 pin sockets shall be supplied.

P. *Indicator Lights*

Lights shall be provided to indicate Pump Run, Seal Fail, (each pump) and motor over temperature (each pump). Indicator lights shall be LED type heavy duty 30mm.

Q. *RTU Circuit Breaker*

RTU shall be powered through a 20 ampere circuit breaker “Q” Frame.

R. *Power Distribution Block*

Power distribution block with touch safe cover shall be provided, sized for 600 volt, 175 amps minimum. The power distribution block shall have a flammability rating of UL 94V-0 and shall be based upon NEC. Power block shall be Busmann 16 series.

S. *Lightning Arrestor*

A secondary arrestor, complying with ANSI 62.2 shall be installed in accordance with manufacturer’s instructions on the outside bottom of the cabinet.

T. *Elapsed Time Meters*

Elapsed Time Meters shall be five digits non-resetting interfaced with appropriate motor starter and shall be mounted on the dead front door. One will be required for each pump.

U. *Level Control Systems*

Lift station level control systems shall be either floats or Level Transducer in accordance with the following guidelines:

i. All Low Flow Lift Station with a design pump rate between 22 gpm and 79 gpm shall be float controlled;

ii. All Standard Duplex Lift Stations with a design pump rate between 80 gpm and 349 gpm shall be float controlled;

iii. All Standard Duplex Lift Stations with a design pump rate between 350 gpm and 749 gpm shall be Level Transducer controlled, with the exception of the Audio/Visual High Water Alarm system, which shall be by float;

iv. All Triplex, Quadraplex and Initial/Ultimate Lift Stations shall be Level Transducer controlled, with the exception of the Audio/Visual High Water Alarm system, which shall be by float.

v. **Where a Level Transducer level control system is required**, the transducer shall be installed within a slotted six (6) inch DR-11 HDPE casing pipe installed within the wet well as follows:

   a. The transducer casing pipe shall be placed between the pump intakes on submersible installations, to serve as the housing and stilling well for the transducer assembly;

   b. The stilling well pipe shall be open on both ends and slotted between six (6) inches from the bottom and twenty-four (24) inches from the bottom with slots approximately three (3) inches center to center; slots shall be one-half (½) inch wide by four (4) inches long and cut on opposite sides of the pipe.

   c. The stilling well shall terminate on the "wet" end at the level of the pump intakes in the pump sump or in a sloped recessed area constructed in the sump invert that provides the same elevation relative to the pump intakes.

d. On submersible installations, the stilling well pipe on the dry end shall terminate approximately two (2) feet below the access hatch and on the same side of the wet well as the guide rails.

e. Stilling well pipe shall be vertical and plumb to facilitate removal for cleaning and maintenance of the transducer.

f. On submersible pump installations the casing shall be securely fastened to guide rail brackets with 316 Stainless Steel brackets and off-set so as not to interfere with the installation/removal of pumps.

g. The transducer shall be set within the stilling well casing at the **Low Water Level** elevation. At the Low Water Level (LWL) elevation in the wet well the transducer calibration setting shall correlate with the "zero" depth of water level.

Level Transducer**:** The submersible level sensor, where required, shall be a solid state instrument designed to continuously measure and transmit liquid level data. The transducer shall have a 4-20ma output with 24 VDC supply. The transducer shall be calibrated for 0 – 24 feet of water. Transducer shall have conduit adapter, and cable length as required by the installation. The transducer shall not have a breathing (vent line) or boxes. Transducers shall be capable of field calibration and shall have a manufacturer's one year warranty from date of installation. The transducer shall be in stainless steel housing. The transducer shall be installed in a stilling well as described in this article of the Standard. The electrical connections shall be (two) 2 wire, shielded waterproof cable attached to a terminal strip with screwed connections.

Level Control**:** Floats, where required, shall activate when switch is horizontal and deactivate when liquid level drops below the activation elevation. The float shall have a chemical resistant polypropylene casing with a firmly bonded electrical cable protruding. One end of the cable shall be permanently connected to the switch with the entire assembly encapsulated to form a completely watertight unit. The float shall be mounted from above on a 316 Stainless Steel hanger.

V. *Control Transformer*

Control transformer shall be 480 Volt Primary, 120 Volt Secondary sized as necessary to carry all connected loads.

W. *Control Wiring Identification*

All wiring shall be color coded sized as follows:

120 VAC (Un-switched Hot) #12 AWG Black
120 VAC (Dry Contacts) # 12 AWG Red 120
VAC (Neutral) # 12 AWG White
120 VAC (Switched Hot) # 12 AWG Red
24 VDC + # 16 AWG Orange
24VDC - # 16 AWG Brown

Control Wiring shall be numbered or lettered at each end. Wire numbers/letters shall be Pass & Seymore "Legrande" or JWSC P&CD equal.

X. *Wire Duct*

All wiring shall be routed through a wiring duct system to provide protection and an organized appearance.

Y. *Terminals*

Terminals shall be provided for interface with field installed equipment. The terminal blocks shall be mounted on a 30 degree angle for ease of field connection.

Z. *Nameplates*

All components shall be labeled using a laser screen Mylar nameplate. The nameplate shall be a laminated two part system using black letters on a white background providing protection against fading, pealing or warping. The labeling system shall be computer controlled to provide logos, post-script type or custom designs. The uses of laminate or plastic engraved legend plates will not be accepted.

AA. *Mounting Hardware*

All components shall be mounted using stainless steel machine screws. All mounting holes shall be drilled and tapped. The use of self-tapping screws shall not be acceptable.

Note: **UL Labels:** The entire control system shall bear a UL 508 serialized label "Enclosed Industrial Control Panel". The use of the label "Industrial Control Panel Enclosure" without the UL508 serialized label is not acceptable.

4.5.12 Remote Terminal Unit (RTU) - System and Panel

An approved manufacturer as listed in the Approved Materials Section of this Standard shall manufacture the remote terminal unit (RTU). The panel shall be constructed in accordance with UL 508A requirements for enclosed industrial control panels.

4.5.12.1 General

The manufacturer shall be responsible for all efforts necessary to select, furnish, supervise installation and connections, calibrate and to place into operation all SCADA system instrumentation and controls along with all other associated equipment and accessories.

The manufacturer shall furnish all materials necessary for a complete operational radio based SCADA System as described herein. System shall include all materials necessary to interface field instruments and devices with the various control panels and SCADA system and shall provide for surge protection of the units.

The base function of the RTU shall be to monitor the status of and provide control of lift station pumps, and to provide historic data of facility operations.

4.5.12.2 Warranty

Warranty on system function and equipment shall be two (2) years from the date of start-up. Warranty shall include any problems (to include lightning and other surges) which prevent satisfactory operation of the system. Warranty shall include, but not be limited to parts, labor and travel expenses.

4.5.12.3 System Requirements

RTU's shall meet or exceed the following requirements:

a. Each RTU shall incorporate the power supply, logic, memory, communications interface and input/output circuitry.

b. The unit must be microprocessor based, use a 16 bit processor as a minimum and include the following capabilities:

    i. Fused, user configurable, digital and input/output

    ii. User configurable digitally scaled analog inputs

iii. On-board trickle type battery charger and battery

iv. Bounceless changeover circuitry for primary to battery power transfer

c. Each digital input/output shall be user configurable through either the host computer or local terminal; each must use a standard input/output module. The selected modules must provide the ability to use input signals up to 140VAC and 30VDC, and provide output signals to the interface with control voltages up to 280VAC/60VDC.

d. Configuration of the digital inputs/outputs shall include the following as a minimum:

i. Normally closed/open point type

ii. Accumulation of time on the transitions

iii. Accumulation of pulse counts (up to 20 per second)

iv. Manual/Automatic mode

v. Analog point type

vi. Enable/disable of selected features

vii. Run time accumulation

viii. Number of starts

ix. Time between starts

e. Each analog input/output shall be digitally scaled to assure accuracy. Analog conversion method shall, at a minimum, use dual slope integration techniques with a least two (2) processor samples per second. Analog inputs shall have twelve (12) bit minimum accuracy available. Either voltage or current mode shall be jumper selectable on the unit for each input. Analog outputs shall have twelve (12) bit accuracy. Configuration of the analog inputs/outputs shall have the following features as a minimum:

i. Point type

ii. Communication to the host computer on set point violation

iii. Local alarm output interface for set point deviation

iv. Value range

v. Filter constant

vi. Low and high gain

vii. Low and high set point

viii. Set point dead band

ix. Set point delay time

x. Scaling

xi. Enabling/disabling of selected features

f. RTU shall be Driver and MODBUS programmable to existing SCADA or approved equivalent

g. Communication Modem:

i. Modem supplied shall be MODBUS Protocol Modem or approved equivalent.

ii. VHF Transceiver Radio installations shall include FCC license amendment to include operations at new locations. FCC licensing shall be the approved manufacturer's responsibility to provide radio frequency and radio testing each site.

iii. Antenna and cable shall be selected to be compatible with the transceiver and be installed to deliver clear and reliable signals by approved manufacturer.

h. Contact points for all SCADA systems shall at a minimum provide Input/output functionality and relays for the following settings:

i. Off level

ii. Low level

iii. Lead level

iv. Lag level(s)

v. High level

vi. Power fail (phase failure)

vii. Pump run status (all pumps)

viii. Pump fail status (all pumps)

ix. Pump enable/disable

x. Wet Well Water level (transducer facilities only)

xi. Water pressure (where required to monitor local water pressure on public mains)

4.5.13 Combination MCC/RTU Panel

The combination MCC/RTU panel shall include all of the components listed above for the MCC panel and for the RTU panel. The MCC portion of the panel shall include the motor starter/controller as noted in Article 4.5.11.2 of this Standard (MCC-I, MCC-II). All exceptions to the above requirements are provided below. The MCC/RTU shall incorporate all low voltage control and automation components being mounted behind the left hand dead front door. The enclosure shall have a full length aluminum barrier separating the low voltage side from the high voltage power devices. The high power components will be located behind the right hand dead front door. All pilot device displays etc. shall be on the left hand dead front door. The main, emergency and pump breaker handles reset buttons etc. shall be on the right hand dead front door.
The battery, charger and associated equipment shall be mounted near the bottom left hand side of the enclosure and the terminal blocks shall be placed approximately where the battery and charger shelf are located.

Minimum enclosure size for MCC/RTU shall be sixty (60) inches tall forty- eight (48) inches wide and twelve (12) inches deep.

All control components listed here-in shall be housed in a NEMA 12/4X 316 stainless steel enclosures and shall have inner door separating control and automation components from power related equipment.

4.5.14 Low Flow Station (Only) Remote Terminal Unit (RTU) System

The approved material section of this standard will provide a list of approved parts to be installed inside the enclosure.

4.5.14.1 General

Low flow site RTU's minimum shall be monitor only.

The manufacturer shall be responsible for all efforts necessary to select, furnish, supervise installation and connections, calibrate and to place into operation all required system instrumentation and controls along will all other associated equipment and accessories.

