Golf Course Drive NE and Eagle Street NE Stormwater Improvements Bid No. ITB 16-009

FOR

City of Fort Walton Beach

HMM Project No. 363524

April 2016

PREPARED BY:

Hatch Mott MacDonald Florida, Inc.

ARCHITECTS, ENGINEERS, SURVEYORS

220 W. GARDEN STREET, SUITE 700
PENSACOLA, FLORIDA 32502

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DIVISION 2

SECTION 00003A
INVITATION TO BID

ISSUE DATE: **April 19, 2016**

BID NO: **ITB 16-009**

OPENING DATE: **May 19, 2016**

OPENING TIME: **10:00AM CDT**

City of Fort Walton Beach, Florida
Purchasing Division
105 Miracle Strip Pkwy SW
Fort Walton Beach, Florida 32548
Telephone: (850) 833-9523
Fax: (850) 833-9643
Website: http://www.fwb.org

BID REQUESTED:

The City of Fort Walton Beach invites bids for **BID No. ITB 16-009: Golf Course Drive and Eagle Street Stormwater Improvements.**

Bids will be opened and publicly read aloud at City Hall Annex Bldg - Training Room, City of Fort Walton Beach, 105 Miracle Strip Parkway SW, Fort Walton Beach, Florida at 10:00AM CDT on **May 19, 2016**. Bids must be SUBMITTED ON THE FORMS FURNISHED BY THE CITY and in accordance with specifications and the list of quantities desired.

Sealed bids shall be submitted to the Office of the Purchasing Manager no later than 10:00AM (CDT), on May 19, 2016. Bids shall not be accepted after this time and date. Each bid shall be submitted in a sealed envelope marked with the bid number, title of the bid, and bid opening date.

Sealed bids are to be addressed as follows for either mail or hand delivery. Bids submitted by mail must be received by the Purchasing Manager before the bid opening time.

Paul L. Eubanks
Purchasing Manager
Purchasing Division
City of Fort Walton Beach
105 Miracle Strip Parkway SW
Fort Walton Beach, FL 32548

Respondents are advised that from the date of release of this solicitation until award of the contract, **contact with City personnel, other than the Purchasing Manager, related to this solicitation is strictly prohibited. All communications are to be directed to the sole contact listed here: Paul L. Eubanks, Purchasing Manager, Purchasing Division, City of Fort Walton Beach,** 105 Miracle Strip Parkway SW, Fort Walton Beach, Florida 32548. All Communication shall be written.

Plans and Specifications will be provided exclusively in electronic format and can be viewed/downloaded at http://fwb.org/purchasing/open-archived-invitations-to-bid/. Future Addenda, if applicable, will be issued exclusively in electronic format and will be posted to the same location.

It is the intent and purpose of the City of Fort Walton Beach that this Invitation to Bid promotes competitive bidding. It shall be the bidder's responsibility to advise the Purchasing Division at the address noted in the Special Conditions, if any language, requirements, etc. or any combination thereof, inadvertently restricts or limits the requirements stated in this Invitation to Bid to a single source. Such notification must be submitted in writing and must be received by the Purchasing Division no later than ten (10) days prior to the Bid opening date.

Sincerely,

Paul L. Eubanks
City of Fort Walton Beach
Purchasing Manager

SECTION 00003B
BID COVER SHEET

(This completed form must appear as the top sheet for all bids submitted.)

TITLE: ITB No. ITB 16-009: Golf Course Drive and Eagle Street Stormwater Improvements

ISSUE DATE: April 19, 2016 **BID NO: ITB No. 16-009**

BID BOND REQUIRED

Total Amount of bid or Base bid **$_____**

Amount of Bid Bond	**(5% of base bid)**	**$_____**
Amount of Cashier's Check	**(5% of base bid)**	**$_____**
Amount of Certified Check	**(5% of base bid)**	**$_____**

Please specify -- All Items bid? Yes ____ No ____

Submitted by:

_____	**BY:** _____
NAME OF BUSINESS	**SIGNATURE**
_____	_____
MAILING ADDRESS	**NAME & TITLE (type or print)**
_____	_____
CITY, STATE, ZIP CODE	**EMAIL ADDRESS**
(_____) _____	**(_____)** _____
TELEPHONE NUMBER	**FAX NUMBER**

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we _____

_____ as Principal, hereinafter _____, called the Bidder, and the _____, a corporation duly organized under the laws of the State of _____ as Surety, hereinafter called Surety, are held and firmly bound unto the **City of Fort Walton Beach** as Obligee, hereinafter called Owner, in the sum of _____ _____ for the payment of work on the **Golf Course Drive and Eagle Street Stormwater Improvements,**

which sums, well and truly to be made, the said Bidder and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Bidder has submitted a bid for, **ITB 16-009**, known as:

Golf Course Drive NE and Eagle Street NE Stormwater Improvements
Fort Walton Beach ITB 16-009

NOW THEREFORE, if the Owner shall accept the bid of the Bidder and the Bidder shall enter into a contract with the Owner in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or contract documents with good and sufficient surety for the faithful performance of such contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Bidder to enter such contract and give such bond or bonds, if the Bidder shall pay to the Owner the penalty hereof, then this obligation shall be null and void, otherwise to remain in full force and effect, unless returned by Owner to Bidder; until Owner shall demand payment by Surety, all as allowed in the Contract Documents.

Signed and sealed this _____ day of _____ A.D. _____.

ATTEST:

_____ _____
(Principal) (SEAL)

_____
(Print/Type)

_____
(Title)

ATTEST:

_____ _____

_____ _____

(Attach Certified Copy of Power of Attorney)

SECTION 00004
INSTRUCTIONS FOR SUBMITTING BID RESPONSE

1. Bidders are expected to examine this bid form and all instructions. Failure to do so will be at the bidder's risk.

2. All prices and notations must be in ink or typewritten. No erasures are permitted. Mistakes may be crossed out and corrections typed adjacent and must be initialed and dated in ink by person signing bid. All bids must be signed with the firm name and by a responsible officer or employee.

3. Each bidder shall furnish all the information required on the bid form and each accompanying sheet on which he/she makes an entry.

4. Unit price for each unit bid shall be shown. A total shall be entered in the amount column for each item bid. In case of discrepancy between a unit price and extended price, the unit prices will be presumed to be correct.

5. Although the City generally awards bids based on a "lump sum" basis to the bidder submitting the lowest responsive and responsible total bid as shown on the Invitation to bid cover sheet, the City may choose to award on a "per group" or "per item" basis. Therefore, bidders must submit with their bids, all pricing pages on the forms provided, clearly indicating which items are bid and which are not. Failure to submit these pages will render such bid non-responsive.

Persons with disabilities needing a special accommodation to participate in this Invitation to Bid should contact the Purchasing Manager, 105 Miracle Strip Parkway, Fort Walton Beach, Florida 32548, (850) 833-9523, at least seven days before the date the accommodation is necessary.

BID CHECKLIST: ***Bidders are cautioned to assemble the bid packet using this check list:***

_____ Invitation to Bid Cover Sheet with Total Amount Bid Stated On It
_____ Signed Bidder's Certification Page
_____ Addendum Page
_____ References Completed
_____ Drug Free Workplace Form
_____ Public Entities Crime Form
_____ Invitation to Bid Price Schedule, Unit Price and Total Price Columns Completed
_____ Bid Envelope Prepared as Specified –Clearly Labeled and Properly Delivered
_____ Trench Safety Compliance Certification Form

SPECIAL ITEMS (APPLICABLE TO THIS BID ONLY):

XX Bond Requirements (See Special Conditions-Section O)
XX Insurance (See Special Conditions-Section P)
XX Exceptions to Specifications on company letterhead (See General Conditions Section 00005)

NOTE: PLEASE ENSURE THAT ALL BID DOCUMENTS ARE COMPLETED AND SUBMITTED IN ACCORDANCE WITH THIS INSTRUCTION SHEET. FAILURE TO DO SO MAY RESULT IN YOUR BID NOT BEING CONSIDERED FOR AWARD.

SECTION 00005
BIDDER'S CERTIFICATION

ITB 16-009

Knowledgeable & Competent employee(s) of my company with decision-making authority have personally and carefully examined the Invitation to Bid, Instructions to Bidders, General and Special Conditions, Bidder's Notes, Specifications, proposed agreement and any other documents accompanying or made a part of this Invitation. Additionally, they have personally inspected all project areas and are familiar with all visible features and conditions impacting the project scope of work. Furthermore, they have reviewed the project plans while performing the site inspections to compare and understand the work to be performed. Any conflict between project plans and observable field conditions or questions as to scope of work have been submitted to Owner during the bidding process.

I hereby propose to furnish the goods or services specified in the Invitation at the prices or rates quoted in my bid. I agree that my bid will remain firm for a period of up to ninety (90) days in order to allow the City adequate time to evaluate the bids.

I certify that all information contained in this bid is truthful to the best of my knowledge and belief. I further certify that I am duly authorized to submit this bid on behalf of the vendor/contractor as its act and deed and that the vendor/contractor is ready, willing and able to perform if awarded the bid.

I further certify that this bid is made without prior understanding, agreement, connection, discussion, or collusion with any other person, firm or corporation submitting a bid for the same product or service; no officer, employee or agent of the City of Fort Walton Beach or of any other bidder interested in said bid; and that the undersigned executed this bidder's Certification with full knowledge and understanding of the matters therein contained and was duly authorized to do so.

_____
NAME OF BUSINESS

BY: _____
Signature

_____
NAME & TITLE **(type or print)**

_____
MAILING ADDRESS

_____
CITY, STATE, ZIP CODE

(_____) _____
TELEPHONE NUMBER

(_____) _____
FAX NUMBER

_____
DATE

SECTION 00006
ADDENDUM ACKNOWLEDGEMENT PAGE

ITB 16-009

The undersigned acknowledges receipt of the following addenda to the Documents (Give number and date of each):

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

FAILURE TO SUBMIT ACKNOWLEDGMENT OF ANY ADDENDUM THAT AFFECTS THE BID PRICES IS CONSIDERED A MAJOR IRREGULARITY AND WILL BE CAUSE FOR REJECTION OF THE BID.

_____
NAME OF BUSINESS

BY: _____
Signature

_____
NAME & TITLE **(type or print)**

_____
MAILING ADDRESS

_____
CITY, STATE, ZIP CODE

(_____) _____
TELEPHONE NUMBER

(_____) _____
FAX NUMBER

_____
DATE

SECTION 00007
CONTRACTOR'S REFERENCES

ITB 16-009

Bidder shall submit as a part of the bid package, business references with name of the business, address, contact person, and telephone number. As required in Section 00014**.**

REGARDING PROPOSER / BIDDER: _____

Name:	**Name:**
Contact:	Contact:
Address:	Address:
Telephone:	Telephone:
Facsimile:	Facsimile
Name:	**Name:**
Contact:	Contact:
Address:	Address:
Telephone:	Telephone:
Facsimile:	Facsimile
Name:	**Name:**
Contact:	Contact:
Address:	Address:
Telephone:	Telephone:
Facsimile:	Facsimile

SECTION 00008
DRUG-FREE WORKPLACE FORM

ITB 16-009

The undersigned vendor, on _____, 2016, in accordance with Section 287.087, Florida Statutes, certifies that [company] _____ does:

1. Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.
2. 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, employee assistance programs and the penalties that may be imposed upon employees for drug abuse violations.
3. Give each employee engaged in providing the commodities or contractual services that are under bid a copy of the statement specified in Paragraph 1.
4. In the statement specified in Paragraph 1, notify the employees that, as a condition of working on the commodities or contractual services that are under bid, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of Chapter 893 or 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.
5. Impose a sanction on, or require the satisfactory participation in a drug assistance or rehabilitation program if such is available in the employee's community, by any employee who is so convicted.
6. Make a good faith effort to continue to maintain a drug-free workplace through implementation of Paragraphs 1 through 5.

Check one:

_____ As the person authorized to sign this statement, I certify that this firm complies fully with above requirements.

_____ As the person authorized to sign this statement, this firm does not comply fully with the above requirements.

NAME OF BUSINESS: _____

BY: _____
SIGNATURE

_____
NAME & TITLE, TYPED OR PRINTED

SECTION 00009
PUBLIC ENTITY CRIME FORM

ITB 16-009

SWORN STATEMENT UNDER SECTION 287.133 (3) (A) FLORIDA STATUTES, ON PUBLIC ENTITY CRIMES

THIS FORM MUST BE SIGNED IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICER AUTHORIZED TO ADMINISTER OATHS.

This sworn statement is submitted with Proposal, Proposal or Contract #_____

This sworn statement is submitted by _____ whose business address is _____ and (if applicable) Federal Employer Identification Number (FEIN) is _____ (If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement).

My name is _____ and my relationship to the entity named above is _____.

I understand that a "public entity crime" as defined in Paragraph 287.133(a)(g), Florida Statutes, means a violation of any state or federal law by a person with respect to and directly related to the transaction of business with any public entity or with an agency or political subdivision of any other state or with the United States, including, but not limited to, any proposal or contract for goods or services to be provided to any public entity or any agency or political subdivision of any other state or of the United States and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentation.

I understand that "convicted" or "conviction" as defined in paragraph 287.133(a)(b), Florida Statutes, means finding of guilt or a conviction of a public entity crime with or without an adjudication of guilt, in any federal or state trial court of records relating to charges brought by indictment or information after July 1, 1989, as a result of a jury verdict, non-jury trial, or entry of a plea of guilty or nolo contendere.

I understand that an "affiliate" as defined in Paragraph 287.133(1)(a), Florida Statutes, means:

- A predecessor or successor of a person convicted of a public entity crime (or)
- An entity under the control of any natural person who is active in the management of the entity and who has been convicted of a public entity crime. The term "affiliate" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in the management of an affiliate. The ownership by one of shares constituting a controlling income among persons when not for fair interest in another person, or a pooling of equipment or income among persons when not for fair market value under a length agreement, shall be a prima facie case that one person controls another person. A person who was knowingly convicted of a public entity crime, in Florida during the preceding 36 months shall be considered an affiliate.

I understand that a "person" as defined in Paragraph 287.133(1)(e), Florida Statutes, means any natural person or entity organized under the laws of the state or of the United States with the legal power to enter into a binding contract for provision of goods or services let by a public entity, or which otherwise transacts or applies to transact business with a public entity. The term "person" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active n management of an entity.

Based on information and belief, the statement which I have marked below is true in relation to the entity submitting this sworn statement. (Please indicate which statement applies.)

_____Neither the entity submitting this sworn statement, nor any officers, directors, executives, partners, shareholders, employees, members, or agents who are active in management of the entity, nor affiliate of the entity have been charged with and convicted of a public entity crime subsequent to July 1, 1989.

_____The entity submitting this sworn statement, or one or more of the officers, directors, executives, partners, shareholders, employees, members, or agents who are active in management of the entity or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989. (Please attach a copy of the final order.)

_____ The person or affiliate was placed on the convicted vendor list. There has been a subsequent proceeding before a hearing officer of the State of Florida, Division of Administrative Hearings. The final order entered by the hearing officer determined that it was in public interest to remove the person or affiliate from the convicted vendor list. (Please attach a copy of the final order)

_____ The person or affiliate has not been placed on the convicted vendor list. (Please describe any action taken by, or pending with, the Department of General Services.)

_____
(Signature)

_____
(Date)

STATE OF: _____ COUNTY OF: _____

PERSONALLY APPEARED BEFORE ME, the undersigned authority, who, after first being sworn by me, affixed his/her signature at the space provided above on this _____ day of _____, 2016, and is personally known to me, or has provided_____ as identification.

_____
Notary Public

My Commission expires: _____

SECTION 00010
GENERAL CONDITIONS

1 **EXECUTION OF BID**: Bid must contain a manual signature of an authorized representative in the space provided. Florida law requires that when a municipality enters into a contractual agreement with a corporation licensed to do business in the State of Florida; such agreement shall be signed by two (2) Corporate Officials (i.e., President, Vice President, Secretary, Treasurer) with the corporate seal affixed. It is also required that such execution be acknowledged before a Notary Public with Notary Seal affixed. If neither the aforementioned corporate officers nor the corporate seal are readily available, a letter of authorization can be submitted in lieu of these requirements. Such letter of authorization must be on the corporate stationery, must clearly state that the person who signed the referenced agreement is duly authorized to enter into such agreement on behalf of the corporation and must be signed by the corporate officials designated above. Failure to submit letter of authorization within two (2) weeks after notification of award may result in award to the next apparent low bidder.

1.1 In the case of a partnership, the agreement must be signed by a general or managing partner and notarized as outlined above.

1.2 In the case of a sole proprietorship, the owner must sign the agreement and have such execution notarized.

1.3 If you have any questions regarding the execution of the signature page, please feel free to contact the Purchasing Division at (850) 833-9523 for further clarification.

2 **SUBMITTAL OF BIDS**: Bids shall be submitted utilizing the bid form(s) provided by the City. All bids shall be properly executed with all blank spaces filled in. The signatures of all persons signing shall be in longhand. Erasures, interlineations, or other corrections shall be authenticated by affixing in the margin immediately opposite the correction the initials of a person signing the bid. If the unit price and the total amount named by a bidder for any item are not in agreement the unit price alone shall be considered as representing the bidder's intention, and the totals shall be corrected.

3 **AMENDMENT OF THE INVITATION TO BID**: It is the Bidder’s responsibility to contact the Purchasing Division prior to submitting a bid to ascertain if any addenda have been issued, to obtain all such addenda, and return executed addenda with the bid (or complete and sign addenda acknowledgement form.) The failure of a bidder to submit acknowledgment of any addenda that affects the bid price(s) is considered a major irregularity and will be cause for rejection of the bid.

4 **BIDDER'S CERTIFICATION FORM**: Each bidder shall complete the "Bidder's Certification" form included with this Invitation to Bid, and submit the form with the bid. The failure of a bidder to submit this document will be cause for rejection of the bid.

5 **SPECIFICATIONS REQUIRED**: All items quoted must be in compliance with the specifications. If you are taking exception, indicate those exceptions on company letterhead and attach to this invitation to bid.

6 **PRICES, TERMS, and PAYMENT**: All prices must be firm for the delivery schedule quoted in the specifications. Bids stipulating "Price in effect at time of shipment" or other similar conditions will be considered not responsive to the bid invitation and will not be accepted. All prices shall be quoted F.O.B. delivered to any City of Fort Walton Beach department unless otherwise stipulated in the bid invitation. Bidder is requested to offer cash discount for prompt invoice payment. It is the policy of the City of Fort Walton Beach to make payments of invoices in time to earn any offered cash discounts. Discount time will be computed from the date of satisfactory delivery at place of acceptance or from receipt of correct invoice at the Finance Department office, whichever is later.

7 **DISCOUNTS**: Bidders may offer a cash discount for prompt payment; however, such discounts shall not be considered in determining the lowest net cost for bid evaluation purposes. Discount will be computed from the date of satisfactory delivery at place of acceptance or from receipt of correct invoice at the office specified, whichever is later.

8 **EFFECTIVE PERIOD**: Prices quoted in the bid must remain open for a period of ninety (90) days from the date of bid opening.

9 **QUESTIONS REGARDING SPECIFICATIONS OR BIDDING PROCESS:**

9.1 Respondents are advised that from the date of release of this solicitation until award of the contract, **no contact with City personnel related to this solicitation is permitted. All communications are to be directed to the Purchasing Representative and sole contact listed below in section 9.4.**

9.2 Any questions related to interpretation of specifications or the bid process shall be addressed to the Purchasing Manager, in writing, in ample time before the period set for the receipt and opening of bids. No inquiries, if received within ten (10) days of the date set for the receipt of bids, will be given any consideration. Any interpretation made to prospective bidders will be expressed in the form of an addendum to the specifications which, if issued, will be conveyed to all prospective bidders no later than five (5) days before the date set for receipt of bids. Oral answers will not be authoritative.

9.3 It will be the responsibility of the bidder to contact the Purchasing Division prior to submitting a bid to ascertain if any addenda have been issued, to obtain all such addenda, and return executed addenda with the bid.

9.4 Direct inquiries to:

Paul L. Eubanks, Purchasing Manager
Purchasing Division, City of Fort Walton Beach
105 Miracle Strip Parkway SW
Fort Walton Beach, Florida 32548
Telephone: (850) 833-9523 Fax: (850) 833-9643
Email: peubanks@fwb.org
Website: http://www.fwb.org

10 **SEALED BIDS**: All bids must be submitted in a sealed envelope. The face of the envelope shall contain the date and time of the bid opening and the bid number. Bids not submitted on the City's bid forms may be rejected. All bids are subject to the conditions specified and on any attached sheets, specifications, special conditions or vendor notes.

11 **RECEIPT OF BIDS, DUE DATE:**

11.1 **Sealed bids shall be submitted to the Purchasing Division no later than**

10:00 AM (CDT), on MAY 19, 2016. Bids shall not be accepted after this time and date. Each bid shall be submitted in a sealed envelope marked with the bid number, title of the bid, and bid opening date.

11.2 Sealed bids are to be addressed as follows for either mail or hand delivery. Bids submitted by mail must be received by the Purchasing Manager before the bid opening time.

Purchasing Manager
Purchasing Division
City of Fort Walton Beach
105 Miracle Strip Parkway SW
Fort Walton Beach, FL 32548

12 **WITHDRAWAL OF BIDS**: Bidders may withdraw a bid after it has been deposited with the Purchasing Manager's Office any time before the scheduled time for opening the bids.

13 **BID OPENING**: The bid opening shall be public, on the date and at the time specified on the bid form. It is the bidder's responsibility to assure that their bid is delivered at the proper time and place of the bid opening. Bids which for any reason are not so delivered will not be returned but will be retained in the "BID FILE" unopened. Offers by telephone for a sealed bid cannot be accepted.

14 **AWARD OR REJECTION OF BIDS**: The contract will be awarded to the lowest responsive and responsible bidder(s) complying with all the provisions of the Invitation to Bid, provided the bid price is reasonable, and it is in the interest of the City to accept it.

15.1 The City of Fort Walton Beach reserves the right to reject any or all bids and to waive any informality in bids received whenever such rejection or waiver is in the best interest of the City. The City of Fort Walton Beach also reserves the right to reject the bid of a bidder who has previously failed to perform properly or complete, on time, contracts of a similar nature, or a bid of a bidder who an investigation shows is not in a position to perform the contract.

15.2 Award will be made in approximately fourteen (14) days. It is incumbent on bidders to contact the Purchasing Department at (850) 833-9523 to determine the successful bidder(s). Bidders or respondents who do not agree with the City Council's award are afforded the opportunity to protest the recommendation by submitting a written vendor protest to the Purchasing Division within three (3) business days after City Council has awarded the purchase. Failure to file a written vendor protest within three (3) business days shall constitute a waiver of proceedings under this policy.

15.3 In the best interest of the City, the right is reserved to make award(s) by individual items, group of items, all or none, or a combination thereof, with one or more suppliers; to reject any and all bids, or to waive any informality or technicality in bids received.

15 **SELECTION / REJECTION OF OPTIONS / ALTERNATIVES**: If an invitation to bid permits options or alternatives, the City reserves the right to select or reject any or all options or alternatives that are bid and as deemed to be in the best interests of the City.

16 **PUBLIC ENTITY CRIMES**: A person or affiliate, as defined in § 287.133, Florida Statutes, who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid on a contract to provide any goods or services to a public entity, may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids on leases of real property to a public entity, may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in § 287.01, Florida Statutes, for Category Two, for a period of 36 months from the date of being placed on the convicted vendor list. By submitting a bid, you are certifying your company is in compliance with § 287.133, Florida Statutes.

17 **BID TABULATION & EVALUATION**: Bidders may request copies of the bid tabulation documents via email, in person or by sending a stamped, self-addressed envelope with the bid. Bid Tabulations will not be provided by telephone.

18 **TAX EXEMPT**: The City does not pay federal excise and state sales taxes. The City's tax exemption number is 85-8012740106C-0 and is included on all purchase orders.

19 **POLITICAL SUBDIVISIONS CONTRACTS**: Under Florida Law, prices contained in State Contracts shall be available to the City of Fort Walton Beach, who might wish to purchase under a State Purchase Contract. The City reserves the right to purchase from a State Purchase Contract if in the best interest of the City.

20 **MISTAKES**: Bidders are expected to examine the specifications, delivery schedules, bid prices, and all instructions pertaining to supplies and services. Failure to do so will be at the bidder's risk.

21 **CONDITION and PACKAGING**: It is understood and agreed that any item offered or shipped as a result of this bid shall be new and the current production model at the time of this bid, unless otherwise specified. All containers shall be suitable for storage or shipment, and all prices shall include standard commercial packaging.

22 **SAFETY STANDARDS**: Unless otherwise specified in the bid, all manufactured items and fabricated assemblies shall comply with applicable requirements and standards of the Occupational Safety and Health Act.

23 **MARKING**: Each individual container shall be marked with the brand name of the product, quantity and the name and address of the manufacturer. Each shipping container shall include the name of the vendor and must also clearly indicate the City of Fort Walton Beach Purchase Order Number.

24 **INVOICING AND PAYMENT**: Applications for payment shall be submitted to: Steven D. White, PE, Hatch Mott MacDonald, 220 W Garden St. Suite 700, Pensacola, FL 32502. Invoices are to be billed at the prices stipulated on the purchase order and as outlined in this bid. All invoices must show the City of Fort Walton Beach Purchase Order Number.

25 **CONFLICT OF INTEREST**: Any award of contract for this Invitation to Bid is subject to Chapter 112, Florida Statutes. All bidders must disclose with their bid the name of any officer, director, or agent who is also an employee of the City of Fort Walton Beach. Further, all bidders must disclose the name of any City of Fort Walton Beach officer, director, or employee who owns, directly or indirectly, an interest of ten percent (10%) or more of the bidder's firm or any of its branches or who has any contractual relationship or agreement of any kind with the bidder. The bidder warrants that no one was paid a fee, commission, gift, or other consideration contingent upon receipt of an award for the services and/or supplies specified herein.

26 **INSPECTION, ACCEPTANCE, AND TITLE**: Inspection and acceptance will be at the destination point unless otherwise stipulated by the City. Title and risk of loss or damage to all items shall be the responsibility of the shipper (vendor) until accepted by the using department of the City of Fort Walton Beach, unless loss of damage results from negligence by the City of Fort Walton Beach or its Departments.

27 **DISPUTES**: In case of any doubt or differences of opinion as to the items to be furnished pursuant to the specifications of this Invitation to Bid, the decision of the City of Fort Walton Beach City Manager shall be final and binding on both parties.

28 **LEGAL REQUIREMENTS**: Federal, state, county and local laws, ordinances, rules and regulations that in any manner affect the item(s) covered in the specifications of this Invitation to Bid shall apply. Lack of knowledge by the bidder will in no way be cause for relief from such responsibility.

29 **LIABILITY**: The vendor shall hold and save the City of Fort Walton Beach, its officers, agents and employees harmless from liability of any kind in the performance of or fulfilling the requirements of any purchase order which may result from this bid.

30 **DRUG FREE WORKPLACE PREFERENCE**: Pursuant to § 287.087, Florida Statutes, the City must give preference to businesses that have implemented a drug-free workplace programs whenever two or more bids, proposals, or replies are equal in price, quality, and service. If your business has implemented a drug free workplace program, you must provide a copy of all documents, rules, policies and procedures adopted by your business that satisfy the requirements of § 287.087.

END OF SECTION

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

SECTION 00011
STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by

ACEC
American Council of Engineering Companies

The Associated General Contractors of America — Skill Responsibility Integrity

ASCE American Society of Civil Engineers

P/E National Society of Professional Engineers
Professional Engineers in Private Practice

AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
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NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

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CONSTRUCTION SPECIFICATIONS INSTITUTE

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. 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 which is evidence of the agreement between Owner and Contractor covering the Work.

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

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

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

6. *Bidder*—The individual or entity who submits a Bid directly to Owner.

7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).

8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.

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

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

11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

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

15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.

16. *Cost of the Work*—See Paragraph 11.01 for definition.

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

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

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

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

21. *General Requirements*—Sections of Division 1 of the Specifications.

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

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

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

25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

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

27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.

29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

30. *PCBs*—Polychlorinated biphenyls.

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

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

33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

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

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

36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.

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

38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

39. *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.

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

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

42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

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

45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.

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

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

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

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

50. *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, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

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

1.02 *Terminology*

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives:*

1. 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 Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day:*

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

D. *Defective:*

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

a. does not conform to the Contract Documents; or

b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

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

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

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

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

F. 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 Bonds and Evidence of Insurance*

A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

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

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

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

2.04 *Starting the Work*

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

2.05 *Before Starting Construction*

A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), 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 Documents;

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.

2.06 *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 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, 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 instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial 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 for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within 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 component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one 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. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.

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

3.02 *Reference Standards*

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

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

2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work*: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

2. *Contractor's Review of Contract Documents During Performance of Work*: If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation , (b) any standard, specification, manual, or code, or (c) 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 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

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 Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); 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 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;

2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier 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 editions; or

2. 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.

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

3.06 *Electronic Data*

A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the

Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

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

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

4.02 *Subsurface and Physical Conditions*

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

1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and

2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner 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; or

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

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

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

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

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

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

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

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

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

C. *Possible Price and Times Adjustments:*

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

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

   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 Paragraphs 9.07 and 11.03.

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

   a. Contractor knew of the existence of such conditions at the time Contractor made a final 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

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

   c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other

professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

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

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and

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

   a. reviewing and checking all such information and data;

   b. locating all Underground Facilities shown or indicated in the Contract Documents;

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

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

B. *Not Shown or Indicated:*

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

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price

or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

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

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner 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; or

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

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

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

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by

Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. 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 4.06.E.

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

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

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, 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 a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner 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 a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

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

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds 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 shall show that it is effective on the date the agent or attorney-in-fact signed each bond.

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

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

5.03 *Certificates of Insurance*

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

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

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

D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.

E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

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

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

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

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

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

    a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

    b. by any other person for any other reason;

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

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

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

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

3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

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

6. include completed operations coverage:

    a. Such insurance shall remain in effect for two years after final payment.

    b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

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

5.06 *Property Insurance*

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

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;

2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.

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

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

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

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.

B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.

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

D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property

insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

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

5.07 *Waiver of Rights*

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

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:

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

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

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery

against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.

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

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

A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

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

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

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

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

6.02 *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 at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the 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.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

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

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

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

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

2) it 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; and

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

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

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

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

2. *Substitute Items:*

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

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

c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.

d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

1) shall certify that the proposed substitute item will:

a) perform adequately the functions and achieve the results called for by the general design,

b) be similar in substance to that specified, and

c) be suited to the same use as that specified;

2) will state:

a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,

b) 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

c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

3) will identify:

a) all variations of the proposed substitute item from that specified, and

b) available engineering, sales, maintenance, repair, and replacement services; and

4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

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

C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

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

E. *Engineer's Cost Reimbursement*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. 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.

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

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or

other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor

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

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

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

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

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (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 any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

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.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *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. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all

court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

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

6.10 *Taxes*

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

6.11 *Use of Site and Other Areas*

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

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

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

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner 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 claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

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

C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor

shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

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

6.12 *Record Documents*

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

6.13 *Safety and Protection*

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

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

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

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

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

D. 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.

E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or 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).

F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

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

6.15 *Hazard Communication Programs*

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

6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

    a. Submit number of copies specified in the General Requirements.

    b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples:*

    a. Submit number of Samples specified in the Specifications.

    b. 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 6.17.D.

B. 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. *Submittal Procedures:*

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

    a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

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

    c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

    d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

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

3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop

Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.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's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

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

6.18 *Continuing the Work*

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.

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

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

2. normal wear and tear under normal usage.

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

1. observations by Engineer;

2. recommendation by Engineer or payment by Owner of any progress or final payment;

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

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

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

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

7. any correction of defective Work by Owner.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner 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 performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom 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 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor,

Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:

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

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

6.21 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

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

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

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

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. 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. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

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

7.02 *Coordination*

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

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

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

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

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

7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.

C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

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

8.02 *Replacement of Engineer*

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

8.03 *Furnish Data*

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

8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

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

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

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

8.10 *Undisclosed Hazardous Environmental Condition*

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

8.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

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 pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.

9.02 *Visits to Site*

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

and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

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

9.05 *Rejecting Defective Work*

A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

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

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

9.07 *Determinations for Unit Price Work*

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

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

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

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

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

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

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

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.10 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *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 by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

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

10.02 *Unauthorized Changes in the Work*

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

10.03 *Execution of Change Orders*

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

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

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

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

10.04 *Notification to Surety*

A. If 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.

10.05 *Claims*

A. *Engineer's Decision Required*: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The

opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

C. *Engineer's Action*: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the Claim in whole or in part;
2. approve the Claim; or
3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall 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. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on

Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

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

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

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

5. Supplemental costs including the following:

   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, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

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

   d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, 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 property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

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

h. Minor expenses such as telegrams, long distance telephone calls, telephone 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 Contractor is required by the Contract Documents to purchase and maintain.

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

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

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

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

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

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

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

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

11.02 *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:*

1. Contractor agrees that:

a. 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

b. 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 on account of any of the foregoing will be valid.

C. *Contingency Allowance:*

1. Contractor agrees that a 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 on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

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. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

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. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

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

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

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

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

12.01 *Change of Contract Price*

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

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

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

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

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

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

1. a mutually acceptable fixed fee; or

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

a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five 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 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

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

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

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

12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

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

12.03 *Delays*

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

B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, 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 the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the

control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

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

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, 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 therewith as applicable.

13.03 *Tests and Inspections*

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

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

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

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

3. as otherwise specifically provided in the Contract Documents.

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

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

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.

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

13.04 *Uncovering Work*

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

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

D. 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, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

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

13.06 *Correction or Removal of Defective Work*

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

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or

2. correct such defective Work; or

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

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

B. If 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. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute

resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

C. 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.

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

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

13.08 *Acceptance of Defective Work*

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

13.09 *Owner May Correct Defective Work*

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

B. In exercising the rights and remedies under this Paragraph 13.09, 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, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and

equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

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

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

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

14.02 *Progress Payments*

A. *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. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the

Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

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

B. *Review of Applications:*

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

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations 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 9.07, 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 Documents; 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, or

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

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

d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, 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 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

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

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

c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or

d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. *Payment Becomes Due:*

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

D. *Reduction in Payment:*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

b. 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;

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

d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

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

14.04 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

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

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities

pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. 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 tentative list.

14.05 *Partial Utilization*

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. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and 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 14.04.A through D for that part of the Work.

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

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 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

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

14.06 *Final Inspection*

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

14.07 *Final Payment*

A. *Application for Payment:*

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

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

   a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;

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

   c. a list of all Claims against Owner that Contractor believes are unsettled; and

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

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner 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.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Payment Becomes Due:*

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

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

14.09 *Waiver of Claims*

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

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

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

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

15.02 *Owner May Terminate for Cause*

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

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

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

3. Contractor's repeated disregard of the authority of Engineer; or

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

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);

2. 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

3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.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 all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

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

F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, 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;

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

4. reasonable expenses directly attributable to termination.

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

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

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, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or

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

3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

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

17.03 *Cumulative Remedies*

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

17.04 *Survival of Obligations*

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

17.05 *Controlling Law*

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

17.06 *Headings*

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

SECTION 00012
SPECIAL CONDITIONS

If marked, the following Special Conditions apply to this Invitation to Bid:

XX A. PERFORMANCE TIME: The Contractor shall achieve substantial completion within NINETY (90) calendar days after the Purchase Order and NTP has been issued. The Contractor shall achieve Final Completion within ONE HUNDRED TWENTY (120) calendar days after the Purchase Order has been issued, or September 30, 2016, whichever date comes first.

XX B. LIQUIDATED DAMAGES: Work shall begin within 15 calendar days after Notice to Proceed has been issued and all work shall be completed within the contract times indicated. It is hereby understood and agreed by the bidder that time is of the essence in the delivery of supplies, services, materials, or equipment of the character and quality specified in the bid document. In the event these specified supplies, services, materials, or equipment are not delivered by the date specified, there will be deducted from the total contract price, not as a penalty but as liquidated damages, the sum of $500.00 per day for each and every calendar day of delay beyond the time specified for Substantial Completion, the sum of $500.00 per day for each and every calendar day of delay beyond the time specified for Final Completion; except that if the delivery be delayed by any act, negligence, or default on the part of the City, public enemy, war, embargo, fire, or explosion not caused by the negligence or intentional act of the contractor or his supplier (s), or by riot, sabotage, or labor trouble that results from a cause or causes entirely beyond the control or fault of the contractor or his supplier(s), a reasonable extension of time as the City deems appropriate may be granted. Upon receipt of a written request and justification for an extension from the contractor, the Purchasing Office may extend the time for performance of the contract or delivery of goods herein specified at the Purchasing Office's sole discretion for good cause shown.

XX C. FAMILIARITY WITH SITE CONDITIONS: The responsibility for the determination of accurate measurements, the extent of work to be performed, and the conditions surrounding the performance thereof shall be the bidder's. Submission of a bid shall constitute acknowledgement by the bidder that he is familiar with all such conditions. Failure or neglect of a bidder to be familiar with the site of the proposed work shall in no way relieve the bidder from any obligations with respect to this bid.

XX D. RIGHT TO AUDIT RECORDS: The City shall be entitled to audit the books and records of the Contractor or any sub-contractor to the extent that such books and records relate to the performance of the Agreement or any sub-contract to the Agreement. Such books and records shall be maintained by the Contractor for a period of three (3) years from the date of final payment under the Agreement and by the sub-contractor for a period of three (3) years from the date of final payment under the sub-contract unless a shorter period is otherwise authorized in writing.

XX E. VALUE ENGINEERING: It is the intent of the City to award a contract to the lowest responsible bidder provided the bid has been submitted in accordance with the requirements of the bidding documents and does not exceed the funds available. In the event the lowest responsible bid exceeds the City's established fixed construction cost, the City shall have the right to engage the lowest responsible bidder in value engineering in order to comply with the fixed construction cost. In no instance shall such value engineering exceed ten percent (10%) of the base bid or reduce the base bid to an amount less than the fixed construction cost in place at the time of bidding.