The enclosure shall be 14"x12"x6" weatherproof NEMA 4X polycarbonate enclosure.

The parts list shall consist of the minimum parts herein:

a. Modular Backplane

b. Digital monitoring module card (DMM)

c. Broadband DC block protector

d. Radio interface module

e. Internal coax connector (pig tail)

4.5.14.2 Warranty

Warranty on system function and equipment shall be one (1) year from the date of start-up. Warranty shall include any problems (to include lightning and other surges) which prevent satisfactory operation of the system. Warranty shall include, but not be limited to parts, labor and travel expenses.

4.5.14.3 System Requirements

RTU's shall meet or exceed the following requirements:

a. Programming:

   i. The device shall be configured, programmed, and setup using any standard Internet web browser software.

   ii. All connected equipment can be monitored and configured from an internet connection to the world-wide-web.

   iii. Screens shall be Password protected to provide secure access.

iv. Operational programming software or user skills shall not be proprietary.

b. Radio Communication:

i. Communication shall be via Radio wave using DFS primary protocol or equivalent MODBUS protocol and shall communicate through the data transmission services using existing licensed frequencies.

ii. A factory approved antenna and mast shall be provided as part of the onsite communication structure with accordance to manufactures communication height.

iii. N-Series coax cable shall be installed between broadband DC block protector and the antenna.

iv. Antenna masts shall be anchored According to the manufactures specifications unless other inspection conflicts are noted.

v. All Grounding of communications shall be grounded by one (1) - eight (8) foot copper ground rod and bonded to GA Powers grounding strap.

vi. All antenna connections shall be protected by heat shrink.

vii. All mast connections shall be brass or bronze coated with galvanized coating or spray.

viii. FCC Licensing shall be the approved manufacturer's responsibility to provide radio frequency and radio testing of each site.

c. Alarming and Monitoring: The device shall monitor connected alarms and analyze and report the following information with alarm notifications sent immediately, or at user selectable time delays:

i. High water alarm (From level controller)

ii. Lag float alarm

iii. Float sequence failures

iv. Power failure alarm

v. Phase monitor

vi. Pump 1,2 On/Off Cycles

vii. Starter failures

viii. Pump 1,2 Runtimes

ix. Hand / Off / Auto switch position

x. High pump temperature alarm, Pump #1 & #2

d. Power Supply:

i. Incoming electrical service shall be 115 VAC, 60 Hz, single- phase power.

ii. Fuse protected 12 VDC power supply shall be powered from the 120-volt incoming power and shall include tapered charge type battery circuitry to maximize battery life. The power supply shall be rated at minimum 2.0 Amps @ 12 VDC.

iii. A 12-volt battery charging power supply and battery backup with a 2-hour minimum operation time shall be provided.

e. Protection: A single-phase lightning arrestor shall be connected to each line of the incoming side of the power input terminals. The installation shall include a good (minimum eight (8) foot deep) copper ground rod bonded to GA Power grounding strap.

4.5.15 Emergency Power

Lift Stations with a design capacity of 1,500 gpm or greater shall be provided with a permanently mounted on-site generator set and automatic transfer switch. Pump stations with a design capacity less than 1,500 gpm shall be equipped with a generator receptacle for use with a portable generator. Generator receptacles, where applicable, shall be matched to accommodate the use of JWSC portable generators.

4.5.16 On-site Standby Generators & Automatic Transfer Controls

On-Site generators shall be installed in accordance with NEC Article 702, Optional Standby Systems.

4.5.16.1 General

On-Site generators shall be sized by the manufacturer based upon the lift stations running electrical load and motor-starting requirements as specified by a Georgia Licensed Engineer, taking into consideration the characteristics of the generator and engine.

On-Site generators shall be sized, designed and capable of operating two pumps simultaneously on duplex and triplex facilities and three pumps simultaneously on quadraplex facilities taking into account the pump motor starting sequence delay interval. The design shall allow for a maximum 20% voltage dip at motor start of the second or third pump while the originally started pump is in full operation. Where the facility includes differing motor sizes, the largest motor shall always be started first.

The generator shall be equipped with field-forcing equipment to sustain the rated excitation and current up to three times the generator's rated output. Downstream and generator circuit breakers shall be coordinated so that the branch circuit breaker trips first. An under-voltage relay shall be provided to trip breakers and shut down the engine if over current at less than full voltage occurs for a predetermined length of time.

On-Site generators shall be powered by a diesel fueled engine capable of supplying the shaft power required by the actual/required maximum load applied to the generator. The diesel fueled generator shall be provided with a UL 142 compliant above ground fuel storage tank or integral belly tank sized to provide a minimum of 24 hours of continuous run time based on full facility power requirements and loadings.

4.5.16.2 Engine-Generator Controls

Controls shall meet or exceed the following requirements:

a. General controls shall include:

   i. Manual start/stop

   ii. Auto/remote start

   iii. Emergency stop

   iv. Fault reset

   v. Remote start input active

vi. Fuel gauge

vii. Exercise function

viii. 3-Phase voltage regulator

ix. Fault history

x. Output circuit breaker

b. Instruments for the engine shall include:

i. Oil Pressure

ii. Coolant temperature

iii. Engine speed

iv. Engine running hours

v. Number of starts

vi. Battery voltage

c. Safety controls for engine shut-down shall only be manually reset and shall include:

i. Low oil pressure

ii. High engine coolant temperature

iii. Failure to crank shutdown

iv. Over crank (failure to start)

v. High/low battery voltage/weak battery

vi. Over-speed

vii. Low fuel

d. Instruments for generator shall include:

i. 3-Phase L-L and L-N voltage

ii. Frequency

iii. 3 Phase current

iv. Kilowatt hour

v. Total kilovolt-amps

e. Safety control for generator shut-down shall only be manually reset and shall include:

i. Under and over voltage

ii. Under and over frequency

iii. Over current and short circuit

iv. Reverse power

f. Instruments and controls shall be mounted on the generator control panel

g. Actuating the safety devices shall shut-down the generator set, indicate the cause of the shut-down by lighting the appropriate indicating light, and provide separate outputs for the remote alarm indication panel and the computer.

4.5.16.3 Automatic Transfer Controls/Switches

Automatic Transfer Controls/Switches shall be provided and shall conform to all of the requirements of UL 1008 and be so listed and labeled; Bypass isolation switches that allow the ATS to be removed for repairs shall be provided.

a. Automatic transfer switches shall be Double-throw type switches having the following ratings:

i. Continuous rating.

ii. Inrush rating

iii. Load interrupting

iv. Thermal and Magnetic

b. Automatic transfer switches shall include a pause-in-neutral position with an adjustable time delay that causes the motor to be disconnected from the power source during transfer and allows the motor voltage to collapse to a safe level prior to re-energization. Automatic transfer switch position indicating panel shall include:

4.5.16.4 Starting Batteries and Charging Systems

Starting batteries for the standby generator shall be wet cell lead-acid batteries having a cranking capacity adequately sized for the specific application.

4.5.16.5 Generator Set Enclosure

Generator Set enclosure shall be an aluminum sound attenuated weather protective enclosure with the following features:

a. Stainless Steel hardware

b. Compact footprint

c. Package listed to UL 2200

d. Fuel and electrical stub-up area within enclosure perimeter

e. Two or more recessed doors per side, depending on dimensions.

f. Pad-lockable doors with weather protective seals

g. Enclosed exhaust silencer

h. Rain collar and rain cap

i. Access lifting points for spreader bars or forklift

j. Window for control viewing

k. Exterior oil and coolant drains with interior valves for ease of service

l. Sound attenuated 70 dB(A) at twenty-three (23) feet (non-residential)

4.5.17 Lift Station Testing

Each Lift Station shall be subjected to testing in accordance with JWSC Water and Wastewater Developmental Standards and Procedures.

4.6 PRIVATE LIFT STATIONS

This section delineates the minimum standards for wastewater lift stations intended for private ownership, operation and maintenance that will discharge to the publically owned and operated gravity sewer systems or low pressure system force mains of the JWSC.

These Standards shall encompass individual residential, single property service commercial, multi-service/multi-lot facilities that require less than 22 gpm falling below the threshold for public ownership, and those facilities discharging greater than 22 gpm not "intended" for dedication by a documented "Notice of Intent" from the property owner to the JWSC.

4.6.1 General Requirements

No Publically owned and operated sanitary sewer system or lift station shall be permitted to discharge, directly or indirectly, to a privately owned and operated lift station.

All piping systems contributing flow to a private lift station shall be privately owned and operated by the facility owner and/or allowed by a documented agreement between the owners of contributing systems and the lift station owner. Such agreements shall establish the rights and responsibilities for operation and maintenance of the lift station and of the individual piping systems between the parties. The JWSC shall be provided with a copy of such agreement(s) prior to the payment of connection fees.

With the exception of individual residential and single property commercial lift stations, private lift station and sanitary sewer system owners shall be required to enter into a Satellite System Working Agreement with the JWSC prior to payment of connection fees to discharge to the public system.

Private Lift Stations of capacities suitable for dedication to the JWSC that have not been designed and constructed in accordance with the Dedicated Lift Station Standards herein stated shall not be considered for public ownership until such facility is brought to the minimum current Standards for Dedicated Lift Stations. Exempted from this policy will be lift stations designed and constructed in accordance with City of Brunswick or Glynn County Standards at the time of installation and that are functioning properly.

The served property for a low pressure connection to the public force main shall be adjacent or contiguous to the publicly owned low pressure force main; the acquisition of an easement through private property to access a low pressure system force main that is not adjacent or contiguous to the property is the responsibility of the owner.

With the exception of Single Family Residential and Single Lot Commercial Lift Stations serving only one (1), water account customer, all private lift stations shall display a sign in a prominent location at the facility fitted to a post or enclosing fence. The sign shall identify the facility as a wastewater lift station, identify the owner and provide an emergency contact phone number after the phrase **"In Case of Emergency Call"**. The sign lettering shall be large enough to be easily read from fifty (50) feet away with the lettering and sign made of durable weather resistant material.

4.6.2 Single Family Residential & Single Lot Commercial Lift Stations

4.6.2.1 Owner Responsibilities

The individual property owner shall be responsible for the selection, purchase and installation of the on-site wastewater collection and transmission system to the approved point of connection to the public facilities.

Where an existing septic system is on the property, it shall be abandoned in accordance with Environmental Health Department Standards.

All on-site pumping systems shall be installed by a Georgia Licensed Master Plumber or Utility Contractor and permitted through the appropriate local Code Enforcement Department.

The property owner shall remain responsible for the operation, maintenance, repair and replacement of all on-site systems up to the point of connection to the public system.

4.6.2.2 System Components

The lift station (pumping system) shall include a holding tank, anti- floatation collars, grinder pump and electrical and controls. An alarm system that provides a light and/or audible signal when the water in the holding tank is above the normal operating range shall be provided.