XX F. BIDDER QUALIFICATION: Bids will be considered from firms who have adequate personnel and equipment and who are so situated as to perform prompt service, Monday through Friday, except for City holidays. Bids will be considered only from firms which are regularly engaged in the business as described in this bid package; with a record of performance for a reasonable period of time, which have sufficient financial support, equipment, and organization to ensure that they can satisfactorily execute the service if awarded a Contract under the terms and conditions herein stated. The terms "equipment and organization" as used herein shall be construed to mean a fully equipped and well established company in line with the best business practice in the industry and as determined by the City.

XX G. INSPECTION: The City reserves the right to conduct an inspection of the bidder's facility and equipment prior to the award of the contract.

XX H. FISCAL YEAR FUNDING APPROPRIATION: Unless otherwise provided by law, a contract for supplies or services may be entered into for any period of time deemed to be in the best interest of the City, provided the term of the contract and conditions of renewal or extension, if any, are included in the solicitation and funds are available for the first fiscal period at the time of contract. Payment and performance obligations for succeeding fiscal periods shall be subject to appropriation of adequate funds by City Council.

XX I. CANCELLATION DUE TO UNAVAILABILITY OF FUNDS: When funds are not appropriated or otherwise made available to support continuation of performance in a subsequent fiscal period, the contract shall be cancelled and the contractor shall be entitled to reimbursement for the reasonable value of any nonrecurring cost incurred but not advertised in the price of the supplies or services delivered under the contract or otherwise recoverable.

XX J. EXECUTION OF CONTRACT: The successful bidder shall, within fifteen (15) calendar days after Notice of Award is issued by the Purchasing Manager, enter into a contract with the City for the performance of work awarded and shall simultaneously provide any required bonds, indemnities and insurance certificates. Failure to comply with the established deadline for submittal of required documents may be grounds for cancellation of the award.

XX K. FAILURE TO EXECUTE CONTRACT: Failure of the successful bidder to enter into a contract in the proscribed time may be cause for cancellation of the award to that bidder. In the event that the award is cancelled, the award may then be made to the second lowest responsive and responsible bidder, or the City may reject all of the bids. Contractors who default are subject to suspension and/or removal from the Bidder's List.

XX L. FLORIDA PROMPT PAYMENT ACT: For purposes of billing submission and payment procedures, a "proper invoice" by a contractor, vendor, or other invoicing party shall consist of at least all of the following:

1. A description (including quantity) of the goods and/or services provided to the City (or a party on behalf of the City) reasonably sufficient to identify it (or them);

2. The amount due, applicable discount(s), and the terms thereof;

3. The full name of the vendor, contractor or other party who is supplying the goods and/or services including a mailing address in case of a dispute and a mailing address for payment purposes (if they are different) and a telephone number;

4. The Purchase Order or Contract Number as supplied by the City; and identification by office or department where and to whom the goods were delivered or services provided;

5. All invoices shall be sent to the Accounts Payable Department, City of Fort Walton Beach, 107 Miracle Strip Parkway SW, Fort Walton Beach, Florida, 32548.

6. The invoice must be based on a proper delivery, installation, or provision of the goods and/or services to and acceptance by the City; the vendor, contractor or other party who is supplying the goods and/or services has otherwise complied with all of the contract's terms and conditions and is not in default of any of them; and if the contract requires any subcontractors or other parties to be bound by similar other "flow – down" requirements are in compliance with those requirements.

XX M. DISPUTE RESOLUTION: In the event a dispute occurs between a contractor, vendor, or other invoicing party ("invoicing party") and the City concerning payment of an invoice, the City department or office which has the dispute along with a representative of the City's Purchasing Division and the invoicing party shall meet to consider the disputed issues. The invoicing party shall provide to the City such material and information as the City may reasonably require. Any such procedure shall be initiated by either party notifying the other in writing of a dispute and stating with specificity its nature. This procedure shall commence not later than 45 days and be resolved not later than 60 days after the date on which the proper invoice was received by the City. If the issue cannot be resolved, then it will be submitted to the City Manager. Any decision by the City Manager shall constitute the final decision of the City regarding these matters and shall be communicated in writing to the invoicing party within three business days after such decision.

XX N. BOND REQUIREMENTS

XX 1. Performance Bond equal to one hundred percent (100%) of the Contract price will be required.

XX 2. Labor & Material Payment Bond equal to one hundred percent (100%) of the Contract price will be required.

XX 3. Performance and Labor & Materials Payment Bonds shall accompany the contract be signed, sealed and dated no earlier than the contract effective date and specifically refer to the contract by date.

XX 4. Surety companies providing any bond must be listed in the latest Federal Register of the U.S. Department of Treasury, Circular 570, entitled “Surety Companies Acceptable on Federal Bonds”, or otherwise acceptable to the City.

XX O. INSURANCE: Bidders must be eligible for and provide evidence of insurance coverage, which equals or exceeds the City’s minimum standards for the project. All insurance required must be provided by a company licensed to do business in the State of Florida and with an A.M. best rating of at least A-. Proof of Insurance must accompany the signed contract.

XX 1. Workers Compensation

- Coverage A In conformity with Florida Statutes
- Coverage B $500,000/$500,000/$500,000

XX 2. Commercial General Liability

- Each occurrence for Bodily Injury/Property Damage $1,000,000
- Products/Completed Operations $1,000,000
- Annual Aggregate for Bodily Injury/Property Damage $2,000,000
- Products/Completed Operations $1,000,000

XX All coverage above shall include the following provisions:

- The City of Fort Walton Beach shall be an additional insured.
- The policy shall not be cancelled unless the City is given at least 30 days notice.
- Any coverages which are eliminated, restricted or reduced to less than what is commonly provided by standard I.S.O. forms must be indicated.

XX 3. Business Automobile Liability
Combined Single Limit - $1,000,000

XX This coverage shall include the following provisions:

- The City of Fort Walton Beach shall be an additional insured
- The policy shall not be cancelled unless the City is given at least 30 days notice.
- Any coverages which are eliminated, restricted or reduced to less than what is commonly provided by standard I.S.O. forms must be indicated.
- Symbol "1,2" (Any Auto) or equivalent, shall be used to designate insured autos.

XX 4 Builders Risk Insurance

- Builders Risk insurance is to be purchased to cover subject property for special perils (all risks or equivalent) of loss (including theft and sinkhole), subject to a waiver of coinsurance, and covering on-site and off-site storage, transit and installation risks as indicated in the Installation Floater and Motor Truck Cargo insurance described hereafter, if such coverages are not separately provided.
- If flood and/or earthquake risks exist, flood and/or earthquake insurance are to be purchased.
- If there is loss of income, extra expense and/or expediting expense exposure, such coverage is to be purchased.
- If boiler and machinery risks are involved, boiler and machinery insurance, including coverage for testing, is to be purchased.
- The Builders Risk insurance is to be endorsed to cover the interests of all parties, including the Organization and all contractors and subcontractors. The insurance is to be endorsed to cover testing and to grant permission to occupy.

XX P. SUBCONTRACTOR(S): Unless otherwise stated in the contract documents or the bidding requirements, the contractor, as soon as practicable after award of the contract, shall furnish in writing to the City the names of persons or entities, including those who are to furnish materials or equipment fabricated to a special design, proposed for each principal portion of the Work. The City will promptly inform the bidder in writing whether it has reasonable objection to any such proposed person or entity. The City may consider the use of any particular subcontractor when evaluating whether a bidder can perform the contract or provide the service promptly, or within the time specified, without delay or interference.

XX Q. CONSTRUCTION OF SPECIAL CONDITIONS: If any specification or general condition of this Invitation to Bid conflicts with any Special Condition, the Special Condition shall have precedence over the General Condition.

END OF SECTION

SECTION 00013
SUPPLEMENTARY SPECIAL CONDITIONS

Where there may be a conflict between this section and other sections or plans, this Section shall prevail:

1. The Contractor shall be responsible to obtain any required City of Fort Walton Beach and Okaloosa County Right-of-Way permits. The Right-of-Way permit fees will be waived by the City for the City portion. The Contractor will comply with all permit conditions and regulations of any governing agency.

2. It is the Contractor's responsibility to satisfy the City of Fort Walton Beach, and any other applicable regulatory body that the work area has been satisfactorily restored to preconstruction conditions or better. The Contractor shall document pre-construction conditions via photographs and video to assist in this effort.

3. Contractor shall be responsible for disposal of all construction and demolition waste.

4. Contractor shall be responsible for maintaining access to all properties within the project area at all times.

5. Unless otherwise specified, the contractor will be required to limit construction to the hours of 7:00 AM to 8:00 PM, or to within daylight hours, whichever is more restrictive.

6. The Contractor shall provide a work plan, project schedule, payment schedule of values and shop drawing submittal schedule to the Project Engineer within 10 calendar days of the Notice to Proceed. All major revisions must be approved in writing. The Contractor shall also provide the Owner and Engineer with a list of emergency, non-business hour, phone numbers for principal staff for project.

7. Locations of underground utilities shown on the project plans are considered approximate. It shall be the Contractor's responsibility to contact the various utilities companies to locate their facilities prior to beginning the work. No additional compensation shall be paid to the Contractor for damage and repair to these facilities caused by the contractor's work.

8. Maintenance of Traffic must be performed in accordance with the applicable USDOT/FHWA MUTCD chapters and requirements of the City of Fort Walton Beach and Okaloosa County. The Contractor will ensure that construction traffic signs, pavement marking, barricades, barrels and lighting are present when necessary and flagmen are properly deployed. Construction signs will be sufficiently weighted or braced to prevent the wind and traffic from knocking them over.

9. The Contractor shall maintain prominent and clear labeling of its company name and its local phone number on all company owned or leased vehicles on the project site at all times during construction activities.

10. The Contractor will be responsible for all required USEPA Stormwater Pollution Prevention Plan Compliance and soil erosion and sediment control measures. The Contractor will ensure that erosion control measures are installed and maintained for the duration of the project and until final project site stabilization is established. The Contractor will ensure that erosion control is implemented and maintained for all wetlands, ditches, steep slopes, storm water inlets and other environmental and aesthetic areas adjacent to the project. Costs for stormwater pollution prevention and erosion and sediment control measures shall be included in the lump sum price bid for items of work requiring each.

11. Contractor is advised that existing water mains may be of various pipe materials, including asbestos cement. The Contractor shall be responsible for protection of existing water mains during construction and shall be responsible for repairing any pipes damaged during construction. Repair sections shall be PVCP or DI. The Contractor shall comply with all work site, air emission, solid waste and personal safety and protection regulations as related to the excavation, exposure, cutting, handling, containment and disposal of existing water main pipe material.

    The removal, encapsulation or enclosure, storage and disposal of pipe materials containing asbestos shall be in accordance with Sections 455.301 through 455.309 of the Florida State Statutes, American Water Works Association Manual of Water Supply Practices No. M16 "Work Practices for Asbestos-Cement Pipe," OSHA 29CFR 1910.100, 1926.1101 Appendix F, Asbestos NESHAP; 40CFR 61-Subpart M, 40CFR 763-Appendix D and all other industry and regulatory requirements.

12. As directed by the Owner or Engineer, the Contractor shall remove and replace unsuitable material for trench backfill. Trench backfill material shall be any readily compactable sand or silty sand (SP, SP/SM, SM/SP, or SM per USCS designation) and shall be free from vegetation, organic material and debris. Trench backfill material shall be placed at or below optimum moisture. No stones or rocks shall be larger than one (1)-inch in diameter.

13. As directed by the Owner or Engineer, the Contractor shall remove and replace unsuitable material and furnish, install and compact virgin material, FDOT soil aggregate limerock base. Copies of certified weight scale tickets identifying the material, tonnage, contractor and truck shall be submitted with pay requests.

14. The Contractor shall be responsible for utilizing acceptable means and methods, as necessary to place and completely backfill to finished grade new mains and structures in a water free excavation. The means and methods of dewatering the excavation shall comply with all regulatory requirements for temporary diversion of groundwater and its discharge (including FAC Chapter 62-621 "General Permit for the Discharge of Produced Ground Water from Any Non-contaminated Site Activity"). It shall be the Contractor's responsibility to obtain all required permitting associated with the installation of a dewatering system. The cost associated with excavation dewatering is to be included in the lump sum bid price for items of work requiring each.

15. Contractor shall warrant (Contractor's Warranty) that all work shall remain in serviceable and good condition (ordinary wear and tear abuse and causes beyond the control of the contractor excluded) for a period of two (2) years from the date of Substantial Completion & acceptance of the work. Contractor shall repair or replace without cost to the City of Fort Walton Beach, any imperfection in whole or in part which may develop in the work during the period above stated and any damage to other work caused by imperfections or the repairing of same.

16. The City will issue a final acceptance for the contract upon the acceptable restoration of all areas disturbed during construction. The City will also require the Contractor to provide his written release of lien, as-built documents and all other contract closeout documentation.

17. All internal combustion-powered equipment and/or standby power generators shall have, as a minimum, a residential grade silencer (muffler) for equipment to be operating beyond the hours of operation allowed by local Noise Attenuation Ordinance requirements. The equipment shall be noise attenuated to emit a maximum noise level of 80 dBA at 30 feet from the equipment, unless otherwise required by local ordinance.

18. To maintain contract plan clarity, all system and equipment components may not be shown. Contractor is responsible to furnish and install all equipment, fittings, adaptors, connectors, piping, valves and other components to provide fully functional equipment in accordance with manufacturer's requirements. Bidders shall provide name of proposed Project Manager and Superintendent and three (3) professional references for both and submit this information with their bid.

19. Refer to Additional Contractor Qualification Requirements Section for additional documentation that must be submitted with the bid.

20. Substantial Completion Requirements: In order for the project to be substantially complete, all components of the pump station will be mechanically complete and all disturbed areas will be completely restored and accepted by the City, and the Engineer.

21. Final Completion Requirements: Final completion will be achieved upon completion and acceptance of all work, project closeout documentation and any other project requirement.

22. The Engineer's review of Shop Drawings and Samples submitted by the Contractor in accordance with these specifications shall be reviewed without expense to the Contractor for the original submittal and first resubmittal, in response to the Engineer's review of the original submittal, only. However, beginning with the second resubmittal, and for each subsequent resubmittal thereafter, the Contractor shall pay the cost of the Engineer's review. Payment shall be made in the form of a check, made payable to the Engineer in the amount of $500.00 and submitted with each required resubmittal. Second and subsequent resubmittal made without payment shall be returned to the Contractor without review and marked as incomplete.

23. Bidder shall have a representative of the proposed project team who holds a valid FL General Contractor license. Copy of License to be submitted with Bid.

END OF SECTION

SECTION 00014
TRENCH SAFETY COMPLIANCE CERTIFICATION

Temporary earth shoring and protection will be necessary to protect worker safety, adjacent property, utilities, and the job site where the work requires trenching or excavation as defined under OSHA (29 CFR 1926.650 Subpart P.) latest revision. It is solely the Contractor's responsibility to comply with all applicable regulatory agency requirements and provide for the safety of employees and the general public. Additionally, manufactured and site specific shoring and protection systems shall be designed by a Florida Licensed Professional Engineer.

By the signature of its undersigned authorized representative(s), the Bidder hereby warrants to the City of Fort Walton Beach that any excavation performed by the Bidder will be performed in a safe manner and shall be compliant with all safety standards.

The cost of compliance with applicable safety standards is estimated by the Bidder to be $_____, which cost is included in the amount of the bid.

The specific methods of compliance with applicable Trench Safety Standards, and the cost of compliance are as follows:

_____

_____

_____

_____

_____

_____

_____

_____
Authorized Official

SECTION 00015
CONTRACTOR'S BID PROPOSAL

Golf Course Drive NE and Eagle Street NE Stormwater Improvements
HMMF Project No. 363524
Bid No: ITB No. 16-009

City of Fort Walton Beach, Florida
Purchasing Division
Website: www.floridabidsystem.com

The undersigned, as Bidder, hereby declares that the only person or persons interested in the Bid as principal or principals is or are named herein; that this Bid is made without connection with any other person, company, or parties making bid or proposal; and that it is in all respects fair and in good faith, without collusion or fraud.

The Bidder further declares that the worksite has been examined, along with the Plans and Specifications for the work, the Contract Documents relative thereto, and Bidder has read all Special Provisions and Addenda furnished prior to the opening of bids; and the Bidder further declares that Bidder is fully informed in regard to all conditions pertaining to the work.

The Bidder proposes and agrees, if this Proposal is accepted, to contract with the Owner in the form of contract specified, to furnish all necessary materials, equipment, machinery, tools, and labor necessary to complete the work in full and in accordance with the shown, noted, described, and reasonably intended requirements of the Contract Documents.

The Bidder also agrees that, at the time of signing the Contract, Bidder will furnish the required insurance certificates, performance bond and labor and material payment bond. The forms to be used for the performance bond, labor and material payment bond, as well as the contractor's Final Affidavit and the Contractor's Warranty, will depend upon which bid or bids are awarded.

The Bidder further agrees that in case of failure on Bidder's part to execute said Contract, with the Certificates of Insurance and Payment and Performance Bonds within ten (10) consecutive calendar days after written notice having been given of the award of the Contract, the Contract will be awarded to the next higher responsible bidder, and the undersigned will not be considered as a responsible bidder for future contracts for a period of at least one year.

The award of the Contract will be made based on the lowest of individual Base Bids, plus Alternate Bids, if any, that accomplish the work with available funds and Owner's discretion and assessment of priorities and features. The Owner may select the Base Bid, and add or deduct (as applicable) none, any, or all Alternate Bids in no particular order, in addition to the Base Bid.

Furthermore, Bidder agrees that in the event that Owner elects to utilize a tax savings agreement for materials, that all savings shall accrue to the benefit of the Owner.

BASE BID
GOLF COURSE DRIVE NE & EAGLE STREET NE STORMWATER IMPROVEMENTS

VENDOR:_____

Item No.	Description	Units	Quantity	Unit Cost	Total
1.	Mobilization (5% of Total Project Cost)	1	LS		
2.	Maintenance of Traffic	1	LS		
3.	Erosion Control	1	LS		
4.	Demolish and Remove Concrete Sidewalk	393	SY		
5.	Demolish and Remove Concrete Curb and Gutter	482	LF		
6.	Demolish and Remove Concrete Driveway	325	SY		
7.	Demolish and Remove Existing Curb Inlet	10	EA		
8.	Demolish and Remove Existing Stormwater Manhole	2	EA		
9.	Demolish and Remove Existing Chain Link Fence	200	LF		
10.	Demolish and Remove Existing Wood Privacy Fence	450	LE		
11.	Remove Thermoplastic Striping	138	SF		
12.	Demolish and Remove 18" CMP	102	LF		
13.	Demolish and Remove 24" CMP	663	LF		
14.	Demolish and Remove 18"x24" CMP	398	LF		
15.	Demolish and Remove 24"x40" CMP	520	LF		
16.	Remove Tree, </= 12"	13	EA		
17.	Remove Tree, 13"-24"	14	EA		
18.	Remove Tree, 25"-48"	3	EA		
19.	Remove and Reinstall Mailbox	2	EA		
20.	Relocate Stop Sign	3	EA		
21.	Relocate Storage Shed	1	EA		
22.	FDOT Type 4 Curb Inlet (Complete Installation, Including Dewatering)	11	EA		
23.	FDOT Type J-8 Stormwater Manhole (Complete Installation, Including Dewatering)	3	EA		
24.	Connection to Existing Drainage Structure (Complete Installation, Including Dewatering)	1	EA		
25.	18" RCP (Complete Installation, Including Dewatering)	33	LF		
26.	36" RCP (Complete Installation, Including Dewatering)	620	LF		
27.	24"x38" ERCP (Complete Installation, Including Dewatering)	1,092	LF		
28.	Cut and Patch Asphalt Roadway (Complete including base and asphalt)	212	SY		
29.	Milling Existing Asphalt Pavement, 1 1/2" Average Depth	675	SY		
30.	FDOT Type SP-9.5 Asphaltic Concrete	60	TN		
31.	Thermoplastic, STD, White, Solid, 12"	414	LF		
32.	Thermoplastic, STD, White, Solid, 24"	33	LF		
33.	City of Fort Walton Beach Rollback Curb	482	LF		
34.	Concrete Driveway, 5"	325	SY		
35.	Concrete Sidewalk (including curb ramps), 5" Thick	550	SY		
36.	Detectable Warning Strip	160	SF		
37.	Chain link fence, 4'	200	LF		
38.	6' Wood Privacy Fence	450	LF		
39.	Sod	2,800	SY		
40.	10" Ceramic Epoxy Coated DI Pipe (Complete Installation, Including Dewatering)	50	LF		
41.	Fernco Clay to Ductile Iron Coupling	10	EA		

Total Base Bid: $_____

(In Words) _____

ADDITIVE ALTERNATE #1
GOLF COURSE DRIVE NE & EAGLE STREET NE STORMWATER IMPROVEMENTS

VENDOR:_____

Item No.	Description	Units	Quantity	Unit Cost	Total
1.	Maintenance of Traffic	1	LS		
2.	Erosion Control	1	LS		
3.	Demolish and Remove Concrete Sidewalk	13	SY		
4.	Demolish and Remove Concrete Curb and Gutter	983	LF		
5.	Demolish and Remove Concrete Driveway	420	SY		
6.	Demolish and Remove Existing Curb Inlet	2	EA		
7.	Demolish and Remove 18" CMP	30	LF		
8.	Demolish and Remove 24" CMP	663	LF		
9.	Demolish and Remove 24"x40" CMP	1,136	LF		
10.	Remove and Reinstall Mailbox	11	EA		
11.	FDOT Type 4 Curb Inlet (Complete Installation, Including Dewatering)	2	EA		
12.	FDOT Type J-8 Stormwater Manhole (Complete Installation, Including Dewatering)	1	EA		
13.	18" RCP (Complete Installation, Including Dewatering)	35	LF		
14.	24"x38" ERCP (Complete Installation, Including Dewatering)	1,135	LF		
15.	Cut and Patch Asphalt Roadway (Complete including base and asphalt)	211	SY		
16.	Milling Existing Asphalt Pavement, 1 1/2" Average Depth	74	SY		
17.	FDOT Type SP-9.5 Asphaltic Concrete	7	TN		
18.	Thermoplastic, STD, White, Solid, 12"	44	LF		
19.	Thermoplastic, STD, White, Solid, 24"	11	LF		
20.	City of Fort Walton Beach Rollback Curb	983	LF		
21.	Concrete Driveway, 5"	420	SY		
22.	Concrete Sidewalk (including curb ramps), 5" Thick	20	SY		
23.	Detectable Warning Strip	16	SF		
24.	Sod	950	SY		

Additive Alternate #1 Bid: $_____

(In Words)_____

SECTION 00016
SCOPE OF SERVICES

The project includes the replacement of approximately 2850 linear feet of existing corrugated metal stormwater pipes ranging in size from 18" to 20"x40" with reinforced concrete pipe ranging in size from 18" to 24"x38" horizontal elliptical pipe. Project also includes the reconstruction of stormwater inlets, asphalt roadways, concrete curb and gutter, concrete sidewalks and concrete driveways which are demolished in association with the installation of the proposed improvements.

The intent of this project is the replacement of active stormwater infrastructure along the current alignment. As such the contractor shall be required to maintain existing stormwater flow patterns throughout the duration of the construction so as to prevent flooding conditions or other adverse effects to surrounding roadways, right-of-way's, and/or properties.

The proposed improvements are located within residential areas. Contractor shall coordinate with residents regarding periods when access to properties may be impeded.

END OF SECTION

APPLICATION AND CERTIFICATE FOR PAYMENT

Date:

TO (OWNER):
City of Fort Walton Beach
105 Miracle Strip Pkwy SW
Fort Walton Beach, Florida 32548

FROM (CONTRACTOR):

PROJECT:
Golf Course Drive & Eagle Street Stormwater Improvements

VIA (ENGINEER):
Hatch Mott MacDonald
220 W Garden St. Suite 700, Pensacola, FL 32502

APPLICATION NO: **01**
PERIOD TO:
APPLICATION DATE:
CONTRACT DATE:

DISTRIBUTION TO:

X	OWNER
X	ENGINEER
X	CONTRACTOR

CONTRACTOR'S APPLICATION FOR PAYMENT

CHANGE ORDER SUMMARY			
Change Orders approved in previous months by Owner		ADDITIONS	DEDUCTIONS
TOTAL			
Number	Date Approved		
TOTALS		$0.00	$0.00

1.	ORIGINAL CONTRACT SUM			$0.00
2.	NET CHANGE BY CHANGE ORDERS			$0.00
3.	CONTRACT SUM TO DATE (Line 1 + Line 2)			$0.00
4.	ENCUMBRANCES:			
	a. Total Purchase Orders Issued by Owner (To Date)		$0.00	
	b. Anticipated Tax Savings on Owner Issued POs		$0.00	
	c. **TOTAL ENCUMBRANCES:** (Line 4a + Line 4b)			$0.00
	d. **CONTRACT VALUE LESS ENCUMBRANCES:** (Line 3 - Line 4c)			$0.00
5.	EARNED TO DATE:			
	a. Percentage of Work Complete-**Excluding** Owner Purchased Materials		#DIV/0!	
	b. Stored Materials - For Verification Only (See Attached)		$0.00	
	c. **TOTAL EARNED TO DATE:** (From Approved Schedule of Values)			$0.00
6.	RETAINAGE: (% of Line 5C)	10%		$0.00
7.	TOTAL EARNED LESS RETAINAGE (Line 5c less Line 6)			$0.00
8.	LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 7 from prior certificate)			$0.00
9.	**CURRENT PAYMENT DUE** (Line 7 less Line 8)			$0.00
10.	TAX SAVINGS AGREEMENT: (Through Summary No. N/A)			
	a. Vendor Invoices Processed @ Contractors Request		$0.00	
	b. Tax Savings on Processed Invoices		$0.00	
	c. Total Tax Savings Invoices & Credits Processed (Line 10a + 10b)		$0.00	
	d. Vendor retainages unpaid @ Contractors Request		$0.00	
	e. Remaining Balance on Encumb POs and Tax Savings (4c less 10c)		$0.00	
11.	BAL. TO FINISH, INCL RETAINAGE & ENCUMB (Line 3 - Ln 7 - Ln 10c)		$0.00	
12.	CONTRACTOR'S BALANCE TO FINISH, INCLUDING RETAINAGE (Ln 4d - Ln 7)			$0.00

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information, and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that the current payment shown herein is now due.

CONTRACTOR
THE XXX CONSTRUCTION COMPANY

By: Date:

State of: Florida County of: Okaloosa
Subscribed and sworn to before me this day of
Notary Public:

ENGINEER'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising the above application, the Engineer certifies to the Owner that to the best of the Engineer's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

ENGINEER:
AMOUNT CERTIFIED $

(Attach explanation if amount certified differs from the amount applied for.)

By: Date:

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein.

Issuance, payment, and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

SECTION 02000
SUMMARY OF SITE WORK

PART 1 - GENERAL

1.1 LOCATION OF WORK: All of the work of this Contract is located on City of Fort Walton Beach rights-of-way or easements.

1.2 WORK TO BE DONE:

1.2.1 The Contractor shall furnish all labor, tools, services and incidentals to complete all work required by these Contract Documents.

1.2.2 The Contractor shall perform the work complete, in place, tested, disinfected where applicable and ready for continuous services, and shall include repairs, replacements and restoration required as a result of damages caused during this construction.

1.2.3 Furnish and install all materials, equipment and labor which is reasonably and properly inferable and necessary for the proper completion of the work, whether specifically indicated in the Contract Documents or not.

1.3 GENERAL DESCRIPTION OF CONTRACT: The project generally consists of the following components:

1.3.1 Demolition: Contractor shall demolish existing site features as shown on the Drawings. Demolition debris shall be disposed of offsite at an approved construction demolition landfill.

1.3.2 Clearing and Grubbing: Contractor shall remove the individual trees noted for removal. The contractor shall clear and grub, within the limits shown, those areas designated on the drawings. Comply with all applicable local, State and Federal ordinances for offsite disposal.

1.3.3 Earthwork: Contractor shall excavate, backfill, and grade the areas subject to construction in accordance with the contract documents. All areas to receive improvements shall be prepared, graded and compacted in accordance with the recommendations of the soils engineer.

1.3.4 Permanent Water System: Water distribution facility relocation shall be completed by others.

1.3.5 Wastewater Treatment Facilities: No wastewater treatment facilities will be required for this project.

1.3.6 Sanitary Sewer Collection System: Contractor shall provide sanitary sewers, manholes, cleanouts etc. for the sanitary sewer collection system as shown on the drawings.

1.3.7 Stormwater Drainage: Contractor shall construct the stormwater drainage system shown on the Drawings and provide all temporary erosion controls required by government agencies, the Engineer and the Owner.

1.3.8 Roadways: Contractor shall construct/repair all roadways as shown on the Drawings. Contractor shall provide pavement markings as indicated on the drawings.

1.3.9 Buildings: No buildings will be required for this project.

1.3.10 Sidewalks: Sidewalks shall be constructed as shown on the Drawings.

1.3.11 Grassing and Sod: Contractor shall seed and mulch and fertilize all areas disturbed by construction, unless the plans call for the area(s) to be sodded. This includes the areas along roadways and drainage ditches. Sod shall be provided where called out in the construction documents.

1.3.12 Fence: Contractor shall provide and construct all fencing including gates, locks and appurtenances as shown on the Drawings.

1.3.13 Elevated Water Tank: No elevated water tank will be required for this project.

1.3.14 Electrical Systems: No electrical systems will be required for this project

1.3.15 Gas System: No gas system shall be required for this project.

1.3.16 Testing: All testing required by the construction documents shall be the responsibility of the Construction Manager.

1.3.17 Utility Relocation: Contractor shall be responsible for relocation.repair of sanitary sewer facilities as shown on the drawings. Contractor shall coordinate with the appropriate utility provider to relocate other utilities as shown on drawings. All relocation fees, inspection or testing fees required to move or reinstall sanitary sewer shall be paid for by the Contractor. Owners of other utilities requiring relocation as shown on the plans shall bare the cost of such relocation.

1.3.18 Construction Layout: Contractor shall be responsible for all layout required for his work. Layout shall be by a registered land surveyor registered in the State of Florida.

END OF SECTION 02000

SECTION 02100
CLEARING, GRUBBING, AND STRIPPING

PART 1 - GENERAL

1.1 DESCRIPTION: This Section describes the work included in clearing, grubbing, stripping, and otherwise preparing the project site for construction operations.

1.2 EXISTING TREES AND SHRUBBERY: Existing trees, shrubbery, and other vegetative material may not be shown on the drawings. Inspect the site as to the nature, location, size, and extent of vegetative material to be removed or preserved, as specified herein. Preserve in place all trees that are not specifically required to be removed for construction.

1.3 CLEARING AND GRUBBING LIMITS: All excavation and embankment areas associated with construction of proposed improvements shall be cleared and grubbed.

PART 2 - EXECUTION

2.1 PRESERVATION OF EXISTING TREES, SHRUBS, AND OTHER PLANT MATERIAL

2.1.1 All plant materials (trees, shrubbery, and plants) beyond the limits of clearing and grubbing shall be saved and protected from damage resulting from work. No filling, excavating, trenching, or stockpiling of materials will be permitted within the drip line of these plant materials. The drip line is defined as a circle drawn by extending a line vertically to the ground from the outermost branches of a plant or group of plants. To prevent soil compaction within the drip line area, no equipment will be permitted within this area.

2.1.2 When trees are close together, restrict entry to area within drip line by fencing. In areas where no fence is erected, the trunks of all trees 12 inches or greater in diameter shall be protected by encircling the trunk entirely with boards held securely by 12-gauge wire and staples. This protection shall extend from ground level to a height of 6 feet. Cut and remove tree branches where such cutting is necessary to effect construction operation. Remove branches other than those required to effect the work to provide a balanced appearance of any tree. Sears resulting from the removal of branches shall be treated with tree sealant.

2.2 CLEARING AND GRUBBING

2.2.1 Clearing and grubbing shall be performed in the areas indicated and where required to provide adequate work space, including ditches, areas where fill will be placed and where structures will be erected, and including spaces for control stakes and hubs for pipeline work. Asphalt pavement removal is to be included. Should such items be

damaged, they shall be replaced in kind or restored to at least as good condition as that in which they were found immediately before the work was begun, at the expense of the Contractor and to the satisfaction of the Engineer.

2.2.2 All weeds, rubbish and all other obstructions resting on or protruding through the surface of the existing ground, shall be collected and satisfactorily disposed of as specified herein and in compliance with the applicable laws and regulations. All such material shall be removed to a depth of one foot below finish grade.

2.2.3 Where excavation is performed within areas cleared and grubbed, all stumps, roots over one inch in diameter, and deleterious material thereby exposed shall be removed to a depth of one foot below the excavated surface.

2.2.4 Where debris is removed from areas other than those where subsequent excavation, filling, and grading will be done, no depressions shall be left, but the resulting holes shall be filled and neatly graded to conform to the grades indicated on the drawings.

2.3 STRIPPING

2.3.1 Areas to be Stripped: All excavation and embankment areas associated with new structures, slabs, walks, and roadway shall be stripped. Stockpile areas shall be stripped.

2.3.2 Stripping: Remove and store all organic sod, topsoil, grass and grass roots, and other objectionable material remaining after clearing and grubbing from the areas designated to be stripped.

2.4 DISPOSAL OF CLEARING AND GRUBBING DEBRIS

2.4.1 All unusable or excess material removed in clearing and grubbing shall be removed from the project site and disposed of as promptly as practical and shall not be left until the completion of the Contract.

2.4.2 The use of herbicides or blasting in clearing and grubbing is specifically prohibited.

END OF SECTION 02100

SECTION 02200
EARTHWORK

PART 1 - GENERAL

1.1 SCOPE: The work under this section includes the furnishing of all labor, materials, tools and equipment necessary to complete the earthwork shown on the drawings and specified herein, including rough grading.

1.2 GENERAL REQUIREMENTS:

1.2.1 Bidders shall examine the site of the work and make their own determination of the character of materials and the conditions to be encountered on the work, and their proposal shall be based upon their own investigations. Neither the Owner nor the Engineer shall be held responsible for variations found to exist between any soils data which may be included for information only, and actual field conditions that develop through the period of construction.

1.2.2 Underground structures and utilities shown on the drawings are located according to the best available records. However, it shall be the Contractor's responsibility to acquaint himself with all information and to locate all underground structures and utilities in order to avoid conflict with existing facilities. Neither the Owner nor the Engineer shall be held responsible for the inaccuracies or omissions in the location or grade of facilities of this type.

1.2.3 Where actual conflicts are unavoidable, work shall be performed so as to cause as little interference as possible with the service rendered by the facility disturbed. Facilities or structures damaged in the prosecution of the work shall be repaired immediately at the Contractor's expense, in conformance with the best standard practice, to the satisfaction of the owner and to the extent required, including replacement.

1.2.4 Benchmarks and other reference points shall be carefully maintained and, if disturbed or destroyed by the Contractor, shall be replaced by a Professional Surveyor registered to practice in the State of Florida, to the satisfaction of the Engineer and at no additional cost to the Owner. Location of benchmarks and other reference points not shown on the drawings but used during construction shall be recorded on the Contractor's "as-builts" of the Contract Drawings.

1.2.5 On paved surfaces the Contractor shall not use or operate tractors, bulldozers, or other power operated equipment which would damage such surfaces. All surfaces which have been damaged by the Contractor's operations shall be restored to a condition at least equal to that in which they were found immediately before work

was begun. Suitable materials and methods as determined by the Engineer shall be used for such restoration.

1.2.6 Core building data, including groundwater elevations or conditions, existing piping, and structure locations as appended to these specifications and indicated on the drawings, are presented only as information that is available which indicates certain conditions found and limited to the exact locations and on the dates indicated. The inclusion of such data shall not be interpreted as an indication of conditions that may actually be encountered through the period of construction.

PART 2 - EXECUTION

2.1 STRIPPING AND STOCKPILING TOPSOIL

2.1.1 Topsoil suitable for final grading operations shall be stripped and stockpiled in for reuse. Unsuitable material shall be removed from the site and disposed of in a manner satisfactory to the Engineer at no additional cost to the Owner.

2.1.2 The Owner reserves the right to claim and use for his own benefit all excess spoil material.

2.2 GRADING

2.1.2 Grade all areas as indicated. Fill shall be brought to finish grades shown and shall be graded to drain water away from structures as required.

2.2.2 Overall Area Grading for Which No Grades are Indicated:
Within the limits of construction and outer limits of clearing and grubbing, all holes and other depressions shall be filled, all mounds and ridges cut down, and the area brought to sufficiently uniform control so that the Owner's subsequent mowing operation will not be hindered by irregular terrain. This work shall be done regardless of whether the irregularities were the result of the Contractor's operations or originally existed.

2.3 EXCESS MATERIAL:

2.3.1 Excess excavated material suitable for reuse as backfill, shall be immediately disposed of by the Contractor on site as directed by the Engineer or Owner, and at no additional cost to the Owner. Material shall be spread and graded in such a manner as to drain properly and not disturb existing drainage conditions.

2.3.2 Excess excavated material not suitable as reuse for backfill shall be immediately removed from the site and disposed of by the Contractor at no expense to the Owner.

2.4 UNSUITABLE MATERIAL: If unsuitable material is encountered, the Contractor shall immediately notify the Engineer. The Engineer shall arrange for an independent soils testing firm to define the limits of and quantify the unsuitable material to be removed and replaced. Contractor shall be responsible for the removal, disposal and replacement of unsuitable material. Wet materials will not be considered unsuitable and it is the Contractor's responsibility to dry suitable materials as necessary for use at the site. Testing fees, if any, shall be paid by the Construction Manger.

2.5 DUST CONTROL: Dust control, if arises, will be the contractors responsibility. If, in the opinion of the Owner or the Engineer, it is necessary to control dust from time to time during the progress of the work, the Contractor shall use water trucks and/or furnish and spread calcium chloride at the site of the work as directed by the Engineer at no additional cost to the Owner.