The grinder pump shall be designed to handle the required flow rate (gpm) at the estimated backflow pressure (pressure head) for the individual application being considered.

The pump line (force main) from the lift station to the point of connection to the public low pressure system force main or gravity sewer system service line shall be, at minimum, one and one-fourth (1¼) inch diameter PVC or HDPE pressure pipe. At no time shall a force main from a private pumping system lay within a public right-of-way without obtaining a road encroachment permit from the proper authorizing authority with a copy of which submitted to the JWSC with the connection application

When discharging to a public gravity sewer system, the pump line (force main) shall discharge to a gravity sewer system manhole if the force main is connected to a public gravity main within a road right-of-way. If connecting to a gravity main from private property or through an easement, the private force main shall be connected to a sanitary sewer service line in accordance with JWSC Standards for Gravity Sewer Service connections. Requirements for corrosion protection as specified in Section 3 for manholes do not apply for discharge rates of 22 gpm or less.

When connecting to a publically owned and operated Low Pressure Force Main, the pressure line from the lift station shall connect to the Low Pressure System Force Main stub-out provided for the property in accordance with the JWSC Force Main Connection Standards.

A force main crossing of property not owned by the owner of the lift station to reach a public sewer system connection point shall require an easement from the owner of the property being crossed. Such documentation shall be filed with the JWSC along with the connection permit application.

All on-site systems shall be inspected by a JWSC inspector prior to being placed in service.

4.6.3 Multi-Family, Multi-Lot and/or Multi-User Commercial Stations

4.6.3.1 Owner Responsibilities

The system owner shall be responsible for the selection, purchase and installation of the on-site wastewater collection and transmission system to the approved point of connection to the public facilities.

The system owner shall remain responsible for the operation, maintenance, repair and replacement of all components up to the point of connection to the public system.
The system owner shall be required to enter into a Satellite System Working Agreement with the JWSC prior to payment of connection fees to discharge to the public system.

4.6.3.2 System Components

System shall be designed by a Licensed Georgia Professional Engineer to pump the design peak hourly flow with one pump out of service.

System shall be designed and constructed in accordance with all applicable regulations and guidelines of the Georgia Environmental Protection Division.

System shall have a minimum of 2 pumps with each pump being of the same capacity with the rated flow of each pump being as required for the estimated daily flow in gpm + a 2.0 peaking factor.

The pump line (force main) from the lift station to the point of connection to the public low pressure system force main or gravity sewer system service line shall be, at minimum, one and one-fourth(1 ¼) inch diameter PVC or HDPE pressure pipe. At no time shall a force main from a private pumping system lay within a public right-of-way. Where a public gravity sewer main or manhole or low pressure force main is not available contiguous to the property, the owner shall acquire easements through adjoining property or properties to the point of connection approved by the JWSC.

When discharging to a public gravity sewer system, the pump line 9force main) shall connect to a gravity sewer system service line draining to a manhole or gravity main in accordance with JWSC Standards for Gravity Sewer Service connections. Requirements for corrosion protection as specified in Section 3 for manholes do not apply for discharge rates of 22 gpm or less.

When connecting to a publically owned and operated Low Pressure Force Main, the pressure line from the lift station shall connect to the Low Pressure System Force Main stub-out provided for the property ion accordance with JWSC Force Main Connection Standards.

A force main crossing of property not owned by the owner of the lift station to reach a public sewer system connection point shall require an easement from the owner of the property being crossed. Such documentation shall be filled with JWSC along with the connection permit application.

All on-site systems shall be inspected by a JWSC inspector prior to being placed in service.

4.7 FORCE MAINS

4.7.1 General

Force mains shall discharge to sanitary sewer gravity system manholes at the manhole invert level in such a manner as to minimize turbulence and join the normal flow of wastewater through the manhole without disrupting or impeding other flow or flows entering or passing through the manhole. Where the discharge manhole has no other flows entering it, the force main discharge shall be directed straight through the manhole, through a properly constructed invert, into the manhole effluent line.

No force main, with the exception as noted in section 4.6.2.2, System Components for Single Family Residential and Single Lot Commercial Lift Station and stations discharging less than 22 gpm), shall connect to a sanitary sewer manhole that does not meet the requirements for corrosion protection as cited in the Section 3 of these standards for the discharge manhole and downstream manholes.

No force main shall be discharged to a sanitary sewer system unless such downstream gravity system has been verified by the JWSC to have adequate capacity to accept the discharge.

Force mains shall have isolation valves installed at two-thousand (2,000) foot intervals beginning at the isolation valve installed at the lift station. Lift stations with force mains less than two-thousand (2,000) feet to the point of discharge do not require isolation valves beyond the lift station.

4.7.2 Force Main Manifolds

Other than in low pressure systems, force mains from proposed public or private lift stations may not generally be manifolded with existing publicly owned force mains. Where manifolding is recommended for a proposed lift station by the developer's or owner's engineer for consideration by the JWSC, hydraulic modeling will be required. Such modeling shall demonstrate velocities for all interconnected pipes within standard parameters as described in Section 4.7.3 to be considered.

No force main from a private lift station shall be allowed to manifold with a public force main without documented agreement shown on the approved record drawing, or by written legally binding documentation submitted to the JWSC with the connection application by the owner, accepting responsibility for any private pumping system upgrades that may become necessary if the private lift station's ability to discharge into the public force main, due to changing flow conditions in the public force main were

to occur, and/or for any damage or associated liabilities that may result as a failure of such public force main to accept the discharge from the private lift station.

Force mains from single-family residential or single lot commercial users shall only connect to publically owned Low Pressure System force mains at service connections provided at the property line or public right-of-way in accordance with these Standards.

4.7.3 Force Main Size

The minimum size pressure sewer service laterally for single-family residential or single lot commercial shall be one and one-fourth (1 ¼) inch in diameter.

Force mains for a single facility use lift station discharging to gravity shall be sized for peak flow (required pump rate) at a minimum velocity of 2.5 fps with one pump running and a maximum velocity of 5.0 fps with both pumps running in a duplex station. For triplex or quadraplex facilities velocities shall not exceed 5.0 fps with two or three pumps running respectively.

Force mains in manifolded systems, where approved, shall be sized as demonstrated by hydraulic modeling to provide a minimum velocity of 2.0 fps with the minimum of pumps operating as needed to handle the required pump rates of all connected facilities, (i.e. one pump in each duplex facility, two pumps in each triplex facility, three pumps in each quadraplex facility), and to provide a maximum velocity of 5.0 fps with the maximum of pumps operating in each facility, (i.e. two pumps operating in a duplex facility, three pumps operating in a triplex facility, four pumps operating in a quadraplex facility).

With the exception of single-family residential or single lot commercial, no public force main shall be smaller than two (2) inches in diameter while still meeting the minimum and maximum velocities in this standard.

Where the JWSC has approved an Initial/Ultimate Lift Station design concept and the parameters outlined above cannot be achieved with one force main, dual interconnected parallel force mains shall be used. The interconnection of such dual force main systems shall be designed and constructed with valving to provide the use of either force main individually or together simultaneously within required velocity and flow parameters.

4.7.4 Force Main Depth

Force mains shall be designed meeting minimum cover requirements of thirty-six (36) inches with a maximum of 60 inches. Cover shall be measured from finished grade.

Force main depths shall be designed so as to reduce or minimize the number of high points in the pipeline by varying the depth along the route as is reasonable to maintain a consistent pipe elevation. Changes in elevation which exceed two feet will require an air/vacuum release valve.

4.7.5 Force Main Location

Force mains shall be designed and constructed along the shoulder or within public rights-of-way on the opposite side from water mains.

Force mains shall be designed and constructed within appropriately sized easements dedicated to the JWSC. Easements provided shall be maintenance vehicle and equipment trafficable all weather easements.

A horizontal distance of three (3) foot minimum shall be maintained from all force mains to drainage structures, telephone duct banks, electrical transformers, signal relays, power poles, and other structures in the right- of-way as well as any other parallel underground utility with the exception of water mains.

Where force mains cross other underground utilities, with the exception of water mains, a minimum vertical separation of six (6) inch shall be maintained. All distances shall be measured from the outside edge of the pipes. The vertical separation between force mains and other crossing utilities shall be filled with a suitable pipe bedding material and compacted or filled with flowable fill to prevent settlement, contact and potential pipe to pipe abrasion caused by the vibration of flow through the force main.

Force main connections to manholes shall be cored and booted connections in accordance with Paragraph 4.7.1 of this Standard.

Force mains shall not be constructed within or below open ditch bottoms unless crossing on a perpendicular. Where crossing open ditch bottoms, the forcemain shall be a minimum of sixteen (16) inches below the bottom of the ditch and encased in concrete for the full width of the ditch as measured across the top of ditch banks.

Force mains shall be located outside of paved areas except at roadway crossings.

Sewer force main and water main separations shall be in accordance with Georgia EPD requirements and as follows:

a. At crossings, pipe joints shall be as far as possible and equidistant from the point of crossing with the water main on top. Separation shall be measured from the outside edge of the pipe to the outside edge of the pipe. A full length of pipe must be centered at the crossing.

b. Alternatively, at such crossings, the pipes shall be arranged so that all water main joints are at least 6' from all joints in the sewer force main.

Sewer force mains crossing major ditches, canals, streams, creeks and rivers shall be sub-aqueous crossings installed by horizontal directional drilling or other boring/tunneling method approved by the JWSC. Such crossings shall be provided with isolation valves on both sides of the crossing. Both sides of the crossing shall be treated as high points in the force main and have air release/vacuum valves installed. The placement of isolation valves and air valves shall be a minimum of fifteen (15) feet horizontally away from stream bank tops. The crossing pipe shall be perpendicular to the stream. Aerial crossings and bridge attachments shall not be permitted. No sewer force main shall be designed or constructed under ponds, lakes, retention ponds or other bodies of water other than in crossings as described above. No sewer force main shall be designed or constructed to lay closer than twenty (20) horizontal feet from the top of the bank of any body of water noted in this article.

Tracer Wire shall be provided on all installed force mains; tracer wire shall be continuous or properly spliced single strand No. 10 solid plastic coated (30 mil) copper wire from iron fitting to iron fitting.

Detection Tape shall be provided on all force mains; detection tape shall be two (2) inches wide Mylar encased metal marking tape and shall be buried eight (8) inches – twelve (12) inches below plan-finished grades.

4.7.6 Materials

4.7.6.1 Pipe

Force main piping shall be color coded green. Force main piping shall be fused joint DR 17.0 HDPE meeting the requirements of ASTM D3035 - DIP size with butt fused joints; or, SDR 21 Class 200 PVC meeting the requirement of ASTM D2241, with elastomeric integral bell gasketed joints meeting the requirements of ASTM D-3036; or, AWWA C-900 and C-905

DR-18 PVC. Where specifically approved by the JWSC for special conditions on short runs, interior coated CL52 DIP meeting the requirements of ASTM A-746, with elastomeric push-on joints, mechanical joints conforming to ANSI A-21.11, or flange joints conforming to ANSI
21.1. All bolts and bolt studs associated with flange joint pipe connections shall conform to ANSI B-16.1.