2.6 SILTATION AND EROSION: The Contractor shall take steps and make suitable provisions to minimize siltation and erosion which may result from, or as a result of, his operations during the course of construction of this project. All siltation and erosion control shall be in strict accordance with applicable local, state, and federal requirements. The Contractor shall be responsible for removing all erosion control barriers upon stabilization and completion of the work.

The Contractor shall be responsible for submitting a National Pollution Discharge Elimination System (NPDES) permit, certification statement and the appropriate fee 48-hours prior to beginning construction. The Contractor shall be responsible for preparing and updating the stormwater pollution prevention plan as necessary to meet the requirements of the NDPES permit. The Contractor shall be responsible for all inspections necessary to maintain compliance with the NPDES permit conditions.

END OF SECTION 02200

SECTION 02210
GRASSING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary Conditions apply to work of this Section.

1.2 DESCRIPTION OF WORK: Extent of grassing work is as specified or shown on the construction plans. Sodded areas disturbed during construction shall be re-sodded to match existing. All other areas disturbed during construction operations shall be seeded, unless noted otherwise on plans.

1.3 QUALITY ASSURANCE: All seed used shall be labeled in accordance with U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act in effect on the date of invitation for bids. All seed shall be furnished in sealed standard containers, unless exception is granted in writing by the Owner. Seed which has become wet, moldy, or otherwise damaged in transit or in storage shall not be used. Fertilizer shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Any fertilizer which becomes cake or otherwise damaged, making it unsuitable for use, shall not be used. Seed, fertilizer and other grassing materials shall be stored under cover and protected from damage which would make then unacceptable for use.

1.4 SUBMITTALS: Approvals, except those required for field installations, field applications, or field tests shall be obtained before delivery of materials or equipment to the project. The results of laboratory tests performed on the topsoil material shall be submitted. The reports shall include the pH level, the amount of organic matter, and available phosphoric acid and potash of the soil intended for use in the work. Certificate of conformance will be required for the following:

1.4.1. Grass seed shall be certified by registered, certified seed association or a registered testing laboratory not more than ten months prior to seeding.

1.4.2. Sprigs

1.4.3. Fertilizer

1.4.4. Topsoil

1.4.5. Lime

1.4.6. Mulching

PART 2 - PRODUCTS

2.1 TOPSOIL: If the quantity of existing, stored, or excavated topsoil is inadequate for planting, sufficient additional topsoil shall be furnished at no additional cost to the owner. Topsoil furnished shall be a natural, fertile, friable soil, possessing characteristics of representative productive soils in the vicinity. It shall be obtained from naturally well-drained areas. Topsoil shall be without admixture of subsoil and free from Johnson grass (Sorghum halepense), nut grass (Cyperus rotundus) and objectionable weeds and toxic substances.

2.2 SOIL AMENDMENTS:

2.2.1. LIME: Ground limestone (Dolomite) shall contain not less than 85 percent of total carbonates, and shall be ground to such a fineness that 50 percent will pass a 100-mesh sieve and 90 percent will pass a 20-mesh sieve.

2.2.2. FERTILIZER: Fertilizer shall be 16-16-16 formulation. The nitrogen shall be 60% urea-formaldehyde form. Fertilizer shall conform to the applicable State Fertilizer laws and shall be granulated so that 80 percent is held on a 16-mesh screen, uniform in composition, dry and free-flowing.

2.2.3. MULCH: Clean hay or fresh straw mulch.

2.3 GRASS MATERIALS:

GRASS SEED: Federal Specifications JJJ-S-18 and shall satisfy the following requirements:

Seed	Pure Seed	and Hard Seed	Weed Seed
Argentine Bahia	80%	15%	.25%

Seed failing to meet the purity or germination requirements by not more than twenty-five percent may be used, but the quantity shall be increased to yield the required rate of pure live seed. Seed failing to meet the weed seed requirements shall not be used.

PART 3 - EXECUTION

3.1 GRADING: Areas to be grassed shall be graded to remove depressions, undulations, and irregularities in the surface before grassing.

3.2 PLACING TOPSOIL: Areas to be grassed shall have a minimum topsoil cover of two inches. Topsoil shall not be placed when the subgrade is excessively wet, extremely dry or in a condition otherwise detrimental to the proposed planting or proper grading.

3.3 TILLAGE: The area to be grassed shall be thoroughly tilled to a depth of four inches using a plow and disc harrow or rotary tilling machinery until a suitable bed has been prepared and no clods or clumps remain larger than 1-1/2 inches in diameter.

3.4 APPLICATION OF LIME: The pH of the soil shall be determined. If the pH is below 5.0, sufficient lime shall be added to provide a pH between 5.5 and 6.5. The lime shall be thoroughly incorporated into the top three to four inches of the soil. Lime and fertilizer may be applied in one operation.

3.5 APPLICATION OF FERTILIZER: Fertilizer shall be applied at the rate of 6 pounds per 1,000 square feet and shall be thoroughly incorporated into the top three to four inches of soil.

3.6 PLANTING SEEDS: All areas disturbed during construction shall be seeded as specified herein. Immediately before seeds are sown and after fertilizer and lime are applied, the ground shall be scarified as necessary and shall be raked until the surface is smooth, friable, and of uniformly fine texture. Areas to be grassed shall be seeded evenly with a mechanical spreader, raked lightly, rolled with a 200-pound roller, and watered with a fine spray.

3.6.1. Seed shall be applied at the following rate:

Seed	Rate of Application
Argentine Bahia Grass	6 lbs./1000 sq. ft.
(paspalum notatum)	260 lbs./acre

3.6.2. Seeded areas shall be mulched at the rate of not less than 1-1/2" loose measurement over all seeded areas. Spread by hand, blower, or other suitable equipment. Mulch shall be cut into the soil with equipment capable of cutting he mulch uniformly into the soil. Mulching shall be done within 24 hours of the time seeding is completed.

3.7 ROLLING: After seeding and mulching, a cultipacker, traffic roller, or other suitable equipment shall be used for rolling the grassed areas. Areas shall then be watered with a fine spray.

3.8 WINTER COVER: All areas to be grassed shall be protected against erosion at all times. For protection during winter months (November 1st through March 31st) Italian rye grass shall be planted at the rate of four pounds per 1,000 square feet on all areas which are not protected by permanent grass.

3.9 CLEAN-UP: All excess soil, excess grass materials, stones, and other waste shall be removed from the site daily and not allowed to accumulate.

3.10 MAINTENANCE: Maintenance shall begin immediately following the last operation of grassing and continue until final acceptance. Maintenance shall include watering, mowing, replanting, and all other work necessary to produce a uniform stand of grass. Grassing will be considered for final acceptance when the permanent grass is healthy and growing on 97 percent of the area with no bare areas wider than 12 inches.

3.11 ACCEPTANCE: The Contractor shall submit to the Owner two copies of a written request for final acceptance of the grassing work. The request shall be submitted at least ten days prior to the anticipated date of acceptance. The condition of the grass will be noted, the Contractor will be notified if maintenance is to continue.

END OF SECTION 02210

SECTION 02211
SODDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary Conditions apply to work of this Section.

1.2 DESCRIPTION OF WORK: This work consists of sodding areas cleared during construction and not paved, or as otherwise shown on the Construction Plans. All material and construction methods shall be in accordance with sections 570, 571, 573, or 575 of the Florida Department of Transportation Standard Specifications, Latest Edition.

Sodding: Areas noted on Construction Plans shall be sodded.

1.3 MATERIAL: Use grass species to match existing sod(s). The sod shall have live, fresh, and uninjured at the time of planting and shall have a thick mat of roots with enough adhering soil to assure growth. Apply sod within 48 hours of cutting or stack and keep moist. Do not plant dormant sod or if ground is frozen.

1.3.1 Placement: Prepare the ground by loosening the soil. Place sod on the prepared soil to form a solid mass with tightly fitted joints. Butt ends and sides of sod strips; do not overlap. Stagger strips to avoid a continuous downhill seam. Tamp or roll lightly to ensure contact with subgrade. Tamp the outer edges of the sodded area to produce a smooth contour. Work sifted soil into minor cracks between pieces of sod; remove excess to avoid smothering of adjacent grass. Water sod thoroughly with a fine spray immediately after planting.

1.3.2 Watering: Keep sod continuously moist to a depth below the root zone for three weeks after placement. If there is not water available to the site, the Contractor shall provide the water for the sod.

1.3.3 Maintenance: Maintain sod by watering, fertilizing, weeding, mowing, trimming and other operations such as rolling, re-grading, and re-planting as required to establish a lawn free of eroded or bare areas and acceptable to the Engineer. Where inspected work and materials do not comply with requirements, replace rejected work and continue maintenance until re-inspected by Engineer and found to be acceptable. Remove rejected materials promptly from the project site.

1.4 WARRANTY: Contractor shall warranty all work and material for a period of 18 months beginning from date of acceptance of substantial completion.

1.5 MEASUREMENT AND PAYMENT:

1.5.1 Sodding shall be measured for payment in square yards or by lump sum only for areas indicated on the plans, or as provided in the proposal and contract.

1.5.2 When not listed as a separate contract pay item, sodding shall be considered as incidental work, and the cost thereof shall be included in such contract pay items as are provided in the proposal contract.

1.5.3 Compensation, whether by contract pay item or incidental work will be for furnishing all materials, labor, equipment, tools and incidentals required for the work, all in accordance with the plans and these specifications.

END OF SECTION 02211

SECTION 02215
EXCAVATION, BACKFILL, AND COMPACTION

PART 1 - GENERAL

1.1 DESCRIPTION: This section includes materials, testing, and installation of earthwork for excavations, fills and embankments for structures, pavements, rights-of-way, and sites and trench excavating, backfilling, and compacting for underground pipelines and appurtenant structures. All excavation and backfill for utilities shall be in accordance with any geotechnical engineering report included with these specifications.

1.2 STANDARDS :

1.2.1 Determine the density of soil in place by the sand cone method, ASTM D1556, by nuclear methods, ASTM D2922; or by the rubber balloon method, ASTM D2167.

1.2.2 Determine laboratory options moisture-density relations of cohesive soils by ASTM D1557 (modified Proctor).

1.2.3 Sample backfill materials by ASTM D75.

1.2.4 For cohesive soils, "relative density" is the ratio, expressed as a percentage, of the inplace dry density to the laboratory maximum dry density as determined by ASTM D1557 (modified Proctor).

1.2.5 Determine the relative density of cohesionless soils by ASTM D2049.

1.3 DEFINITIONS:

1.3.1 Subgrade: The undisturbed material immediately below the bottom of an excavation, below an area of fill, or below a structure.

1.3.2 Excavation: Removal of earth or buried material, either temporarily or permanently, as specified or as necessary for construction of the project.

1.3.3 Overexcavation: Excavation exceeding that specified or shown on the plans.

1.3.4 Backfill: Earth material placed permanently in an excavated area.

1.3.5 Fill: Earth material placed permanently above the existing grade.

1.3.6 Borrow: Earth material brought from off the site to be used as fill or backfill.

1.3.7 Structural Backfill: Backfill placed beneath structures and in overexcavated areas.

1.3.8 Structures: Buildings, foundations, and other man-made, stationary features above or below ground.

PART 2 - PRODUCTS

2.1 BACKFILL AND FILL

2.1.1 For Structures: Backfill and fill shall be clean soils that is free from clayballs contain no more than 10% by weight passing the No. 200 sieve. The gradation of this granular material shall be such as to achieve the specified compaction.

2.1.2 For pipe and appurtenance structures, conform as follows:

2.1.2.1 First Lift: From the excavation grade to a level 12 inches below the top of the pipeline. Exclude material with fragments larger than the following:

Pipe Type	Fragment Size (Greatest Dimension-Inches)
Concrete, steel, cast or ductile iron and corrugated metal	2
Vitrified Clay	1½
Polyvinyl Chloride (PVC) and Polyethylene (PE)	½

2.1.2.2 Second Lift: From the top of the First Lift to the ground surface. Exclude material with fragments larger than six inches.

2.1.3 In the event there is insufficient satisfactory material from the excavation to meet the requirements for backfill or fill material, obtain borrow which meets the requirements for backfill material from sources secured by the Contractor.

2.2 STRUCTURAL BACKFILL: Structural backfill shall be free from clayballs and shall conform to ASTM D1241, Type I, Gradation B.

2.3 WATER FOR COMPACTION: Water shall be free of acid, alkali, or organic materials and shall have a pH of 7.0 to 9.0. Provide all water needed for earthwork. Provide temporary piping, valves, and trucks to convey water from the source to the point of use. Provide any meters required if the water is taken from a public water system.

PART 3 - EXECUTION:

3.1 DEWATERING: Provide and operate equipment adequate to keep excavations free of water. Dewater subgrade to a minimum of 3 feet below the bottom of the excavation. Remove water during periods when concrete is being deposited, when pipe is being laid, during the placing of backfill, and for proper inspection and/or testing of the exposed subgrade. These provisions shall apply during the noon hour as well as overnight. Do not drain trench water through the pipeline under construction. Avoid settlement or damage to adjacent property. Dispose of water in a manner that will not damage adjacent property or interfere with normal drainage. When dewatering open excavations, dewater from outside the structural limits and from a point below the bottom of the excavation. Obtain and comply with all required discharge permits from appropriate regulatory authorities. See section 2240 – Dewatering for additional requirements.

3.2 EXCAVATION:

3.2.1 Excavate to the elevations shown on the drawings, to the bottom elevations of the slabs, structures, and foundations or the bottom of the roadway subbase (top of subbase if only to be compacted), whichever is the lowest elevation.

3.2.2 Perform all excavation regardless of the type, nature, or condition of the material encountered to accomplish the construction.

3.2.3 After the excavation has been completed, the Owner or his representative will observe the exposed subgrade to determine the need for any additional excavation. It is intended that additional excavation be conducted in all areas within the influence of the structure where unacceptable subgrade removal of all such unacceptable material that exists directly beneath the hole or structure for the full width of the hole or structure and to a depth required to reach suitable foundation material. Refill the overexcavated areas with structural backfill. No payment will be made by the Owner for overexcavation of wet subgrade materials. It shall be the Contractor's responsibility to dry wet subgrade materials as necessary for proper compaction and stabilization.

3.2.4 Do not carry excavation for footings, slabs, or conduits deeper than the elevations shown on the plans. Backfill overexcavations below the elevations shown to the proper elevation with compacted structural backfill material. Correct cuts below grade by similarly cutting adjoining areas and creating a smooth transition.

3.2.5 The Contractor will not receive any additional payment for overexcavation or refill material used for his convenience or which is not authorized by the Owner or his representative.

3.2.6 The Contractor shall acquaint himself with existing conditions and locate all structures and utilities within the project area in order to avoid conflicts.

3.2.7 Protect any pipes, conduits, wires, mains, footings or other underground structures encountered in trenching/excavating/backfilling from damage or displacement. Replace any pipes, conduits, wires, mains, footings or other structures disturbed during construction.

3.2.8 Contact all utility companies with underground utilities in the project area and obtain their assistance in locating facilities prior to excavation.

3.2.9 Excavate sufficiently in advance of pipe laying to discover obstructions in time to modify alignment, if necessary, to avoid the obstruction. The Owner or his representative must review and approve such alignment modifications before they are encountered.

3.3 PREPARATION OF SUBGRADE PRIOR TO PLACING FOUNDATIONS: Excavate and shape subgrade to line, grade, and cross section. Remove soft material encountered and replace with structural backfill. Fill holes and depressions to the required line, grade, and cross sections with structural backfill. The finished subgrade shall be within a tolerance of ± 0.08 feet of the grade and cross section shown, smooth and free from irregularities, and at the specified relative density.

3.4 PREPARATION FOR PLACING FILL OR BACKFILL:

3.4.1 Remove loosened and disturbed materials at the subgrade.

3.4.2 Remove form materials and trash before placing any fill or backfill. Obtain the specified compressive strength and finish of concrete work before backfilling.

3.4.3 Do not operate earthmoving or excavation equipment within five feet of existing structures or newly completed structures. Place and compact fill or backfill adjacent to concrete walls with hand-operated tampers or other equipment that will not damage the structure.

3.4.4 Fill or backfill around water-holding basins and channels only after specified leakage tests have been conducted.

3.5 COMPACTION:

3.5.1 Unless otherwise specified or shown on the drawings, areas outside pipe trenches must meet the following compaction requirements.

3.5.1.1 Structural Backfill: 98% relative density in 6-inch maximum layers.

3.5.1.2 Subgrade Underfill or Backfill: 95% relative density to a depth of 12 inches.

3.5.1.3 Subgrade Under Structural Backfill or Structures: 95% relative density to a depth of 24 inches.

3.5.1.4 Backfill or Fill Under Pavement: 98% relative density in 12-inch maximum layers.

3.5.1.5 All Other Areas: 95% relative density in 12-inch maximum layers.

3.5.2 Compact by using methods acceptable to the Engineer (powered tampers, vibrators, etc.). Compact the first 2 feet of backfill over pipe either by hand-operated tampering devices or with powered equipment which will not damage the pipe. Flooding or puddling with water to consolidate backfill is not acceptable, except where sand is encountered and the specified density can be obtained using this method.

3.5.3 During the compacting operations, maintain material within ± 2% of optimum moisture. Aerate material containing excessive moisture by blading, discing, or harrowing to hasten the drying process.

3.5.4 Pipe and Appurtenant Structures: Unless otherwise shown on the drawings or otherwise described in the specifications for the particular type of pipe installed, compact soil in pipe trenches to the following minimum:

3.5.4.1 First Lift: 95% relative density.

3.5.4.2 Second Lift not Beneath Paving: 90% relative density.

3.5.4.3 Second Lift in Paved Areas and Under Structures: 98% relative density.

3.5.4.4 Refill for Overexcavation: 95% relative density.

3.6 SHEETING, SHORING, AND BRACING OF TRENCHES:

3.6.1 Install adequate sheeting and bracing to prevent damage to property and injury to persons. Comply with all applicable safety regulations and laws.

3.6.2 Remove sheeting when the trench has been backfilled to at least one-half its depth or when removal will not endanger proper pipe alignment or support.

3.6.3 When conditions or plans and specifications require that sheeting be left in place, cut off the top at an elevation 2.5 feet below finished grade, unless otherwise specified.

3.6.4 The installation of sheet piles shall not be performed by vibratory or impact hammer means.

3.6.5 The contractor shall provide the City Engineer and the EOR with the proposed method of shoring/bracing/protection for review and approval prior to implementing.

3.7 SIDEWALK, PAVEMENT AND CURB REMOVAL: Cut and remove bituminous and concrete pavements, curbs and sidewalks prior to excavation of the trenches. Width of the pavement or brick pavement cut shall be at least one foot wider than the required width of the trench at ground surface. Haul pavement and concrete materials from the site to disposal site secured by Contractor. Do not use for trench backfill.

3.8 TRENCHING:

3.8.1 Cut trenches to a minimum width equal to the outside diameter of the pipe at the joint plus eight inches for unsheeted trenches, or 12 inches for sheeted trenches. The maximum width of trench, measured at the top of the pipe, shall not exceed the outside pipe barrel diameter plus two feet, unless otherwise shown on the plans or details.

3.8.2 Maintain vertical trench walls from the bottom of the trench to a line measured 12 inches above the top of the pipe.