4.7.6.2 Joints

Force mains shall have mechanically restrained joints at changes in direction. The restrainer shall be manufactured of ductile iron and shall meet or exceed all the requirements of ANSI A21.11 (AWWA C111) and ASTM A536. The restrainer system shall provide anchoring ductile iron pipe and fittings, valves and PVC pipe to mechanical joint pipe or fittings, or bell to spigot PVC pipe joints. The restrainer shall accommodate the full working pressure rating of the pipe plus surge allowance. In the assembly of the restraint device, all bolts shall be tightened to the correct torque range as recommended by the restraint manufacturer. Concrete thrust blocking will not be permitted.

4.7.6.3 Fittings

Horizontal and vertical directional changes in force mains shall be accomplished with bends of 45 degrees or less and properly restrained; no 90 degree bends will be permitted.

All fittings on pvc force mains shall be inside coated "sewer safe" mechanical joint cast iron or ductile iron fittings properly restrained.

4.7.6.4 Valves

Force Main isolation valves shall be interior coated plug valves. Plug valves eight (8) inch and greater shall be provided with worm gear actuators, and extension stems with operating nut no more than eight (8) inches below finish grade.

Isolation valve/check valve connections by a new or replacement force main to an existing force main shall be by cutting-in a mechanical joint wye fitting to discharge in the direction of normal flow. Wet tapping with a "T" connection will not be permitted.

Air release valves shall be two (2) inch air release valve assemblies installed within sealed manholes. Air release valves shall be provided at all force main high points. On force mains discharging to gravity systems combination valves (air release and vacuum valves) shall be utilized in the place of air-only release. The size, depth and configuration of the sealed

Air Release/Vacuum vault shall be such as to allow the entry and work of maintenance personnel ***(See JWSC Standards Details).***

4.7.6.5 Force Main Casings

Force mains crossings under major roads, railroads or other major obstructions shall be installed within a casing.

Where Steel Pipe is to be used as a casing it shall conform to either ASTM Standard A139 for "Electric Fusion (arc) Welded Steel Pipe" with minimum yield strength of 35,000 psi or "API Specification API-5LX, Grade X-42 Welded Steel Pipe". Wall thickness shall meet the requirements of the latest Revision of the American Railway Engineering Association Manual of Recommended Practice or the Georgia Department of Transportation Standard Specification for Road and Bridge construction, as applicable. For street uses which are not GDOT or railroad, use GDOT casing thickness. All pipe furnished by the manufacturer shall be cast and machined at one foundry location to assure quality control and provide satisfactory test data. Full pipe length shall be provided. No short pipe lengths less than eight (8) feet long will be allowed unless approved by the JWSC. The pipe ends shall be tapered where welding is required.

Where HDPE pipe is to be used, it shall be DR 9 HDPE meeting the requirements of ASTM D3035 and butt-fusion welded.

Casing pipe interior diameter shall, at a minimum, be twice the outside diameter of the force main being encased.

4.7.7 Force Main Testing

Force mains shall be hydrostatically tested to 1.5 times the working pressure of the associated lift stations, or 100 psi, whichever is greater in accordance with the procedures of AWWA C600. Testing shall be observed and approved by a JWSC inspector.

All installed isolation, air release and check valves shall be tested for proper operation, set and marking

Force main tracer wire shall be checked for continuity along the pipe run and checked at terminus points for proper connection.

APPENDIX 4A
ACCEPTABLE MANUFACTURERS

APPENDIX 4A

SANITARY SEWER – LIFT STATION AND FORCE MAINS
ACCEPTABLE MANUFACTURERS

PARAGRAPH	PRODUCT	MANUFACTURERS
4.5.2	**Site Requirements**	
4.5.2.6	*Bypass Pumping Connection Cam Lock*	Dixon OPW
	Bypass Piping *PVC 1120, Class 150, DR 18*	Vulcan Plastics JM Eagle
	DR 18 Sewer Safe Mechanical Joint Fittings	Star Pipe Sigma Corp.
	Bypass Piping *Ductile Iron Pipe*	Griffin Pipe US Pipe
	Ductile Iron Pipe Sewer Safe Mechanical Joint Fittings	Star Pipe Sigma Corp.
4.5.3	**Wet Well Configuration**	
4.5.3.4	*Access Hatches*	U.S. Foundry
4.5.4	**Precast Concrete Structures**	
4.5.4.1	*Precast Concrete Structures*	MST Inc. Hanson Pipe and Precast Mega Cast
4.5.4.2	*Moderate Risk Corrosion Protection*	Raven Epoxy Sewer Shield Parsonpoxy Hydro-Pox Epoxy
	High Risk Corrosion Protection	Spectra Shield SewperCoat Green Monster
	Significant Risk Corrosion Protection	SewperCoat Green Monster
4.5.5	**Fiberglass Structures**	
4.5.5.1	*Fiberglass Structures*	Xerxes L.F. manufacturing Flowtite
4.5.7	**Wet Well and Discharge Header Piping**	
4.5.7.1	*Interior Piping High density Polyethylene (HDPE) Pipe*	Performance Pipe JM Eagle Lamson & Sessions
	Interior Piping Class 53 Flange by Flange *Ductile Iron Pipe*	Star Pipe Sigma Corp.
4.5.7.2	*Exterior Piping Class 53 Flange by Flange* *Ductile Iron Pipe*	Griffin Pipe US Pipe
	Exterior Pipe Fittings Flange by Flange	Star Pipe Sigma Corp.

PARAGRAPH	PRODUCT	MANUFACTURERS
4.5.8	**Valves and Appurtenances**	
4.5.8.1	*Isolation (Plug) Valves*	Mueller Dezurik
4.5.8.2	*Check Valves*	Clow
4.5.8.3	*Air Release Valve*	
4.5.8.4	*Discharge Gauge Fittings*	
4.5.9	**Pumping Station**	
4.5.9.2	*Submersible Pumps*	Flygt, KSB, Wilo, Shinmaywa
4.5.9.3	*Grinder Pumps*	Flygt, KSB, Wilo, Shinmaywa
4.5.11	**Electrical Equipment and Controls**	
4.5.11.1 A	*Enclosure*	Hoffman APX Flygt Bison
4.5.11.2 B	*Panel Components*	Listed Below
4.5.11.2 C	*Motor Starters* *Variable Frequency Drives*	Square D Yasakawa ITT Danfoss
4.5.11.2 D & E	*Circuit Breakers*	Square D GE Cutler Hammer Westing House
4.5.11.2 F	*Audible Alarm*	Federal Signal
4.5.11.2 G	*Alarm Light*	Federal Signal
4.5.11.2 H	*GFI Receptacles*	ISO GE Morris Levite
4.5.11.2 I	*Generator Receptacles*	Crouse Hinds
4.5.11.2 J	*Manual Transfer Switch*	Square D GE Westinghouse
4.5.11.2 K	*Hand Off Auto Switches*	Cutler Hammer Square D
4.5.11.2 N	*Power Monitor*	Diversified Electronics
4.5.11.2 O	*Relays*	NTE Allen Bradley AA Electric Idec
4.5.11.2 S	*Lighting Arrestors*	Ditek Delta
4.5.11.2 T	*Elapsed Time Meter*	ENG Yokogawa
4.5.11.2 U	*Level Controls*	Roto Float Blue Ribbon ITT

4.5.11.2 V	*Transformers*	Warrick GE ACME

PARAGRAPH	PRODUCT	MANUFACTURERS
4.5.12	**Remote Terminal Unit**	
4.5.12	*RTU (SCADA)*	Data Flow Systems Scadatek
4.5.14	**Low Flow Station (Only) RTU System**	
4.5.14.1	*RTU (SCADA)*	Data Flow Systems Scadatek
4.5.16	**On-Site Standby Generators & Automatic Transfer Controls**	
4.5.16	*Standby Generators*	Onan Caterpillar
4.5.16.2	*Engine-Generator Controls*	Onan Caterpillar
4.5.16.3	*Auto Transfer Switches*	Onan Caterpillar
4.7.6	**Force Main Materials**	
4.7.6.1	*SDR 21 Class 200 PVC Pipe* *AWWA C-900/C-905 DR-18*	Vulcan Plastics JM Eagle U.S. Plastic Corp.
	DR 11 (HDPE) Pipe High Density Polyethylene	Performance Pipe JM Eagle Lamson & Sessions
	Interior Coated CL52 Ductile Iron Pipe	Griffin Pipe US Pipe
4.7.6.3	*Sewer Safe Mechanical Joint Fittings*	Star Pipe Sigma Corp.
	Sewer Safe Coupling	HyMax Star Pipe Sigma Corp.
4.7.6.4	*Isolation (Plug) Valves* *Air Release Valves*	Clow Mueller

SECTION 01150 - MEASUREMENT AND PAYMENT

A. SCOPE

Under this heading shall be included the methods of measurement and payment for items of work under this Contract.

B. ESTIMATED QUANTITIES

All estimated quantities for unit price items, stipulated in the Bid Form, or other Contract Documents, are approximate and are to be used as a basis for estimating the probable cost of the work and for comparing the bids submitted for the Project. The actual amounts of work done and materials furnished under price items may differ from the estimated quantities. The basis of payment for work and materials will be the actual amount of work done and material furnished. The Contractor agrees to make no claim for damages, anticipated profits or otherwise on account of any difference between the amounts of work actually performed and materials actually furnished and the estimated amounts included in the Bid Form.

C. LUMP SUM AND UNIT PRICE QUANTITIES

All quantities are for unit price or lump sum items stipulated in the Bid Form. The Contractor, having read and understood the Bidding Documents and examined the Project sites and adjoining areas, and being familiar with the obstacles and conditions that will affect proposed work, hereby offers and agrees to furnish all labor, products, and services needed to provide work in accordance with the Bidding Documents and will provide a properly itemized listing for each bid item, supported by sufficiently substantially data, to permit evaluation of partial pay requests.

1. Mobilization, Demobilization, Insurance & Bonds

There will be no separate measurement of the items under this heading. Payment for this item will be on the basis of the lump sum price in the Bid Form. The lump sum price for this item shall not exceed 5% of the total of all bid items in the Base Bid (not including the Supplementary Work Allowance).

Payment shall include all compensation for mobilization, demobilization, insurance requirements and bonds for the project. Payment for 50% of the item shall be made when the Contractor completes project mobilization and satisfies the insurance and bonding requirements to the satisfaction of the Owner. Payment for the remaining 50% of the item shall be after demobilization and completion of the work to the satisfaction of the Owner.

2. Temporary Bypass Pumping/Connection

There will be no separate measurement of the items under this heading. Payment for this item will be on the basis of the lump sum price in the Bid Form. Payment includes all labor, equipment and materials required to complete the work as described in the bid documents.

3. Provide 8-Inch Valve, Appurtenances, & Piping Installations Within New Valve Vault

There will be no separate measurement of the items under this heading. Payment for this item will be on the basis of the lump sum price in the Bid Form. Payment includes all labor, equipment and materials required to complete the work as described in the bid documents**.**

4. Remove Existing Pumps and Control Panel and Return to BGJWSC Designated Location

There will be no separate measurement of the items under this heading. Payment for this item will be on the basis of the lump sum price in the Bid Form. Payment includes all labor, equipment and materials required to complete the work as described in the bid documents**.**

5. Provide 6.5-Hp Pumps with VFD's and flow pacing operation

Measurement of this item shall be on the basis of completed units in place. Payment shall be on the basis of the unit price in the Bid Form.

6. Provide 8-Inch Magnetic Flow Meter, Appurtenances, & Plumbing Installations Within Existing Meter Vault

There will be no separate measurement of the items under this heading. Payment for this item will be on the basis of the lump sum price in the Bid Form. Payment includes all labor, equipment and materials required to complete the work as described in the bid documents.

7. Provide Upgrade of Wetwell Piping to 8-Inch HDPE

Measurement of this item shall be on the basis of completed units in place. Payment shall be on the basis of the unit price in the Bid Form.

8. Provide 8-Inch HDPE Force Main

Measurement of this item shall be on the basis of completed units in place. Payment shall be on the basis of the unit price in the Bid Form.

9. Provide 8-Inch HDPE Pipe Fittings – Butt Fusion, Socket Fusion, and Electrofusion Couplings

There will be no separate measurement of the items under this heading. Payment for this item will be on the basis of the lump sum price in the Bid Form. Payment includes all labor, equipment and materials required to complete the work as described in the bid documents.

10. Provide Upgrade of Existing Electrical Service and Breaker Downstream of Utility Meter With Capacity to Power (2) 6.5-Hp Submersible Pumps in Flow Matching Operation Based on Current 3-Phase, 230-Volt Configuration. Provide New 200 Amp Fused Disconnect in NEMA 4X Enclosure

There will be no separate measurement of the items under this heading. Payment for this item will be on the basis of the lump sum price in the Bid Form. Payment includes all labor, equipment and materials required to complete the work as described in the bid documents.

11. Remove Existing 4-Inch Valves, Mag Meter, Appurtenances, and Piping Within Existing Valve and Meter Vaults and Return to BGJWSC Designated Location. Remove Existing Valve Vault and Access Hatch Intact and Return to BGJWSC Designated Location

There will be no separate measurement of the items under this heading. Payment for this item will be on the basis of the lump sum price in the Bid Form. Payment includes all labor, equipment and materials required to complete the work as described in the bid documents.

12. Remove Fencing and Gate For Temporary Access to Pump Station and Replace With New Fencing and Gate With 3 Strands of Barbed Wire

There will be no separate measurement of the items under this heading. Payment for this item will be on the basis of the lump sum price in the Bid Form. Payment includes all labor, equipment and materials required to complete the work as described in the bid documents.

13. Demolish Portion of Existing 4" Force Main Between Existing Meter Vault and Tie-In Connection to Existing 8" Force Main

There will be no separate measurement of the items under this heading. Payment for this item will be on the basis of the lump sum price in the Bid Form. Payment includes all labor, equipment and materials required to complete the work as described in the bid documents.

14. Demolish Existing Piping From Existing Wet Well to Meter Vault

There will be no separate measurement of the items under this heading. Payment for this item will be on the basis of the lump sum price in the Bid Form. Payment

includes all labor, equipment and materials required to complete the work as described in the bid documents.

15. Remove Existing Wetwell Concrete Top and Access Hatch and Complete Existing Valve Vault

There will be no separate measurement of the items under this heading. Payment for this item will be on the basis of the lump sum price in the Bid Form. Payment includes all labor, equipment and materials required to complete the work as described in the bid documents.

16. New CIP Concrete Wetwell Top and New Access Hatch

There will be no separate measurement of the items under this heading. Payment for this item will be on the basis of the lump sum price in the Bid Form. Payment includes all labor, equipment and materials required to complete the work as described in the bid documents.

17. New 8-Feet x 8-Feet x7.5-Feet Deep Precast Concrete Valve Vault With Access Hatch Including Excavation, Backfill, and Compaction

There will be no separate measurement of the items under this heading. Payment for this item will be on the basis of the lump sum price in the Bid Form. Payment includes all labor, equipment and materials required to complete the work as described in the bid documents.

18. New 6-Inch HDPE Bypass

There will be no separate measurement of the items under this heading. Payment for this item will be on the basis of the lump sum price in the Bid Form. Payment includes all labor, equipment and materials required to complete the work as described in the bid documents.

19. Provide Silt Fence

Measurement of this item shall be on the basis of completed units in place. Payment shall be on the basis of the unit price in the Bid Form.

20. Provide Grassing, Fertilizing and Mulching

There will be no separate measurement of the items under this heading. Payment for this item will be on the basis of the lump sum price in the Bid Form. Payment includes all labor, equipment and materials required to complete the work as described in the bid documents.

D. SUMMARY OF ITEM TOTALS

The Bidder shall fill in the appropriate totals which shall be used as a basis for comparison of bids. The Owner reserves the right to award the Contract in the best

interest of the Owner. The total Contract amounts will be determined upon completion of the project using the quantities actually incorporated into the project corresponding to the unit prices and lump sum amounts in the Bid Proposal.

Payment shall be considered to cover the cost of all labor, supervision, material, equipment and performing all operations necessary to complete the work in place. The items listed in the proposal shall be considered as sufficient to complete the work in accordance with the Plans and Specifications; incidental items of work not listed in the bid form shall be a part of the item with which it is associated and shall be included in the cost of the unit shown on the bid form. The unit of measurement shall be the unit shown in the proposal. Payment will be based upon the actual quantity multiplied by the unit price.

END OF SECTION 01150

SECTION 02050 - DEMOLITION

1. SCOPE:

Under this heading shall be included all operations necessary for demolition of the existing structures, foundations, and utilities as shown on the Drawings.

2. SALVAGE RIGHTS:

The BGJWSC reserves first right of salvage for all materials and equipment removed from the project site. Items designated to be retained by the BGJWSC shall be delivered to a BGJWSC designated location by the Contractor at no additional cost. Any materials or equipment not retained by the BGJWSC shall be removed from the project site and disposed off site by the Contractor in accordance with applicable regulations.

3. PROCEDURES:

The procedures proposed for the accomplishment of salvage and demolition work shall be submitted for review. The procedures shall provide for safe conduct of the work, careful removal and disposition of materials specified to be salvaged, protection of property which is to remain undisturbed, coordination with other work in progress, and timely disconnection of utility services. Overhanging trees that interfere with the accomplishment of the work shall be trimmed the minimum amount necessary. The submittal shall include a detailed description of the methods and equipment to be used for each operation, and the sequence of operation.

4. STRUCTURES AND EQUIPMENT:

Structures and equipment indicated for removal on the Drawings including related piping are to be removed.

5. DUST CONTROL:

The amount of dust resulting from demolition shall be controlled to prevent the spread of dust to occupied portions of the site and to avoid creation of a nuisance in the surrounding area. Use of water will not be permitted when it will result in, or create, hazardous or objectionable conditions such as ice, flooding and pollution.

6. DISCONNECTION OF UTILITY SERVICES:

Utilities shall be disconnected at the points indicated. Where such disconnection will interrupt the utility services to an area not included in the Contract, arrangements for such interruption shall be reviewed with the Engineer at least 72 hours in advance of the interruption. Where water and sewer lines are disconnected or removed the remaining utility shall be plugged and left in such a manner that reconnection can be made.

7. BURNING:

The use of burning at the project site for the disposal of refuse and debris will not be permitted.

8. PROTECTION OF EXISTING WORK:

Existing work to remain shall be protected from damage. Work damaged by the Contractor shall be repaired or restored to its original condition or acceptable equivalent.

9. EXISTING UTILITIES:

a. Utility Services.
Disconnections of utility services, shall be coordinated so as not to affect service to other areas outside of the project limits. The owners of all utilities must be contacted prior to proceeding with work.

b. Utilities.
Remove or abandon all existing utilities as indicated. When utility lines are encountered, that are not indicated on the drawings, they shall be removed or abandoned to the extent that they would project into or interfere with the new construction.

10. DISPOSITION OF MATERIAL:

a. Title to Materials.
Title to all materials and equipment to be demolished not claimed by the Owner is vested in the Contractor upon receipt of notice to proceed. The Owner will not be responsible for the condition, loss or damage to such property after notice to proceed. All existing equipment claimed by the Owner shall be delivered in good condition to a location designated by the Owner.

b. Material for Contractor's Salvage.
Material that is salvageable will be removed from the project site by the Contractor.

c. Unsalvageable Materials.
Concrete, masonry, and other noncombustible materials, other than concrete permitted to remain in place, shall be disposed of by the Contractor off the property.

11. HISTORICAL ITEMS:

There are no known historical items on the project site; however, if historical items are discovered, remove historical items in a manner to prevent damage.

Turn over historical items, if found, to the Owner for disposition such as:
Corner Stones

Contents of Corner Stones
Document Boxes wherever located on the site
Belgian Block
Information Placards and Construction Memorials

12. CLEANUP:

Remove debris and rubbish from the site as soon as practicable. Do not allow debris or rubbish to accumulate in buildings or on site. Remove and transport debris in a manner as to prevent spillage on streets or adjacent areas.

13. MEASUREMENT AND PAYMENT:

Measurement and payment for work under this Section shall be in accordance with Section 01150.

END OF SECTION 02050

SECTION 02210 - EROSION AND SEDIMENT CONTROL

1. GENERAL:

a. RELATED LAND DISTURBING DOCUMENTS:

1. Land Disturbing Activity Permit (LDA) is required for each project over 1.0 acres and is part of the Work associated with the project. The Contractor is required to comply with the best management practices for the control of erosion and sediment from the work site.

2. NPDES General Permit No. GAR 100000 for the discharge of storm water associated with construction activity for projects five (5) acres and larger and for projects fifty (50) acres and larger. Both the Owner and the Contractor are primary permittees (any entity that has submitted a Notice of Intent) of the Erosion, Sedimentation and Pollution Control Plan (ES&PCP). The Owner provides the ES&PCP to the Contractor. A copy of this permit will be provided to the Contractor and the Contractor shall comply with its provisions until the work is completed and accepted by the Owner.

   The Contractor cannot start work until seven (7) days after the Owner has filed the Notice of Intent (NOI).

   If the disturbed area is five (5) acres or larger the project is governed by the NPDES Permit for the discharge of stormwater associated with construction activity as shown in the Erosion, Sedimentation and Pollution Control Plan.