3.8.3 Utility Bedding: The minimum utility bedding allowable shall consist of a shaped trench bottom which provides firm bedding for the utility pipe. Bed the pipe in undisturbed firm soil of hand-shaped unyielding material, so that the pipe will be in continuous contact therewith for its full length and provide a minimum bottom segment support for the pipe equal to 0.6 of the outside diameter of the barrel. All bedding materials and installation for pipe shall be in accordance with the manufacturers recommendations.

3.8.4 Construct special bedding as called for on the plans or in the contract documents as recommended by the pipe manufactures.

3.8.5 Excavate the trench to the lines and grades shown on the drawings with allowance for pipe thickness and for pipe base or special bedding. If the trench is excavated below the required grade, refill any part of the trench excavated below the required grade at no additional cost to the Owner. Place the refilling material over the full width of trench in compacted layers not exceeding twelve inches deep to the established grade with allowance for the pipe base or special bedding.

3.8.6 During trench excavation, place the excavated material only within the project area. Do not obstruct any roadways or streets. Conform to federal, state, and local codes governing the safe loading of trenches with excavated material.

3.9 TRENCH EXCAVATION IN BACKFILL AND FILL AREAS: Construct trench excavation for pipe, pipes, or conduit in backfill or fill areas in accordance with the following procedures:

3.9.1 Construct and compact the backfill or fill to an elevation of one foot minimum over the top of the pipe or conduit to be installed.

3.9.2 Excavate trench in the compacted backfill or fill. Place pipe base material, install pipe or conduit, and backfill to 12 inches above the pipe as specified for the type of pipe used. Compact backfill above this point to the same relative density as the adjacent embankment.

3.10 STRUCTURAL BACKFILL: Place structural backfill where specified and in over-excavation areas, to the lines and grades shown or specified. Compact each layer. Stop structural backfill at least 6 inches below finished grade in all areas where topsoil is to be replaced. Moisten material as necessary to aid compaction.

3.11 TRENCH BACKFILLING:

3.11.1 Excavate bell holes at each joint to permit proper assembly and inspection of the entire joint.

3.11.2 Backfill for non-plastic pipe and appurtenant structures in accordance with the following procedures:

3.11.2.1 After pipe has been bedded, place "First Lift" material simultaneously on both sides of the pipe, keeping the level of backfill the same on each side. Carefully place the material around the pipe so that the pipe barrel is completely supported and that no voids or uncompacted areas are left beneath the pipe. Place material on the underside of the pipe in such a manner as to prevent lateral movement during subsequent backfilling.

3.11.2.2 Compact material placed within 12 inches of the outer surface of the pipe by hand tamping only.

3.11.2.3 Push the backfill material carefully onto the backfill previously placed in the "First Lift". Do not permit free fall of the material until at least two feet of cover is provided over the top of the pipe. Do not drop sharp, heavy pieces of material directly onto the pipe or the tamped material around the pipe.

3.11.3 Place backfill material in maximum 12 inch layers and compact each lift to the specified relative density.

3.12 SITE WORK

3.12.1 Shape the surface of earthwork to conform to lines, grades and cross sections that existed prior to beginning work or as shown on the drawings, within 1/10 of a foot. Round tops of banks to circular curves to not less than a 6-foot radius. Neatly and smoothly trim rounded surfaces. Do not overexcavate and backfill to achieve the proper grade.

3.12.2 Remove excess, unsuitable, or cleared material resulting from the facility installation from the work site and dispose of at locations secured by the Contractor.

3.13 DRAINAGE, EROSION AND SEDIMENTATION: Maintain all existing drainage patterns and control run-off from the construction area to prevent erosion, sedimentation, or flooding due to the construction.

3.14 PROTECTION OF PROPERTY

3.14.1 Protect the trunks of trees adjacent to this work by enclosure with padding or wood. Operate excavating machinery and cranes with care to prevent damage to trees, particularly to overhanging branches and limbs.

3.14.2 Do not cut branches, limbs and roots unless they are within six inches of the facility under construction. Make all necessary cuts smoothly and neatly without splitting or crushing. Neatly trim and cover the tree with healing paint at all cut or damaged portions.

3.14.3 Do not cut or operate on paved surfaces any equipment with treads or wheels which will cut or otherwise damage paved surfaces. Provide adequate protective measures to avoid damages to the paved surfaces.

3.15 TESTING

3.15.1 Field density tests will be made in locations reviewed by the Owner, normally in each vertical layer, and using the following approximate spacing.

3.15.1.1 Under structures, pavements, and slabs, one per 2500 square feet with at least two per structure or area.

3.15.1.2 In trenches, one every 300 feet in continuous trenches under pavements or future pavements plus one at each intersection or one every 500 feet in continuous trenches not under pavements.

3.15.2 If any field density tests are below the specified relative density, recompact or re-excavate, rebackfill and recompact the area until the specific density is obtained. Make a minimum of two field density tests per recompacted and/or re-excavated area, but do not exceed the spacing specified above.

END OF SECTION 02215

SECTION 02240
DEWATERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes construction dewatering.

1.3 PERFORMANCE REQUIREMENTS

A. Ample means shall be provided during construction to remove and dispose all water entering trench and structure excavations. Said dewatering shall continue during construction to keep the ground water below the level of backfill at all times.

B. The Contractor may use any dewatering method he deems feasible to comply with the above conditions.

C. Discharge from the dewatering system shall be such that it will not endanger public health, damage property, or adversely affect any portion of the work under construction. Care should be taken to prevent the washing of soil into watercourses or storm sewers during discharge. The contractor shall be financially responsible for the sampling and testing of up to 5 samples in an effort to obtain an FDEP approved "clean" sample. If after 5 samples a contaminant is still present in the groundwater, the contractor and the City Engineer will develop a plan of action for discharging the groundwater in a method acceptable to FDEP.

D. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control ground-water flow into excavations and permit construction to proceed on dry, stable subgrades.
   1. Maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
   2. Prevent surface water from entering excavations by grading, dikes, or other means.
   3. Accomplish dewatering without damaging existing buildings adjacent to excavation.
   4. Remove dewatering system if no longer needed.

1.4 SUBMITTALS

A. Shop Drawings for Information: For dewatering system. Show arrangement, locations, and details of wells and well points; locations of headers and discharge lines; and means of discharge and disposal of water.
   1. Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.
   2. Include a written report outlining control procedures to be adopted if dewatering problems arise.
   3. Include Shop Drawings signed and sealed by the qualified professional engineer responsible for their preparation.

B. Qualification Data: For Installer.

C. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations.

D. Record drawings at Project closeout identifying and locating capped utilities and other subsurface structural, electrical, or mechanical conditions performed during dewatering.
   1. Note locations and capping depth of wells and well points.

E. Field Test Reports: Before starting excavation, submit test results and computations demonstrating that dewatering system is capable of meeting performance requirements.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with water disposal requirements of authorities having jurisdiction.

B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.

B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from this data.
   1. Make additional test borings and conduct other exploratory operations necessary for dewatering.
   2. The geotechnical report is referenced elsewhere in the Stormwater Pollution Prevention Plan.

C. Survey adjacent structures and improvements, employing a qualified professional engineer or land surveyor, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
   1. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.
   1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
   2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

3.2 INSTALLATION

A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

B. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed, or until dewatering is no longer required.

C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.
   1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.

D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
   1. Maintain piezometric water level a minimum of 60 inches below surface of excavation.

E. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water in a manner that avoids inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.

F. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.
   1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches (900 mm) below overlying construction.

G. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

3.3 OBSERVATION WELLS

A. Provide, take measurements, and maintain at least the minimum number of observation wells or piezometers indicated and additional observation wells as may be required by authorities having jurisdiction.

B. Observe and record daily elevation of ground water and piezometric water levels in observation wells.

C. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. Suspend construction activities in areas where observation wells are not functioning properly until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.

D.
   1. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.

3.4 PAYMENT

A. Cost for dewatering shall be included in the price for the related items.

END OF SECTION 02240

SECTION 02500
SITE DRAINAGE

PART 1 - GENERAL

1.1 SCOPE: The work under this section includes the furnishing of all labor material and equipment required to provide proper drainage of the site.

1.2 GENERAL REQUIREMENTS:

1.2.1 Pipe sizes shown on the drawings are based on concrete pipe with a coefficient of roughness based on Florida Department of Transportation Standards.

1.2.2 All workmanship, materials, equipment and installation shall be in accordance with the applicable portions of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition, and referred to hereinafter as Standard Specification. The specific sections of the above mentioned specifications which are applicable are listed below.

1.2.3 Contractor shall be responsible for implementing adequate and proper by-passes for stormwater and sanitary sewer during construction. Proposed methods shall be reviewed and approved by the City, and EOR.

PART 2 - MATERIALS

2.1 CONCRETE PIPE:

2.1.1 Pipe: Concrete pipe for culverts shall conform to Section 941 of the Standard Specifications. All pipe shall be Class III unless otherwise noted on the drawings.

2.1.2 Sealing Joints: The joints of new pipe shall be sealed by use of round rubber gaskets as provided in Paragraph 430-7 of the Standard Specifications. All joints to be wrapped with non-woven filter fabric.

2.2 DRAINAGE STRUCTURES: Structures, including mitered end sections, shall be used where shown on the drawings and constructed in accordance with the details shown. Concrete shall be in accordance with Division 3.

2.3 POLYVINYL CHLORIDE PIPE:

2.3.1 Corrugated or Ribbed: Drainage pipe may be corrugated ribbed PVC pipe with exterior ribs perpendicular to the axis of the pipe and in sizes ranging from 12 inches through 48 inches. Pipe shall conform to ASTM F 794 or ASTM F 949 and shall further meet the requirements of Paragraph 2.7 of Section 02560 of these specifications. Acceptable manufactures shall include Ultra-Rib, as manufactured by Extrusion Technologies, Inc., Contech A-2000 corrugated PVC sewer pipe, as manufactured by Contech Construction Products, Inc., or approved equal.

2.5 MANHOLES:

2.5.1 Precast Concrete Manholes: ASTM C 478, precast reinforced concrete, of depth indicated with provision for rubber gasket joints.

Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having a separate base slab or base section with integral floor.

2.5.1.1. Riser Sections: 4-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.

2.5.1.2. Top Section: Eccentric cone type, unless concentric cone or flat-slab-top type is indicated. Top of cone to match grade rings.

2.5.1.3. Grade Rings: Provide 2 or 3 reinforced concrete rings, of 6 to 9 inches total thickness and match 24-inch diameter frame and cover.

2.5.1.4. Gaskets: ASTM C 443, rubber.

2.5.1.5. Steps: Cast into base, riser, and top sections sidewall at 12-to 16-inch intervals.

2.5.1.6. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

2.5.1.7. Channel and Bench: Concrete.

2.5.2 Cast-in-Place Manholes: Reinforced concrete of dimensions and with appurtenances indicated.

2.5.2.1. Bottom, Walls, and Top: Reinforced concrete.

2.5.2.2. Channel and Bench: Concrete.

2.5.2.3. Steps: Cast into sidewall at 12- to 16-inch intervals.

2.5.3 Manhole Steps: Wide enough for an adult to place both feet on one step and designed to prevent lateral slippage off the step.

Material: Steel-reinforced plastic.

2.5.4 Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, heavy-duty, ductile iron, 24-inch inside diameter by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch-diameter cover, indented top design, with lettering "STORM SEWER" cast into cover.

2.6 CATCH BASINS:

2.6.1 Precast Concrete Catch Basins: ASTM C 478 or ASTM C 858, precast reinforced concrete, of depth indicated. Sections shall have provision for rubber gasket joints. Base section slab shall have minimum thickness of 6 inches.

2.6.1.1. Base Section: Base riser section and separate base slab, or base riser section with integral floor.

2.6.1.2. Riser Sections: Sections shall be of lengths to provide depth indicated.

2.6.1.3. Top Section: Type to match FDOT configuration detailed.

2.6.1.4. Grade Rings: Provide 2 or 3 reinforced concrete rings, of 6 to 9 inches total thickness, as necessary.

2.6.1.5. Gaskets: ASTM C 443, rubber.

2.6.1.6. Steps: Cast into riser sidewall at 12- to 16-inch intervals.

2.6.1.7. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

2.6.1.8. Channel and Bench: Concrete.

2.6.2 Cast-in-Place Catch Basins: Reinforced concrete of dimensions and with appurtenances indicated.

2.6.2.1. Bottom, Walls, and Top: Reinforced concrete.

2.6.2.2. Channel and Bench: Concrete.

2.6.3 Catch Basin Steps: Wide enough for an adult to place both feet on one step and designed to prevent lateral slippage off the step.

Material: Steel-reinforced plastic.

2.6.4 Catch Basin Frames and Grates: Per FDOT Standard Frame and Grates.

2.6.5 Curb Inlets: Precast concrete, brick, or other materials, of dimensions conforming to Walton County standards.

2.7 OUTFALLS: General: Construct of reinforced concrete pipe, mitered end section, toewalls, and rip rap, as indicated.

2.8 CONCRETE AND REINFORCEMENT:

2.8.1 Concrete: Portland cement mix, 3,000 psi.

Cement: ASTM C 150, Type II.

2.8.1.1. Fine Aggregate: ASTM C 33, sand.

2.8.1.2. Coarse Aggregate: ASTM C 33, crushed gravel.

2.8.1.3. Water: Potable.

2.8.2 Reinforcement: Steel conforming to the following:

2.8.2.1. Fabric: ASTM A 185, welded wire fabric, plain.

2.8.2.2. Reinforcement Bars: ASTM A 615, Grade 60, deformed.

2.8.3 Forms:

2.8.3.1. Form Materials: Plywood, metal, metal-framed plywood, or other acceptable panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces without distortion or defects. Material shall be of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal.

2.8.3.2. Form Release Agent: Provide commercial formulation form-release agent with a maximum of 350 mg/l volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces. Release agent to be within allowable volatile limits according to applicable local, state and federal codes.

2.9 MASONRY: Bricks for accessories shall be hard common clay brick. Mortar shall be one part Portland cement and three parts masonry sand to which shall be added lime putty in the amount of 50% of the volume of cement. Special commercial mortar mixes may be used if approved by the Engineer. All masonry materials shall conform to the latest applicable ASTM specifications. Set all masonry units in full beds of mortar, with full joints and strike all joints flush. Masonry reinforcements shall be galvanized Dur-O-Wal, or approved equal, and shall be installed at every other bed joint.

2.10 CURING MATERIALS:

2.10.1 Conform to TT-C-800, with 30-percent minimum solids content.

2.10.2 Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yard, complying with AASHTO M-182, Class 2.

2.10.3 Moisture-Retaining Cover: One of the following, complying with ASTM C-171.

2.10.3.1. Waterproof paper

2.10.3.2. Polyethylene film

2.10.3.3. White burlap-polyethylene sheet

2.10.4 Clear Solvent-Borne Liquid Membrane-Forming Curing Compound: This is a solvent-borne membrane-forming curing compound. Revise to Type II and verify manufacturer's products when a white pigmented curing compound is required. Do not use if waterborne low-VOC emissions compounds are required. ASTM C-309, Type I, Class A or B, wax free.

2.10.5 Clear Waterborne Membrane-Forming Curing Compound:

2.10.5.1. This is a waterborne membrane-forming curing compound. Use when low VOC emissions are required. ASTM C-309, Type I, Class B.

2.10.5.2. Provide material that has a maximum volatile organic compound (VOC) rating of 350 mg per liter.

2.10.6 Evaporation Control: Monomolecular film-forming compound applied to exposed concrete surfaces for temporary protection from rapid moisture loss.

PART 3 - EXECUTION

3.1 PREPARATION OF FOUNDATION FOR BURIED STORMWATER SYSTEMS:

3.1.1 Grade trench bottom to provide a smooth, firm, stable, and rock-free foundation, throughout the length of the pipe.

3.1.2 Remove unstable, soft, and unsuitable materials at the surface upon which pipes are to be laid, and backfill with clean sand or pea gravel to indicated level.

3.1.3 Shape bottom of trench to fit bottom of pipe. Fill unevenness with tamped sand backfill. Dig bell holes at each pipe joint to relieve the bells of all loads and to ensure continuous bearing of the pipe barrel on the foundation.

3.2 INSTALLATION, GENERAL:

3.2.1 General Locations and Arrangements: Drawings (plans and details) indicate the general location and arrangement of the underground stormwater system piping. Location and arrangement of piping layout take into account many design considerations. Install the piping as indicated, to the extent practical.

3.2.2 Install piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert, unless approved otherwise by the Engineer. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings in accordance with manufacturer's recommendations for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed. The pipe shall be carefully examined for defects and the inside cleaned. After placing pipe in the ditch, the ends shall be wiped free from all dirt, sand and foreign material. All pipe and joints shall be made, handled, and installed in strict accordance with the manufacturer's recommendations and instructions. A copy of the installation manual shall be furnished to the Engineer prior to placing pipe on the job site.

3.2.2.1. Install concrete pipe in accordance with applicable provisions of American Concrete Pipe Association "Concrete Pipe Field Manual", unless otherwise indicated.

3.2.2.2. Place concrete pipe with elliptical reinforcing so that the reference lines indicating top of pipe are not more than 5 degrees from vertical plane through longitudinal axis of pipe.

3.2.3 Use manholes or catch basins for changes in direction, except where a fitting is indicated. Use fittings for branch connections, except where direct tap into existing sewer is indicated. The Engineer shall be notified at least 24 hours before the pouring of any concrete is to be started, and such pouring shall not be started until the reinforcement has been approved as placed.

3.2.4 Use proper size increasers, reducers, and couplings, where different size or material of pipes and fittings are connected. Reduction of the size of piping in the direction of flow is prohibited.

3.2.5 Install piping pitched down in direction of flow, at minimum slope per plans.

3.2.6 Tunneling: Install pipe under streets or other obstructions that cannot be disturbed, by tunneling, jacking, or a combination of both.

3.3 MANHOLES:

3.3.1 General: Install manholes complete with accessories as indicated. Form continuous concrete or split pipe section channel and benches between inlets and outlet. Set tops of frames and covers flush with finish surface where manholes occur in pavements. Elsewhere, set tops 3 inches above finished grade, unless otherwise indicated.

3.3.2 Place precast concrete manhole sections as indicated, and install in accordance with ASTM C 891.

3.3.3 Construct cast-in-place manholes as indicated.

3.3.4 Provide rubber joint gasket complying with ASTM C 443 at joints of sections.

3.3.5 Apply bituminous mastic coating at joints of sections.

3.4 CATCH BASINS:

3.4.1 Construct catch basins to sizes and shapes indicated.

3.4.2 Set frames and grates to elevations indicated.

3.5 OUTFALLS: Construct outfalls of reinforced concrete which will attain 28-day compressive strength of not less than 3000 psi.

3.6 TAP CONNECTIONS:

3.6.1 Make connections to existing piping and underground structures so that finished work will conform as nearly as practicable to the requirements specified for new work.

3.6.2 Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap, with not less than 6 inches of 3000-psi 28-day compressive-strength concrete.

3.6.3 Make branch connections from side into existing 15 to 18-inch piping by removing section of existing pipe and installing wye fitting into existing piping. Encase entire wye with not less than 6 inches of 3000-psi 28-day compressive-strength concrete.