   If the disturbed area is fifty (50) acres or larger, both the Erosion, Sedimentation and Pollution Control Plan (ES&PCP) and the Comprehensive Monitoring Plan (CMP) must be submitted to EPD with the Notice of Intent. The ES&PCP and CMP will indicate when, where and how often the site inspection and water testing should be conducted. Inspections and monitoring will be made by the BGJWSC.

b. DESCRIPTION OF WORK:

Under this section shall be included all measures both temporary and permanent to control erosion and sedimentation and protect all surface waters and property both on and off site. This shall include all labor, materials and equipment necessary to meet the requirements of this Section. The Contractor shall not begin work until he is in full compliance with the LDA Permit that has been approved for the work associated with this project. Failure to install and maintain erosion control and sedimentation on the site shall constitute a violation of this permit for each day on which such failure occurs.

c. EROSION AND SEDIMENTATION ACT - DEFINED:

It is the intent of this Specification that the Project and the Contractor comply with all applicable requirements of the State of Georgia Erosion and Sedimentation Control Act of 1975 as amended and any County or Municipal Soil Erosion Ordinance.

The Manual for Erosion and Sediment Control in Georgia further defines practices and requirements. All erosion and sedimentation control measures must be designed for a 25-year, 24-hour rain event. The Contractor is responsible for maintaining all sediment and erosion control measures on the project site during construction. The Contractor is responsible for any damage caused due to failure to implement these requirements. A Soil Erosion and Sedimentation Control Permit has been obtained by the Owner. Periodic inspections will be made by the BGJWSC. The Contractor is to cooperate with the person performing these inspections.

d. COORDINATION WITH CONTRACT PLANS:

A Soil Erosion and Sedimentation Control Plan will be provided to the Contractor and is to be implemented as a part of the procedures necessary to implement requirements of the Act and Ordinance.

2 PRODUCTS:

Not applicable to this specification section.

4. EXECUTION:

a. IMPLEMENTATION:

Implementation of the requirements of the Act is based on the following principles:

1. The disturbed area and the duration of exposure to erosion elements should be minimized.

2. Stabilize disturbed areas immediately.

3. Retain or accumulate runoff.

4. Retain sediment.

5. Do not encroach upon watercourses.

5. SYMBOLS:

The Soil Erosion and Sedimentation Control Plan contain standard symbols for the different types of measures for implementing the Act. These symbols are defined for conditions, design criteria and construction specifications in Chapter 6 of the Manual and on the Drawings.

6. SPECIFIC REQUIREMENTS:

a. Obtain the LDA permit from the appropriate authority.

b. All erosion and control measures must be installed prior to initiation of construction activity.

c. A temporary construction egress pad shall be installed and maintained at any point where construction vehicles enter a paved road, street or parking area. The pad shall be used to prevent mud from leaving the construction area. The pad shall be constructed as shown in the Manual for Erosion and Sediment Control.

d. All disturbed areas shall be grassed by sodding or seeding, fertilizing, mulching and watering to obtain a ground cover which prevents soil erosion.

e. All measures installed for sediment control shall be checked at the beginning and end of each day when construction is occurring to ascertain that the measures are in place and functioning properly.

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f. Sewer trenches will not be excavated more than can be properly backfilled by the end of work day.

g. Erosion control measures shall be inspected by the Contractor after each rainfall event and at least daily during prolonged periods of continuous rainfall. Contractor shall make repairs and adjustments as necessary to maintain the effectiveness of all sediment and erosion control measures.

h. The contractor shall remove all silt fencing after permanent grassing is established and accepted by the Owner.

END OF SECTION

SECTION 02221 - EXCAVATION, TRENCHING AND BACKFILL FOR UTILITY SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

This section specifies the requirements for excavation, trenching, and backfilling for all underground utility systems. Underground utility systems include water mains and services, sanitary sewers and services, storm drains, and sanitary sewer force mains.

PART 2 - MATERIALS

2.1 BEDDING

A. Bedding material shall meet the following requirements:

1. Coarse sands and gravels with maximum particle size of 40 mm (1- 1/2 inches), including variously graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry.

2. Fine sand and clayey gravels, including fine sands, sand-clay mixtures, and gravel-clay mixtures.

2.2 BACKFILL

A. Backfill material shall consist of suitable excavated materials or imported gravel meeting the requirements of #57 stone.

B. All backfill material shall be free of stones, concrete and clay lumps larger than a cubic foot. Roots, stumps and rubbish which will decompose will not be permitted in the backfill. Backfill material shall have its moisture content corrected, as may be necessary before being placed in the trench to bring the moisture content to approximately "optimum" for good compaction. Any rock, stone, concrete, clay lumps larger than a cubic foot in volume, rubbish and debris shall be removed from the site and properly disposed of by the Contractor.

PART 3 - EXECUTION

3.1 GENERAL

Underground piping and utility systems which are to be installed in trenches whose lowest point of excavation is below the existing ground level and are unaffected by an excavation for structures, may be installed at any time during the course of the work. Piping and systems to be installed in or over fill, backfill or new embankments shall not be installed until all earthwork has been completed to rough grade, nor until settlement of the fill or embankment has taken place.

3.2 LOCATION AND PROTECTION OF UTILITIES AND STRUCTURES

A. It shall be the responsibility of the Contractor to acquaint himself with the location of all utilities and structures both present and proposed, also all existing surface structures which may be affected by work under the Contract. The location of any underground structures furnished, shown on the Drawings or given on the site are based upon the available records but are not guaranteed to be complete or correct, and are given only to assist the Contractor in making a determination of the existence of underground structures.

B. Overhead utilities, poles, etc., shall be protected against damage by the Contractor, and if damaged by the Contractor, shall be replaced by him. The Contractor shall notify those who maintain utilities sufficiently in advance of the proposed construction so that they may locate, uncover and disclose such work. If the progress of construction necessitates the removal or relocation of poles, overhead utilities and obstructions, the Contractor shall make all arrangements and assume all costs of the work involved.

C. The Contractor shall provide for the continuance of the flow of any sewers, drains, water pipes, and water courses, and the like. Where such facilities, water courses, or electric overhead wires or conduits are interfered with by the work of the Contractor, the interruption shall be a minimum and shall be scheduled in advance with the Engineer and the utility owner.

D. The Contractor shall restore all facilities interfered with to their original condition or acceptable equivalent. The cost of such restoration or damage caused directly by his work shall be paid for by the Contractor and shall be included in the prices bid for the items to which it pertains.

3.3 EXCAVATION AND TRENCHING

A. Excavation

Excavate all materials encountered.

B. Caution in Excavation

The Contractor shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures in the trench zone may be determined before being damaged. He shall be held responsible for the repair or replacement of such structures when broken or otherwise damaged because of his operations.

C. Trench Excavation

Trenches shall be wide enough to permit proper installation of pipe fittings and placing and compacting bedding and backfill materials. The width of the trench shall be sufficient to accommodate compaction equipment. Whenever possible, the clear width of the trench at the top of the pipe should not exceed the pipe outside diameter plus 24 inches.

D. Alignment and Grade

Trenches shall be excavated on the alignments shown on the Drawings, and to the depth and grade necessary to accommodate the pipes at the elevations shown. Where elevations of the invert or centerline of a pipe are shown at the ends of a pipe, the pipe shall be installed at a continuous grade between the two elevations.

E. Over Excavation

Excavation in excess of the depth required for proper shaping shall be corrected by bringing to grade the invert of the ditch with compacted coarse, granular material at no additional expense to the Owner. Bell holes shall be excavated to relieve bells of all load, but small enough to ensure that support is provided throughout the length of the pipe barrel.

Excavation in excess of the depths required for manholes and other structures shall be corrected by placing a sub-foundation of 1500 psi concrete, at no additional expense to the Owner.

F. Rock Excavation

Rock found in trench shall be removed for a depth of at least six (6) inches below the bottom of the pipe.

3.4 SHEETING AND SHORING

Excavations, shall be properly shored, sheeted and braced by the Contractor to maintain excavation in a condition to permit the safe and efficient installation of all items of Contract work. Braced and sheeted trenches and open trenches

shall comply with all state laws and regulations, and local ordinances relating to safety, life, health and property. Also, this shall conform to the Occupational Safety and Health Standards for Excavations, Final Rule (29 CFR Part 1926) as printed in the October 31, 1989 issue of the Federal Register.

3.5 DEWATERING AND PROTECTION AGAINST WATER

A. The Contractor shall remove water from the site and shall lower the ground water level as necessary to complete the excavations to the required depths and so that all required work can be accomplished in the dry. The Contractor shall perform well construction, well pointing, sheeting, ditching, and pumping, and shall construct necessary drains, channels and sumps to keep his excavations and new structures clear of ground water, storm water or sewage and to keep his construction areas dry during the progress of the work.

B. Adequate measures and protection shall be provided by the Contractor to protect his work from damage from uplift due to ground water, storm water, or flood water. Any damages which may result due to dewatering shall be the Contractor's responsibility.

C. All water discharged by pumping operations shall be discharged so as not to interfere with work under this Contract or with existing structures and operations. Water from dewatering operations shall be conveyed to the existing drainage features, using piping and pumping facilities provided by the Contractor. Route of dewatering pipe shall be subject to the Engineer's review. Discharge facilities and water quality shall comply with applicable regulations of State and Federal agencies.

D. Dewatering operations shall be uninterrupted and continuous during the course of the work so as not to endanger any construction in place or to present a hazard to workmen in and around the site. The Contractor shall take all measures necessary including, but not limited to, standby equipment and constant attendance to ensure that the dewatering system remains operational and effective throughout the period of time that it is required.

E. No water shall be allowed to run over any uncompleted portions of the work. No units of the work shall be constructed under water. The cost of dewatering shall be included in the price bid for the item of work for which it is required.

3.6 REMOVAL AND REPLACEMENT OF UNSUITABLE FOUNDATION MATERIAL

A. When the trench is excavated to the plan depth or as required by these Specifications, and soft or other material not suitable for bedding purposes is encountered in the trench, the Contractor shall immediately notify the Engineer for inspection and measurement of the unsuitable material to be removed. Where, in the opinion of the Engineer, the subgrade of the pipe trench is unsuitable material, the Contractor shall remove the unsuitable material to a depth of 6" for the full width of the trench and furnish and place stone backfill in the trench to stabilize the subgrade. Payment for removal and replacement of unsuitable material shall be in accordance with the requirements of the Measurement and Payment Section.

B. Attention is invited to the fact that the presence of water does not necessarily mean that stone backfill is required. If well points or other types of dewatering will remove the water, the Contractor shall be required to completely dewater the trench in lieu of stone backfill. Removal and replacement of unsuitable material with stone backfill will be limited to areas where well pointing and other conventional methods of dewatering will not produce a dry bottom.

C. No payment will be made for any overdepth excavation of soft unstable material due to the failure of the Contractor to provide adequate means to keep the trench dry.