3.6.4 Make branch connections from side into existing 24-inch or larger piping or to underground structures by cutting opening into existing unit sufficiently large to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall, unless otherwise indicated. On outside of pipe or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

3.6.4.1. Provide concrete that will attain minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

3.6.4.2. Use epoxy bonding compound as interface between new and existing concrete and piping materials.

3.6.5 Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris, concrete, or other extraneous material that may accumulate.

3.7 CLOSING ABANDONED STORMWATER SYSTEMS:

3.7.1 Abandoned Piping: Close open ends of abandoned underground piping that is indicated to remain in place. Provide sufficiently strong closures to withstand hydrostatic or earth pressure that may result after ends of abandoned utilities have been closed.

3.7.1.1. Close open ends of concrete pipe or structures with not less than 8-inch-thick brick masonry bulkheads.

3.7.1.2. Close open ends of other piping with plastic plugs, or other acceptable methods suitable for size and type of material being closed. Wood plugs are not acceptable.

3.7.2 Abandoned Structures: Remove structure and close open ends of the remaining piping or remove top of structure down to not less than 3 feet below final grade; fill structure with stone, rubble, gravel, or compacted dirt, to within 1 foot of top of structure remaining, and fill with concrete.

3.8 FIELD QUALITY CONTROL:

3.8.1 Testing: Perform testing of completed piping in accordance with local authorities having jurisdiction. All sampling and testing shall be conducted by a testing laboratory under the direction of a Professional Engineer, licensed in the State of Florida, at the contractor's expense. Submit test results directly to the Engineer. The following tests shall be taken:

3.8.1.1. 28-day compressive test of concrete, minimum of three test cylinders per 50 cubic yards of concrete poured.

3.8.1.2. Air content, minimum one test for each day's pour.

3.8.1.3. Slump test, minimum one test for each day's pour.

3.8.1.4. Contractor shall replace materials removed for testing purposes.

3.8.1.5. Should any work or materials fail to meet the requirements set forth in the plans and specifications, contractor shall pay for retesting of same.

3.8.2 Cleaning: Clear interior of piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.

3.8.2.1. In large, accessible piping, brushes and brooms may be used for cleaning.

3.8.2.2. Place plugs in ends of uncompleted pipe at end of day or whenever work stops.

3.8.2.3. Flush piping between manholes, to remove collected debris.

3.8.3 Interior Inspection: Inspect piping to determine whether line displacement or other damage has occurred.

3.8.4 Make inspections after pipe between manholes has been installed, cleaned and approximately 2 feet of backfill is in place, and again at completion of project. Each section of pipe between structures is to show from either end on examination, a full circle of light. Each appurtenance to the system shall be of the specified size and form, to neatly and substantially constructed, with the top set permanently to exact position and grade.

If inspection indicates poor alignment, debris, displaced pipe, infiltration, or other defects, correct such defects and reinspect. All repairs shown necessary by the inspections are to be made, broken or cracked pipe replaced, all deposits removed and the pipe left true to line and grade as herein specified, or shown on the plans, entirely clean and free from abnormalities and ready for use.

3.8.5 Limits of Infiltration and Methods of Testing: The allowable limit of groundwater infiltration for the entire system of new stormwater systems or any one trunk, or interceptor shall be in complete accordance with ASTM C425-71T and shall not exceed a limit of infiltration equal to 0.2 gal/inch diameter/hour/100 linear feet of pipe.

3.8.5.1. The test will be made by measuring the infiltrated flow of water over a measuring weir set up in the invert of the sewer, or by an alternate method approved by the Engineer, a known distance from a temporary bulkhead or other limiting point of infiltration. After the sewer or sewers have been pumped out, and normal conditions prevail, tests shall be started.

3.8.5.2. Tests shall be run continuously for a period of not less than three(3) hours, with weir readings taken at 20 minute intervals. The tests shall be made by the Contractor. The Engineer shall be notified 24 hours in advance. Where infiltration occurs in excess of the specified amount, the defective pipe or joints shall be located and repaired at the expense of the Contractor. If the defective portions cannot be located, the Contractor, at his own expense, shall remove and reconstruct as much of the original work as necessary to obtain a sewer within allowable infiltration limits upon such retesting as necessary.

3.8.6 Clean-up: Before final inspection and acceptance, the Contractor shall clean ditches, shape shoulders and restore all disturbed areas, including street crossings, grass plots, to as good as condition as existed before work started. All trenches shall be leveled and loose material removed from pavement gutters, sidewalks, pipe lines, and inlet sediment traps, employing hand labor, if necessary.

3.9 MEASUREMENT AND PAYMENT: No additional payment shall be made for the work hereinbefore specified. The Contractor's unit price or lump sum bid as set forth in the PROPOSAL shall constitute full compensation for the work involved for each item.

END OF SECTION 02500

SECTION 02511
PAVEMENT PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: Drawings and general provisions of Contract apply to work of this section.

1.2 DESCRIPTION OF WORK: Work shall include patching of existing pavement removed.

PART 2 - MATERIALS

2.1 GENERAL: Use locally available materials and gradations which exhibit a satisfactory record of previous installations. Materials shall comply with FDOT Standard Specifications for Road and Bridge Construction, latest Edition.

PART 3 - EXECUTION

3.1 PREPARATION: Prior to patching pavement, fully compact trench by tamping or other approved means. Backfill trench with materials acceptable to the Engineer and compact in accordance with FDOT Section 120.

3.2 PLACING BASE:

3.2.1 General: Place and compact base to thickness indicated as directed by applicable FDOT sections listed below:

3.2.2 Asphalt Base Course: FDOT Section 280 & 330, minimum 6" thick.

3.2.3 Placing Surface Course: Comply with requirements of FDOT Section 330 & 334 for single application of Superpave asphalt concrete.

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3.2.4 Erect barricades to protect from traffic for 48 hours.

3.3 MEASUREMENT AND PAYMENT:

3.3.1 Pavement Patching shall be measured for payment in square yards or by lump sum only for areas indicated on the plans, or as provided in the proposal and contract.

3.3.2 When not listed as a separate contract pay item, pavement patching shall be considered as incidental work, and the cost thereof shall be included in such contract pay items as are provided in the proposal contract.

3.3.3 Compensation, whether by contract pay item or incidental work will be for furnishing all materials, labor, equipment, tools and incidentals required for the work, all in accordance with the plans and these specifications.

END OF SECTION 02511

SECTION 02512
BASE COURSE

1.1 SCOPE OF WORK

This section covers materials and construction for a crushed stone base, composed of limerock, for flexible pavements.

1.2 MATERIALS

The limerock material shall meet the requirements of this section. At the Contractor's option, limerock of either Miami, Ocala, or Greater Bahama formation may be used, but limerock of only one formation may be used on any contract. (Limerock may be referred to hereinafter as "rock".)

A. Composition. The minimum percentage of carbonates of calcium and magnesium in the rock material shall be seventy (70). The maximum percentage of water-sensitive clay mineral shall be three (3).

B. Liquid Limit and Plasticity. The liquid limit shall not exceed 35 and the plastic index shall not exceed 10.

C. Mechanical Requirements.

1. Deleterious Material. Limerock material shall not contain cherty or other extremely hard pieces, or lumps, balls or pockets of sand or clay size material in sufficient quantity as to be detrimental to proper bonding, finishing or strength of the rock base.

2. Gradation and Size Requirements. At least 97% (by weight) of the material shall pass a 1 1/2" sieve and the material shall be graded uniformly down to dust. The fine material shall consist entirely of dust of fracture. All crushing or breaking up which might be necessary in order to meet such size requirements shall be done prior to placing the material on the road.

D. Limerock Bearing Ratio (LBR) Requirements. Rock material used in construction of rock base shall have an average LBR value of not less than 100. The average LBR value of material produced at a particular source shall be determined in accordance with approved quality control procedures.

1.3 EQUIPMENT

The rock shall be spread by mechanical rock spreaders, equipped with a device which strikes off the rock uniformly to laying thickness and capable of producing an even distribution of the rock. For crossovers, intersections and ramp areas; for roadway widths of twenty (20)

feet or less; for the main roadway area when forms are used and for any other areas where the use of a mechanical spreader is not practicable; spreading may be done by bulldozers or blade graders.

1.4 TRANSPORTING AND SPREADING

A. The rock shall be transported to the point where it is to be used, over previously placed rock if practicable, and dumped at the end of the preceding spread. Hauling over the subgrade and dumping on the subgrade will be permitted when, in the Engineer's opinion, these operations will not be detrimental to the base.

B. The rock shall be spread uniformly with equipment as specified above. All segregated areas of fine or coarse rock shall be removed and replaced with properly graded rock.

C. When the specified compacted thickness of the base is greater than six inches, the base shall be constructed in two courses. The thickness of the first course shall be approximately one-half the total thickness of the finished base or enough additional to bear the weight of the construction equipment without disturbing the subgrade.

1.5 COMPACTION

A. Single-Course Bases. For single-course base, after the spreading is completed the entire surface shall be scarified and then shaped so as to produce the required grade and cross section after compaction.

B. Double-Course Bases. For double-course base, the first course shall be cleaned of foreign material and bladed and brought to a surface cross section approximately parallel to that of the finished base. Prior to the spreading of any material for the upper course, the density tests for the lower course shall be made and the Engineer shall have determined that the required compaction has been obtained. After the spreading of the material for the second course is completed, its surface shall be finished and shaped so as to produce the required grade and cross section after compaction, and free of scabs and laminations.

C. Moisture Control. When the material does not have the proper moisture content to insure the required density, wetting or drying will be required. When water is added it shall be uniformly mixed-in by disking to the full depth of the course which is being compacted. Wetting or drying operations shall involve manipulation, as a unit, of the entire width and depth of the course which is being compacted.

1.6 DENSITY

The laboratory dry-density of the rock shall be a minimum of 130 lbs/ft^3. As soon as proper conditions of moisture are attained, the material shall be compacted to a density of not less

than 98% of maximum density as determined by AASHO T180.

1.7 TESTING OF SURFACE

The finished surface of the base course shall be checked with a template cut to the required crown and with a fifteen (15) foot straightedge laid parallel to the center line of the road. All irregularities greater than 1/4" shall be corrected by scarifying and removing or adding rock as required, after which the entire area shall be recompacted as specified. In testing the surface the measurements will not be taken in small holes caused by individual pieces of rock having been pulled out by the grader.

1.8 PRIMING

The prime coat shall be applied only when the base meets the specified density requirements and the moisture content in the top half of the base does not exceed 90% of the optimum moisture of the base material. At the time of priming, the base shall be firm, unyielding and in such condition that no undue distortion will occur.

1.9 THICKNESS REQUIREMENT

Thickness of the base shall be measured at intervals of not more than 200 feet. Measurement shall be taken at various points on the cross section, through holes not less than three inches in diameter. If the compacted thickness is deficient by more than 1/2" from the thickness called for in the plans, the Contractor shall correct such areas by scarifying and adding rock. The base shall be scarified and rock added for a distance of 200 feet in each direction from the edge of the deficient area. The affected areas shall then be brought to the required state of compaction and the required thickness and cross section.

1.10 PAYMENT

The cost of this work shall be paid for at the unit price bid per square yard of base, completed and accepted, and shall include the furnishing of all work, labor, materials, equipment and tools necessary to complete the base as planned.

END OF SECTION 02515

SECTION 02513
SUPERPAVE ASPHALT CONCRETE PAVEMENT

PART 1 – GENERAL

1.1 GENERAL:

1.1.1 Construct a Type SP Asphalt pavement for local agencies using the type of mixture specified in the Contract, or when offered as alternates, as approved.

1.1.2 All references to the Engineer shall mean the Engineer of Record.

1.1.3 The Engineer will accept the work based on one of the following methods as described in Part 4: 1)Certification, 2) Certification and process control testing by the Contractor, 3) acceptance testing by the Engineer or 4) other method(s) as determined by the Contract.

1.1.4 GENERAL EXCEPTIONS: Any reference to FDOT Standard Specification for Road and Bridge Construction (latest edition) Division I General Requirements & Covenants shall be excluded and not applicable to any specification referred herein, or otherwise listed in this document.

1.2 LAYER THICKNESSES:

1.2.1 Use only fine graded Type SP asphalt mixes. Fine graded mixes are defined as having a gradation that passes above the restricted zone when plotted on an FHWA 0.45 Power Gradation Chart.

1.2.2 FINE MIXES: The allowable structural layer thicknesses for fine Type SP Asphalt Concrete mixtures are as follows:

Type SP 9.5 .....3/4 – 1 1/4 inches
Type SP 12.5 .....1 1/4 – 2 1/2 inches
Type SP 19.0 .....2- 2 3/4 inches

In addition to the minimum and maximum thickness requirements, the following restrictions are placed on fine mixes when used as a structural course:

1.2.2.1 Type SP 9.5 - Limited to the final (top) structural layer, one layer only

1.2.2.2 Type SP 12.5 - May not be used in the first layer of courses over 3 1/2 inches thick, nor in the first layer of courses over 2 3/4 inches thick on limited access facilities.

Minimum thickness shall be 2 inches installed in two layers. The first layer shall be a minimum 1¼-inches of Type SP 12.5 with asphalt flush with the curb and at curb inlet throat. The thickness of the new pavement may be checked by core samples, where a questionable area is present, as determined by the Engineer. The Contractor shall be required to correct any deficiency either by replacing the full thickness or overlaying the area as directed by the Engineer of Record and accepted by the Owner. The Contractor shall perform an inspection and all base failures shall be corrected prior to asphalt installation.

1.2.2.3 Type SP 19.0 - May not be used in the final (top) structural layer.

1.2.3 ADDITIONAL REQUIREMENTS: The following requirements also apply to fine Type SP Asphalt Concrete mixtures:

1.2.3.1 A minimum 1 1/2 inch initial lift is required over an Asphalt Rubber Membrane Interlayer (ARMI).

1.2.3.2 When construction includes the paving of adjacent shoulders (5 feet wide or less), the layer thickness for the upper pavement layer and shoulder shall be the same and paved in a single pass, unless shown differently in the plans.

1.2.3.3 Use the minimum and maximum layer thicknesses as specified in 1.2.2.2 above unless shown differently in the plans. On variable thickness overbuild layers, the minimum allowable thickness may be reduced by 1/2 inch, and the maximum allowable thickness may be increased 1/2 inch, unless shown differently in the plans.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS:

2.1.1 Meet the material requirements specified in FDOT Standard Specifications Division III. Specific references are as follows:

2.1.1.1 Superpave PG Asphalt Binder or Recycling Agent – Sections 916-1, 916-2
2.1.1.2 Coarse Aggregate, Stone, Slag or Crushed Gravel – Section 901
2.1.1.3 Fine Aggregate – Section 902

2.1.2 Aggregates utilized on this project must be in accordance with FDOT Qualified Products List.

2.2 GRADATION REQUIREMENTS:

2.2.1 Combine the coarse and fine aggregate in proportions that will produce an asphalt mixture meeting all of the requirements defined in this Specification and conform to the gradation requirements at design as defined in Table 2. Aggregates from various sources may be combined.

Table 2
Aggregate Gradation Control Points
(Gradation Design Ranges)

	Type SP Asphalt Mixture (Percent Passing)					
	SP 9.5		SP 12.5		SP 19.0	
Sieve Size	Min.	Max.	Min.	Max.	Min.	Max.
1 inch	-	-	-	-	100	-
3/4 inch	-	-	100	-	90	100
1/2 inch	100	-	90	100	-	
3/8 inch	90	100	-	90	-	-
No. 4	-	90	-	-	-	-
No. 8	32	67	28	58	23	49
No. 200	2	10	2	10	2	8

2.3 RESTRICTED ZONE:

2.3.1 The gradation identified in 2.2 shall pass above the restricted zone specified in Table 3.

Table 3
Aggregate Gradation Restricted Zone
(Design Only)

Sieve Size within Restricted zone	Boundaries of Restricted zone					
	Type SP Asphalt Mixture (Percent Passing)					
	SP 9.5		SP 12.5		SP 19.0	
	Min.	Max.	Min.	Max.	Min.	Max.
No. 4	-	-	-	-	-	-
No. 8	47.2	47.2	39.1	39.1	34.6	34.6
No. 16	31.6	37.6	25.6	31.6	22.3	28.3
No. 30	23.5	27.5	19.1	23.1	16.7	20.7

2.4 AGGREGATE CONSENSUS PROPERTIES:

2.4.1 Meet the following consensus properties at design for the aggregate blend:

2.4.1.1 Coarse Aggregate Angularity: When tested in accordance with ASTM D 5821, meet the coarse aggregate angularity requirement defined in Table 4.

Table 4 Coarse Aggregate Angularity Criteria (Minimum Percent Fractured Faces)			
Depth of Top of Pavement Layer From Surface			
≤ 4"		> 4"	
1 or More Fractured Faces (%)	2 or More Fractured Faces (%)	1 or More Fractured Faces (%)	2 or More Fractured Faces (%)
85	80	60	-

2.4.1.2 Fine Aggregate Angularity: When tested in accordance with AASHTO T-304, meet the fine aggregate angularity requirement defined in Table 5.

Table 5 Fine Aggregate Angularity Criteria	
Depth of Top of Pavement Layer From Surface	
≤ 4"	> 4"
Minimum Uncompacted Void Content (%)	Minimum Uncompacted Void Content (%)
45	40

2.4.1.3 Flat and Elongated Particles: When tested in accordance with ASTM D 4791, use a ratio of maximum to minimum dimensions of 5:1 and do not exceed 10% as the maximum amount of flat and elongated particles.

2.4.1.4 Clay Content: When tested in accordance with AASHTO T 176, meet the sand equivalent value for fine aggregate blend defined in Table 6.

Table 6	
Clay Content	
SP Mixes	45

2.5 USE OF RECLAIMED ASPHALT PAVEMENT:

2.5.1 General Requirements: Reclaimed Asphalt Pavement (RAP) may be used as a component material of the asphalt mixture subject to the following:

2.5.1.1 The Contractor assumes responsibility for the design of asphalt mixes which incorporate RAP as a component material.

2.5.1.2 For design purposes, the Contractor assumes responsibility for establishing accurate specific gravity values for the RAP material. This may be accomplished by one of the following methods:

2.5.1.2.1 Calculation of the bulk specific gravity value based upon the effective specific gravity of the RAP, determined on the basis of the asphalt binder content and maximum specific gravity. The Engineer will approve the estimated asphalt binder absorption value used in the calculation.

2.5.1.2.2 Testing of the extracted aggregate obtained through a vacuum extraction or ignition oven extraction.

2.5.1.3 The amount of RAP material used in the mix is not to exceed 50% by weight of total aggregate.

2.5.1.4 Use a grizzly or grid over the RAP cold bin, in-line roller crusher, screen, or other suitable means to prevent oversized RAP material from showing up in the completed recycled mixture.

If oversized RAP material appears in the completed recycled mix, take the appropriate corrective action immediately. If the appropriate corrective actions are not immediately taken stop plant operations.

2.5.1.5 Provide stockpiled RAP material that is reasonably consistent in characteristics and contains no aggregate particles that are soft or conglomerates of fines.