D. No payment will be made for any overdepth excavation of the unsuitable material and replacement not inspected and measured by the Engineer prior to excavation.

3.7 PLACEMENT OF BEDDING MATERIALS

A. Bedding material shall be placed and compacted up to the springline of the pipe.

B. Bedding material around the pipe shall be installed with care. Care shall be used to ensure that sufficient material has been worked under the haunch of the pipe to provide adequate side support. Precautions must be taken to prevent movement of the pipe during placing of the material through the pipe haunch.

C. Avoid contact between the pipe and compaction equipment. Compaction of bedding shall be done so that compaction equipment will not damage the pipe.

D. ASTM D2321 "Underground Installation of Flexible Thermoplastic Sewer Pipe" shall be used in conjunction with the above.

3.8 PLACEMENT OF BACKFILL MATERIAL

A. Backfilling operations in this work are referred to herein as Backfilling at the Pipe Zone, Type"A" and Type "B". Type A backfilling shall be used where trenches cross under roadways, paved areas, and structures. Type B backfilling shall be used in all other areas.

B. Type "A" backfill shall consist of suitable excavated materials or imported gravel placed in the trench in 6 inch thick layers from one foot abovethe pipe to finished grade. Each 6-inch layer shall be compacted before additional material is placed in the excavation. The density of the backfilled material after compaction shall be equal to 100 percent of the maximum density obtainable at optimum moisture content as determined by the Standard Proctor Test (ASTM D698). No water shall be used to secure compaction except for adding water to the backfill material before placing in the trench to bring moisture content to approximately "optimum" for good compaction.

C. Type "B" Backfilling shall consist of suitable excavated materials or imported gravel placed in the trench in 12 inch thick layers from the spring line of the pipe to finished grade. Each 12 inch thick layer shall be compacted before additional backfill material is placed in the excavation. The density of the backfilled material after compaction shall be equal to 95 percent of the maximum density obtainable at optimum moisture content as determined by the Standard Proctor Test (ASTM D698). Water shall be added to backfill material only before being placed in the trench in order to bring the moisture content to approximately "optimum" for good compaction.

3.9 CONSTRUCTION ALONG HIGHWAYS, STREETS AND ROADWAYS

A. Operations

Excavation, trenching and backfilling along highways, streets and roadways shall be in accordance with the applicable regulations of the Georgia State Highway Department with reference to construction operations, safety, traffic control, road maintenance and repair.

B. Removing And Resetting Fences

Where existing fences must be removed to permit construction, the Contractor shall remove such fences. As construction progresses, reset the fences in their original location and to their original condition. All costs of removing and resetting fences and such temporary works as may be required shall be included in the prices for the utility line or as provided for in the Bid Proposal.

C. Protecting Trees, Shrubbery And Lawns

Trees and shrubbery along trench lines shall not be disturbed unless absolutely necessary. Trees and shrubbery necessary to be removed shall be properly heeled-in and re-planted. Heeling-in and re-planting shall be done under the direction of an experienced nurseryman. Where utility trenches cross established lawns, sod shall be cut, removed, stacked and maintained in suitable condition until replaced.

Topsoil underlying lawn areas shall likewise be removed and kept separate from general excavated materials. Removal and replacement of sod shall be done under the direction of an experienced nurseryman.

D. Protection of Traffic

Provide suitable signs, barricades, and lights for protection of traffic, in locations where traffic may be endangered by construction operations. All signs removed by reason of construction shall be replaced as soon as condition which necessitated such removal has been cleared. No highway, street or roadway shall be closed without first obtaining permission from the proper authorities.

E. Drainage Structures

All side ditches, culverts, cross drains, and other drainage structures shall be kept clear of excavated material and be free to drain at all times.

F. Maintaining Highways, Streets, Roadways and Driveways

The Contractor shall furnish proper equipment which shall be available for use at all times for maintaining highways, streets and roadways. All such streets, highways and roadways shall be maintained in suitable condition until completion and final acceptance of the work.

The Contractor shall repair all driveways that are cut or damaged and maintain them in suitable condition until completion and final acceptance of the work.

3.10 PROTECTION OF WATER SUPPLY PIPES

A. Parallel Installation

Water mains shall be laid at least ten (10) feet horizontally from any existing or proposed sanitary sewer, storm sewer or sewer manhole. The distance shall be measured edge to edge. When local conditions prevent a horizontal separation of 10 feet, the water main maybe laid closer to a sewer (on a case-by-case basis) provided the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer. The gravity sewer materials and joints shall be the equivalent to water main standards of construction and be low pressure air tested in accordance with JWSC Standard 3.6.9 to assure water-tightness.

B. Crossing

Water mains crossing sewers, storm sewers or sanitary sewers shall be laid to provide a separation of at least 18 inches between the bottom of the water main and the top of the sewer. At the crossings, one full length of water pipe shall be located so that both joints will be as far apart as possible. When local conditions prevent a vertical separation of 18 inches, the gravity sewer passing over or under the water mains shall be constructed of materials and with joints that are equivalent to water mains standards of construction and shall be low pressure air tested in accordance with JWSC Standard 3.6.9 to assure water-tightness.

C. Special Conditions

When water mains cross under sewers, additional measures shall be taken by providing:

1. A vertical separation of at least 18 inches between the bottom of the sewer and the top of the water main;

2. That the one full length of water pipe be centered at the point of crossing so that the joints will be equidistant and as far as possible from the sewer; and, special structural support for the water and sewer pipes be installed if required.

3. The sewer force main shall be constructed of water pipe materials and subjected to hydrostatic test, in accordance with JWSC Standard 2.5.3.8 to assure water-tightness.

3.11 REMOVE AND REPLACE PAVEMENT

A. Pavement and base course which must be removed for constructing sewers, manholes, force mains, water lines, and all other appurtenances in streets shall be replaced in accordance with BGJWSC requirements.

B. The top 18 inches of subgrade material immediately under the paving base and also road shoulder shall be carefully removed and kept separate from the rest of the excavated material. This material shall be placed in the top 18 inches of the backfill. Further compaction shall be accomplished by leaving the backfilled trench open to traffic while maintaining the surface with crushed stone or gravel. Settlement in trenches shall be refilled with crushed stone or gravel, and such maintenance shall continue until replacement of pavement.

C. Where utility lines are constructed on unpaved streets, roads or easements, the top 18 inches of soil shall be stripped and windrowed separate from the excavation from trenches. After the line has been installed and the backfill completed within 18 inches of the original grade, the salvaged surfacing shall be replaced. This work shall be considered as general clean-up along with the removal of surplus excavated materials from the site and the restoring of the surface outside trench limits to its original condition, the cost of which shall be included in the price bid for the utility line.

3.12 WALKS, DRIVES, CONCRETE CURB AND GUTTER

A. Walks, driveways, and concrete curb and gutter designated for removal or are damaged during the course of construction shall be replaced.

B. Sidewalks, driveways, and concrete curb and gutter shall be removed by making a vertical saw joint between any existing sidewalk, driveway, or curb and gutter that is to remain in place and the portion that is to be removed. The subgrade shall be compacted in accordance with the requirements of the BGJWSC. Concrete shall be placed in accordance with BGJWSC requirements.

3.13 TESTING

A. General

The Contractor shall select a qualified independent testing laboratory, acceptable to the Engineer, for the purpose of identifying soils, checking densities, and classifying soils materials during construction. All testing will be paid for by the Contractor. Copies of all test results shall be furnished to the Engineer.

B. Moisture-Density Tests

Testing shall be in accordance with ASTM Methods D698. A test shall be performed on each type of material used in the work regardless of source. Tests will be accompanied by particle-size analyses of the soils tested (ASTM Methods D421 and D422). Changes in color, gradation, plasticity or source of fill material will require the performance of additional tests. Copies of all test results shall be furnished to the Engineer.

C. Field Density Tests

Tests shall be made in accordance with ASTM Method D1556. Tests shall be made in accordance with the following minimum schedule or as

required by the soils technician or as may be directed by the Engineer:

One test for each lift of backfill for each 200 feet of trench or fraction thereof.

D. Submittals

1. The soils technicians will submit formal reports of all compaction tests and retests.

2. The reports are to be furnished to the Owner and the Engineer as soon as possible upon completion of the required tests.

3. This report information is to include but not be limited to the following:

   a. Date of the test and date submitted.

   b. Location of test.

   c. Wet weight, moisture content and dry weight of field sample.

   d. Description of soil.

   e. Maximum dry density and moisture content of the lab sample which best matches the field sample in color, texture, grain size and maximum dry density.

   f. Ratio of field dry density to maximum lab dry density expressed as a percentage.

   g. Comments concerning the field density passing or failing the specified compaction.

   h. Comments about re-compaction if required.

E. Compaction Results

1. If any compaction test reveals that fill or backfill is not compacted as specified, the Contractor shall scarify and re-compact as required to achieve the specified density. Additional compaction tests shall be made to verify proper compaction. Theseadditional tests required due to failure of the original test shall be paid for by the Contractor.

2. The soils technician is to advise the Engineer and the Contractor's Superintendent immediately of any compaction tests failing to meet

the specified minimum requirements. No additional lift is to be placed on a lift with any portion failing.

END OF SECTION 02221

SECTION 02451 - CHAIN LINK FENCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Special Conditions and Division 1 and 2 Specification Sections, apply to this Section.

1.2 SCOPE

The work under this heading includes the furnishing and installation of chain link fences and gates with three strands of barbed wire on top as specified herein and as shown on the Drawings.

1.3 MANUFACTURER

The fence shall be the product of a manufacturer who has demonstrated by actual installations of a similar nature that its product is of the type required. The Contractor shall include all supplementary parts necessary or required for a complete and satisfactory installation within the true meaning and intent of the Drawings. All runs of the fence shall present the same general appearance and the product of one manufacturer only will be accepted.

PART 2 - PRODUCTS

2.1 CHAIN LINK FENCING

Fencing for chain link fence shall be as follows:

2.1.1 Fabric

The chain link fence fabric shall conform to ASTM A392. The size of mesh shall be 2 inches and the wire shall be No. 9 Gauge Basic Open Hearth Steel, hot-dip galvanized after weaving with a minimum of 1.20 ounces of zinc or 0.40 ounces of aluminum per square foot of uncoated wire surface. The wire shall be standard finish with the top selvage knuckled and the bottom selvage twisted and barbed. Height of fence shall be **8-feet** excluding barbed wire top extension.

2.1.2 Wire Fabric Ties

Wire fabric ties shall be No. 9 Gauge Hot-Dip Galvanized Steel Wire conforming to ASTM A112 and spaced 12 inches apart on all posts and

24 inches apart on all rails.
Tie wires shall be a double loop and 6.5 inches in length. Clips are not allowed.

2.1.3 Posts, Rails and Braces

Metal post shall comply with ASTM F-1083, Group IC, zinc coated. Rolled formed steel is not permitted. Gate posts shall be for the gate type specified subject to the limitation specified in ASTM F-900 and/or ASTM F-1184. Line and brace posts shall be 2-1/2 inches O.D., 3.65 pounds per linear foot, hot-dip galvanized steel pipe. Corner and end posts shall be 3 inches O.D., 5.79 pounds per linear foot, hot-dip galvanized steel pipe. The top rails and braces shall be 1-5/8 inches O.D., 2.27 pounds per linear foot, hot-dip galvanized steel pipe. Each brace section shall be a diagonally trussed with 3/ 8 inch round hot-dip galvanized steel rod with truss tightener and fittings. All posts shall be furnished with tops and required fittings for attaching fabric and rail. Fittings shall be of malleable iron or pressed steel.

2.1.4 Gates

Gate frames shall be tubular shaped 1.90 inches, 0.120 inches minimum wall thickness, outside diameter with welded or steel fitted corners. Braces and trusses shall be furnished as required to prevent sagging of the gate. Frames shall be covered with fabric as specified for the fence.

Gate posts shall be as follows:

Leaf Width	Post Diameter	Weight/Ft.
0'-5'	4" OD	9.11 lbs.
6'-18'	6-5/8" OD	18.97 lbs.
Over 18'	8-5/8" OD	28.55 lbs.

Posts, frames and fabric shall be hot dipped galvanized as specified above.

2.1.5 Miscellaneous Fittings and Hardware

Miscellaneous fittings and hardware shall be of design standard with the manufacturer. Miscellaneous fittings and hardware shall be zinc-coated steel and shall be equal to the materials specified in Federal Specifications RR-F-183.

2.1.6 Barbed Wire

Barbed wire shall be of three (3) strands of galvanized No. 12-1/2 gauge

wire conforming to ASTM A121 for copper bearing wire with zinc coating, meeting the requirements of Class 3. Barbs shall be of 14 gauge full round wire with 4 points, wound at 4 inch intervals.

2.1.7 Tension Wire

Tension wire shall be Type I, Class 4 Coating, (7 gauge aluminum coated steel coil spring tension wire) in accordance with ASTM A-824 along the bottom of fence fabric.

2.1.8 Welding

Structural members of gates which are in contact shall by fully welded by a method that will procure a continuous weld on all sides and faces of joints at exposed edges. Surplus welding material shall be removed.

2.2 CONCRETE

Concrete shall conform to ASTM C-94/C 94M, using ¾ inch maximum size aggregate, and having minimum compressive strength of 3,000 psi at 28 days. Grout shall consist of one part Portland cement to three parts clean, well-graded sand and the minimum amount of water to produce a workable mix.

2.3 ACCESSORIES

2.3.1 Caps

Cast Steel galvanized; sized to post diameter, set screw retainer.

2.3.2 Fittings

Sleeves, bands rail ends, tension bars, fasteners, and fittings; steel

2.3.3 Extension Arms

Cast Steel galvanized, to accommodate 3 strands of barbed wire, single arm, sloped 45degrees.

2.3.4 Gate Hardware

Fork latch with gravity drop, two duckbill backstop; two 180 degree gate hinges per leaf and hardware for padlock.

2.3.5 Padlocks

2” size – No. 17 by Master Lock Co, with chain. All padlocks keyed alike.

PART 3 - EXECUTION

3.1 INSTALLATION

The site of the fencing shall be sufficiently cleared of obstructions, and surface irregularities shall be graded so that the fence will conform to the general contour of the ground. The bottom of the fence shall be placed a uniform distance above the ground, as shown on the Drawings.

Posts shall be set in concrete as shown on the Drawings and shall be centered in the concrete. The tops of concrete bases shall be finished smooth slightly above the ground surface and sloped to drain.

After the posts have been installed and the concrete has set so that it will not be damaged, the rails and bracing shall be installed.

The fence fabric shall be tightly stretched and fastened to all rails and posts. Care shall be taken to not stretch the wire so tightly that it will break in cold weather or pull the posts out of line. Fastening to gate, end and corner posts shall be with stretcher bars, clamps and bolts. Top selvage shall be dressed flush with the top rail and the bottom shall be 1-1/2 inches above the ground. Provide a 9 gauge high carbon tension wire along the bottom. Fabric shall be spliced by pulling the ends together and twisting in a spiral connection link or picket so as to make a continuous piece of fabric between end, corner and gate posts, as the case may be.

Each post shall be fitted with a 45 degree extension arm for barbed wire as shown. Extension arms shall be malleable iron suitable for three stands of barbed wire.

Splices in barbed wire shall be of the wrap or telephone type, with each end wrapped around the other wire for not less than 6 complete turns.

The gates shall be hung level and plumb with gate fittings on braced gate posts and shall be attached in such a manner that they cannot be lifted off the hinges. Gates shall be adjusted for easy and proper operation. Gate frames shall be of adequate size members for the gate openings shown. Welded construction may be used, in which case the frame shall be hot-dip galvanized after fabrication. Fabric shall be stretched tight across the frame and permanently and neatly secured. All gates shall be fitted with suitable hardware for locking with a padlock. Hinges shall permit the gates to swing back against the fence line. Provide catch fittings to hold gates and a plunger rod and catch block in the center of the opening of the leaf gates.

END OF SECTION 02451

SECTION 02480 - GRASSING AND SODDING

PART 1 - GENERAL

1.1 SUMMARY

This section specifies requirements for includes fertilizer, grassing and sodding.

1.2 GENERAL

All disturbed areas resulting from work under this Contract shall be grassed or sodded as shown on the Drawings. For roads under state jurisdiction, grassing on the right-of-way shall meet the requirements of the Department of Transportation Standard Specifications.

1.3 SUBMITTAL

Manufacturer's data shall be submitted to the Engineer on grass seed, sod and fertilizer before the materials are delivered to the project site.

PART 2 – MATERIALS

2.1 FERTILIZER

Fertilizer shall be 10-10-10, commercial fertilizer conforming to state fertilizer laws.

2.2 LIME

Lime shall be agricultural grade, ground limestone and shall meet the requirements of the Georgia Department of Agriculture. Lime shall be added based on the results of soil test.

2.3 STRAW MULCH

Straw mulch shall consist of straw or hay. The mulch shall be reasonable free of mature seed bearing stalks, roots, or bulblets and shall be free of Johnson Grass, Nutgrass, Sandbur, Wild Garlic, Wild Onion, Wild Mustard, Crotolaria, Pigweed, Witchweed, and Cocklebur.

2.4 WOOD CELLULOSE FIBER MULCH

Wood cellulose fiber mulch shall be made for wood chip particles manufactured for discharging uniformly on the ground when applied by a hydraulic water sprayer. It shall remain in uniform suspension in water under agitation and blend

with grass seed and fertilizer to form a homogenous slurry. It shall be dyed (non-toxic) an appropriate color to facilitate metering of material.

2.5 SEED

A. Seed shall meet the requirements of the Georgia Seed Laws and Rules and Regulations.

B. Seed shall be delivered in suitable sealed containers labeled in accordance with applicable laws and regulations and including name and location of the producer. The pure live grass seed mixture shall be as shown on the Drawings.

C. Mixtures of different types of seed called for in the seeding schedule shall be weighted and mixed in the proper proportions.

2.6 SOD

Sod shall be good quality, densely-rooted centipede grass, free from noxious weeds. The sod shall be obtained from areas where soil is reasonably fertile and contains a high percentage of loamy topsoil. Before cutting, the sod shall be raked free of all debris and the grass cut to two inches. The thickness of the sod shall be such as to contain practically all of the dense root system of the grass and not be less than 1 inch thick. Sod shall be cut into uniform strips not less than 12 inches in width and 24 inches in length.

PART 3 - EXECUTION

3.1 SOIL PREPARATION

A. Immediately before seeding, the soil shall be properly prepared for seeding. The areas shall be made smooth and uniform and shall conform with the finished grade and cross section shown on the Drawings. Area to be grassed, if not loose, shall be loosened to a minimum depth of 3 inches before lime, fertilizer, seed or sod is applied. Seeded areas shall be free of stones larger than 2 inches and of roots and debris of any size.

B. Seeded areas shall be moist when seeding and shall be kept moist by sprinkling until a good stand of grass is obtained and until the work is accepted by the Owner. Reseeding shall be done by the Contractor at his own expense as may be necessary to obtain a satisfactory stand of grass.

C. The Contractor shall use mulch or other additive materials when conditions do not allow an acceptable stand of grass to grow. Mulch and additive materials shall contain no weed seeds.

3.2 SEEDING

A. Seeding shall be performed during the periods and at the rates specified in the seeding schedule in the Drawings. Seeding shall not be performed when the ground is frozen or excessively wet.

B. Seeds are to be sown by a mechanical spreader either hand operated or machine operated. Seeding equipment shall be such as will continuously mix the seeds to prevent segregation

C. Immediately after the seed has been sown, the entire area shall be raked lightly and rolled to pack the soil firmly around the seed. Seeded areas shall be uniformly mulched with a continuous blanket of straw immediately after seeded. Straw shall be applied at a rate of 2 tons per acre.

3.3 SOD

A. Sod shall be placed between March 1st and December 1st. Sod shall be placed within 48 hours of cutting.

B. Sod shall be moist when laid and placed on a moist bed. Sod shall be placed within 48 hours of cutting. The sod strips shall be carefully placed by hand, beginning at the toe of slopes and progressing upward, with the length of the strip at right angles to the direction of flow of surface water. All joints shall be tightly butted and end joints shall be staggered at least 12 inches. The sod shall be immediately pressed firmly into contact with bed by tamping or rolling. Screened soil shall be used to fill all joints between strips.

C. Sod on slopes shall be pegged with sod pegs to prevent displacement. The sod shall be watered, mowed, weeded, repaired or otherwise tended to insure the establishment of a uniform healthy stand of grass.

3.4 HYDROSEEDING (WOOD CELLULOSE FIBER MULCH)

Hyrdoseeding shall be applied at a rate of 1500 pounds per acre in a slurry mixture of seed, fertilizer, and wood cellulose fiber mulch. The slurry mixture shall be regulated to ensure a uniform application of all materials at the rate specified.

3.5 MAINTENANCE AND RESEEDING

A. All seeded and sodded areas shall be maintained without payment until acceptance of the Contract and any regrading, refertilizing, reseeding or resodding shall be done at the Contractor's expense. Any areas which fail to show a "catch" or uniform stand, for any reason whatever, shall be reseeded or resodded with the original mixture, and such reseeding or

resodding shall be repeated until final acceptance. The Contractor shall properly water, mow, and otherwise maintain all seeded and sodded areas until final acceptance.

B. Damage resulting from erosion, gulleys, washouts, or other causes shall be repaired by filling with topsoil, tamping, refertilizing, and reseeding or resodding by the Contractor at his expense if such damage occurs prior to acceptance of the Contract.

END OF SECTION 02480