2.5.1.6 Provide RAP, having minimum average asphalt content of 4.0% by weight of total mix. The Engineer may sample the stockpile to verify that this requirement is met.

2.5.2 Binder for Mixes with RAP: Select the appropriate binder based on Table 7. The Engineer reserves the right to change binder type and grade at design based on the characteristics of the RAP binder, and reserves the right to make changes during production. Maintain the viscosity of the recycled mixture within the range of 4,000 to 12,000 poises. Obtain a sample of the mixture for the Engineer within the first 1,000 tons and at a frequency of approximately one per 4,000 tons of mix.

Table 7
Binder Grade for Mixes Containing RAP

% RAP	Asphalt Binder Grade
< 20	PG 67-22
20-29	PG 64-22
≥ 30	Recycling Agent
Note: When a PF 76-22 Asphalt Binder is called for in the Conctract, limit the amount of RAP material used in the mix to a maximum of 15%.	

PART 3 - GENERAL COMPOSITION OF MIXTURE

3.1 GENERAL:

3.1.1 Compose the asphalt mixture using a combination of aggregate (coarse, fine or mixtures thereof), mineral filler, if required, and asphalt binder material. Size, grade and combine the aggregate fractions to meet the grading and physical properties of the approved mix design. Aggregates from various sources may be combined.

3.2 MIX DESIGN:

3.2.1 Design the Type SP asphalt mixture in accordance with AASHTO PP-28, except as noted herein, to meet the requirements of this Specification. Use only previously approved designs. Prior to the production of any Type SP asphalt mixture, submit the proposed mix design with supporting test data indicating compliance with all Type SP asphalt mix design criteria.

The Engineer will consider any marked variations from original test data for a mix design or any evidence of inadequate field performance of a mix design as sufficient evidence that the properties of the mix design have changed, and the Engineer will no longer allow the use of the mix design.

3.2.1.1 Grading Requirements: Meet the gradation design ranges of Table 2.

3.2.1.2 Gyratory Compaction: Compact the design mixture in accordance with AASHTO TP-4. Use the number of gyrations as defined in Table 8.

Table 8
Type SP Design Gyratory Compactive Effort

	$N_{initial}$	N_{design}	$N_{maximum}$
SP Mixes	7	75	115

3.2.1.3 Volumetric Criteria: Use an air void content of the mixture at design of 4.0% at the design number of gyrations (N_{design}). Meet the requirements of Table 9.

Table 9
Mixture Densification Criteria

	% G_{mm}		
	$N_{initial}$	N_{design}	$N_{maximum}$
SP Mixes	≥ 89.0	96.0	≤ 98.0

3.2.1.4 VMA Criteria: Meet the requirements of Table 10 for voids in the mineral aggregate (VMA) of the mixture at the design number of gyrations.

Table 10 VMA Critieria	
Type Mix	Minimum VMA (%)
SP 9.5	15.0
SP 12.5	14.0
SP 19.0	13.0

3.2.1.5 VFA Criteria: Meet the requirements of Table 11 for voids filled with asphalt (VFA) of the mixture at the design number of gyrations.

Table 11 VFA Criteria	
	Design VFA (%)
SP Mixes	65-75

3.2.1.6 Dust Proportion: Use a dust to effective asphalt binder content by weight.

3.2.1.7 Moisture Susceptibility: Provide a mixture (4 inch specimens) having a retained tensile strength ratio of at least 0.80 and a minimum tensile strength (dry and unconditioned) of 100 psi.

3.2.1.8 Additional Information: In addition to the requirements listed above, provide the following information with each proposed mix design submitted for use:

3.2.1.8.1 The design number of gyrations (N_{design}).

3.2.1.8.2 The source and description of the materials to be used.

3.2.1.8.3 The FDOT source number product code of the aggregate components furnished from an FDOT approved source.

3.2.1.8.4 The gradation and proportions of the raw materials as intended to be combined in the paving mixture. The gradation of the component materials shall be representative of the material at the time of use. Compensate for any change in aggregate gradation in handling and processing as necessary.

3.2.1.8.5 A single percentage of the combined mineral aggregate passing each specified sieve. Degradation of the aggregate due to processing (particularly -No. 200 [-75 μm]) should be accounted for and identified for the applicable sieves.

3.2.1.8.6 The bulk specific gravity value for each individual aggregate (and RAP) component as identified in the FDOT aggregate control program.

3.2.1.8.7 A single percentage of asphalt binder by weight of total mix intended to be incorporated in the completed mixture, shown to the nearest 0.1%.

3.2.1.8.8 A target temperature at which the mixture is to be discharged from the plant and a target roadway temperature (per Section 330-6.3, FDOT Standard Specifications for Road and Bridge Construction, Latest Edition). Do not exceed a target temperature of 340°F for modified asphalts and 315°F for unmodified asphalts.

3.2.1.8.9 Evidence that the completed mixture conforms to all specified physical requirements.

3.2.1.8.10 The name of the Mix Designer.

3.3 REVISION OF MIX DESIGN:

3.3.1 During production, the Contractor may request a target value revision to a mix design, subject to: (1) the target change falls within the limits defined in Table 12, (2) appropriate data exists demonstrating that the mix complies with production air voids specification criteria, and (3) the mixture gradation meets the basic gradation requirements defined in 2.2 and 2.3.

Table 12
Limits for Potential Adjustments to Mix Design Target Values

Characteristic	Limit from Original Mix Design
No. 8 Sieve and Coarser	± 5.0%
No. 16 sieve	± 4.0%
No. 30 sieve	± 4.0%
No. 50 sieve	± 3.0%
No. 100 sieve	± 3.0%
No. 200 sieve	± 1.0%
Asphalt Binder Content (1)	± 0.3%

(1) Reductions to the asphalt binder content will not be permitted if the VMA during production is lower than 1.0% below the design criteria.

Submit all requests for revisions to mix designs, along with supporting documentation, to the Engineer. In order to expedite the revision process, the request for revision or discussions on the possibility of a revision may be made verbally, but must be followed up by a written request. The initial mix design will remain in effect until a change is authorized by the Engineer. In no case may the

effective date of the revision be established earlier than the date of the first communication between the Contractor and the Engineer regarding the revision.

A new design mix will be required for any substitution of an aggregate product with a different aggregate code, unless approved by the Engineer.

3.4 PAVING EQUIPMENT:

3.4.1 Mechanical Spreading and Screeding Equipment:

3.4.1.1 General: Provide mechanical spreading and screeding equipment of an approved type that is self-propelled and can be steered. Equip it with a receiving and distribution hopper and a mechanical screed. Use a mechanical screed capable of adjustment to regulate the depth of material spread and to produce the desired cross-section.

3.4.1.2 Automatic Screed Control: For all asphalt courses, placed with mechanical spreading and finishing equipment, equip the paving machine with automatic longitudinal screed controls of either the skid type, traveling stringline type, or non-contact averaging ski type. Ensure that the length of the skid, traveling stringline, or non-contact averaging ski is at least 25 feet. On the final layer of base, overbuild, and structural courses, and for friction courses, use the joint matcher in lieu of the skid, traveling stringline, or noncontact averaging ski on all passes after the initial pass. Furnish a paving machine equipped with electronic transverse screed controls when required by the Contract Documents.

3.4.1.3 Inflation of Tires: When using paving machines equipped with pneumatic tires, the Engineer may require that the tires be ballasted.

3.4.1.4 Screed Width: Provide paving machines on full width lanes that have a screed width greater than 8 feet. Do not use extendable screed strike-off devices that do not provide preliminary compaction of the mat in place of fixed screed extensions. The Contractor may use a strike-off device on irregular areas that would normally be done by hand and on shoulders 4 feet or less in width. When using the strike-off device on shoulders in lieu of an adjustable screed extension, the Contractor must demonstrate the ability to obtain an acceptable texture, density, and thickness.

When using an extendable screed device to extend the screed's width on the full width lane or shoulder by 24 inches or greater, the Engineer will require an auger extension, paddle, or kicker device unless the Contractor provides written documentation from the manufacturer that these are not necessary.

3.4.1.5 Motor Graders: Provide two motor graders for spreading widening courses with prior approval from the Engineer only. Use motor graders that are rated at not less than 6 tons and are self-propelled and power-controlled. Mount them on smooth tread or rib-type tires (no lug types allowed) with a wheel base of at least 15 feet. Equip the front motor grader with a spreader box capable of spreading the mix at the required rate.

3.4.1.6 Rollers:

3.4.1.6.1 Steel-Wheeled Rollers: Provide compaction equipment capable of meeting the density requirements described in these Specifications. In the event that density testing is not required, provide a tandem steel-wheeled roller weighing a minimum of 8 tons for seal rolling, and for the final rolling, use a separate roller with a minimum weight of 8 tons. Variations from these requirements shall be approved by the Engineer.

3.4.1.6.2 Traffic Rollers: Provide compaction equipment capable of meeting the density requirements described in these Specifications. In the event that density testing is not required, provide a self-propelled, pneumatic-tired traffic roller equipped with at least seven smooth-tread, low pressure tires, equipped with pads or scrapers on each tire. Maintain the tire pressure between 50 and 55 psi or as specified by the manufacturer. Use rollers with a minimum weight of 6 tons. Do not use wobble-wheeled rollers. Variations from these requirements shall be approved by the Engineer.

3.4.1.6.3 Prevention of Adhesion: Do not allow the mixture to adhere to the wheels of any rollers. Do not use fuel oil or other petroleum distillates to prevent adhesion. Do not use any method which results in water being sprinkled directly onto the mixture.

3.4.1.7 Trucks: Transport the mix in trucks of tight construction, which prevents the loss of material and the excessive loss of heat. Provide each truck with a tarpaulin or other waterproof cover mounted in such a manner that it can cover the entire load when required. When in place, overlap the waterproof cover on all sides so that it can be tied down.

3.4.1.8 Coring Equipment: Furnish a suitable saw or drill for obtaining the required density cores.

3.4.1.9 Hand Tools: Provide the necessary hand tools such as rakes, shovels, etc., and a suitable means for keeping them clean.

3.5 CONTRACTOR'S PROCESS CONTROL:

3.5.1 Personnel: Provide qualified personnel for sampling, testing and inspection of materials and construction activities. Ensure that qualifications are maintained during the course of sampling, testing and inspection. Construction operations that require a qualified technician must not begin until the Engineer verifies that the technician is on the CTQP (Construction Training Qualification Program) list of qualified technicians. The CTQP lists are subject to satisfactory results from periodic Independent Assurance evaluations.

3.5.2 Calibration of the Gyratory Compactor: Calibrate the Gyratory Compactor in accordance with the manufacturer's recommendations prior to producing the mixture for any project. Check the height calibration, the speed of rotation, ram pressure and angle of gyration.

3.5.3 Plant Testing Requirements: During the initial production of a mix design, test mix to ensure proper performance and provide results to the Engineer.

3.5.4 Roadway Testing Requirements: Areas that demonstrate concerns of the mix design quality or poor/improper compaction efforts may be subject to coring and testing as seen fit by the Engineer. All tests will be performed at the contractor's expense.

3.5.5 Extraction Gradation Analysis: Sample the asphalt mixture at the plant and perform extraction test prior to asphalt being delivered to project. The percent asphalt binder content of the mixture will be determined in accordance with FM 5-563 (ignition oven). The gradation of the extracted mixture will be determined in accordance with FM 1-T 030. All test results will be shown to the nearest 0.01. All calculations will be carried to the nearest 0.001 and rounded to the nearest 0.01. All results to be provide to the Engineer prior to placement of asphalt on any project. Run an extraction gradation analysis on the mixture at a minimum frequency of once per 1,000 tons or a maximum of four consecutive days of paving, which ever comes first. The target gradation and asphalt content will be as shown on the mix design. Any changes in target will require a change in the mix design in accordance with 3.3.

If the percentage of asphalt binder deviates from the optimum asphalt binder content by more than 0.55%, or the percentage passing any sieve falls outside the limits in Table 13, immediately resample the mix and test to validate the previous test result, and if needed, make the necessary correction. If the results for two consecutive tests deviate from the optimum asphalt binder content by more than 0.55%, or exceed the limits in Table 13 for any sieve, notify the Engineer and take immediate steps to identify and correct the problem, then resample the mix. If the results from this test deviate from the optimum asphalt binder content by more than 0.55%, or exceed the limits in Table 13 for any sieve, stop plant operations until the problem has been corrected.

Table 13 Tolerances for Quality Control Tests (Extraction Gradation Analysis)	
Size	Percent Passing
1 inch	7.0
3/4 inch	7.0
1/2 inch	7.0
3/8 inch	7.0
No. 4	7.0
No. 8.	5.5
No. 16	5.0
No 30	4.5
No. 50	4.5
No. 100	3.0
No. 200	2.0

3.5.6 Volumetric Control: During production of the mix, monitor the volumetric properties of the Type SP asphalt mix with a Type SP Gyratory Compactor to determine the air voids, VMA, VFA, and dust-to effective asphalt binder ratio (dust proportion) at N_{design}. Take appropriate corrective actions in order to maintain an air void content at N_{design} between 3.0 and 5.0% during production. When the air void content at N_{design} drops below 2.5 or exceeds 5.5%, stop plant operations until the appropriate corrective actions are made and the problem is resolved to the satisfaction of the Engineer. Evaluate any failing material in accordance with Part 5.

Determine the volumetric properties of the mixture at a minimum frequency of once per production day when the daily production is less than 1,000 tons. If the daily production exceeds 1,000 tons, monitor the volumetric properties two times per production day. During normal production, volumetric properties of the mixture will not be required on days when mix production is less than 100 tons. However, when mix production is less than 100 tons per day on successive days, run the test when the accumulative tonnage on such days exceeds 100 tons.

Testing required for volumetric property determination includes AASHTO TP-4, FM 1-T 209, FM 5-563 and FM 1-T 030. Prior to testing samples in accordance with AASHTO TP-4 and FM 1-T 209, condition the test-sized sample for one hour at the compaction temperature in a covered container.

3.5.7 Plant Calibration: At or before the start of mix production, perform an extraction gradation analysis of the mix to verify calibration of the plant. The sample tested at the start of any project may be utilized for this requirement.

3.5.8 Process Control of In-Place Compaction: Develop and implement a method to control the compaction of the pavement and ensure its compliance with the minimum specified density requirements. The Engineer may require the use of a nuclear gauge to test areas suspected of not having proper compaction. Testing will be performed at the contractor's expense. Other density measuring devices may be used in lieu of the nuclear density gauge, provided that it is demonstrated to the satisfaction of the Engineer that the device can accurately measure the relative level of density in the pavement on a consistent basis.

PART 4 - ACCEPTANCE OF THE MIXTURE

4.1 GENERAL:

4.1.1 The asphalt mixture will be accepted based on one of the following methods as determined by the Engineer and/or Contract Documents:

4.1.1.1 Certification by the Contractor.
4.1.1.2 Certification and Process Control Testing by the Contractor.
4.1.1.3 Acceptance testing by the Engineer.
4.1.1.4 Other method(s) as determined by the Contract.

4.2 CERTIFICATION BY THE CONTRACTOR:

4.2.1 Submit a Notarized Certification of Specification Compliance letter on company letterhead to the Engineer that all material produced and placed on the project was in substantial compliance with these specifications.

4.3 CERTIFICATION AND PROCESS CONTROL TESTING BY THE CONTRACTOR:

4.3.1 Submit a Notarized Certification of Specification Compliance letter on company letterhead to the Engineer that all material produced and placed on the project was in substantial compliance with these specifications, along with supporting test data documenting all process control testing. If so required by the Contract, utilize an Independent Laboratory as approved by the Engineer for the Process Control testing.

4.4 ACCEPTANCE TESTING BY THE ENGINEER:

4.4.1 Acceptance at the Plant: The asphalt mixture will be accepted, with respect to gradation and asphalt binder content, based on the results from the start up test. However, any load or loads of mixture which, in the opinion of the Engineer, are unacceptable for reasons of excessive segregation, aggregates improperly coated, of excessively high or low temperature will be rejected for use in the work.

4.4.1.1 Acceptance Procedures: Control all operations in the handling, preparation, and production of the asphalt mix so that the percent asphalt binder content and the percents passing the No. 8 and No.200 sieves will meet the targets from the mix design within the tolerances shown in Table 14.

Table 14
Tolerances for Acceptacne Tests

Characteristic	Tolerance *
Asphalt Binder Content	± 0.55%
Passing No. 8 sieve	± 5.50%
Passing No. 200 sieve	± 2.00%
*Tolerances for sample size of n=1.	

Calculations for the acceptance test results for asphalt binder content and gradation (percentages passing the No. 8 and No. 200 sieves) will be shown to the nearest 0.01. Calculations for arithmetic averages will be carried to the 0.001 and rounded to the nearest 0.01. Payment will be based on the acceptance of the project by the Engineer.

4.4.2 Acceptance on the Roadway:

4.4.2.1 Density Control: The in-place density of any questionable section of a course of asphalt mix will be evaluated by the use of a nuclear gauge and/or by the testing of 6 inch diameter roadway cores. All tests to be performed at the contractor's expense. The Engineer will not perform density testing on leveling courses, open-graded friction courses, or any course which does not show signs of poor/improper compaction efforts. In addition, density testing will not be performed on the following areas when they are less than 1,000 feet in length: crossovers, intersections, turning lanes, acceleration lanes or deceleration lanes. Compact these courses (with the exception of open graded friction courses) in accordance with the rolling procedure as approved by the Engineer.

4.4.2.1 Acceptance**:** The completed pavement will be accepted with respect to overall ride, overall appearance, and overall yield. Areas of question may be tested with a nuclear gauge or by the testing of the density of the cores, as determined by the Engineer.

4.4.2.3 Additional Density Requirement:

4.4.2.3.1 On shoulders with a width of 5 feet or less, the Engineer will not require density. Compact the pavement in accordance with the rolling procedure (equipment and pattern) approved by the Engineer. Stop the production of the mix if the rolling procedure deviates from the approved procedure.

4.4.2.4 Surface Tolerance: The asphalt mixture will be accepted on the roadway with respect to surface tolerance by the use of a 15ft rolling straight edge. The Engineer will determine if the use of a straight edge is warranted. Unevenness of the course shall not vary more than plus or minus 3/16 inch in 15 feet.

4.5 ADDITIONAL TESTS:

4.5.1 The Engineer reserves the right to run any test at any time for informational purposes and for determining the effectiveness of the Contractor's quality control.

PART 5 - DISPOSITION OF FAILING MATERIAL

Any material that is represented by failing test results will be evaluated to determine if removal and replacement is necessary. Remove and replace any material, if required, at no cost to the Owner. The evaluation will be conducted by the Engineer. If so directed, obtain an engineering analysis, as directed by the Engineer, by an independent laboratory (as approved by the Engineer) to determine if the material can (a) remain in place, for this case the appropriate pay factor will be applied, or (b) be removed and replaced at no cost to the Owner. The analysis will be a signed and sealed report by a Professional Engineer licensed in the State of Florida.

PART 6 - METHOD OF MEASUREMENT

For the work specified under this Section the quantity to be paid for will be the in-place measurement of the area in SY unless otherwise stated in the project plan details. The bid price for the asphalt mix will include the cost of the liquid asphalt or the asphalt recycling agent. There will be no separate payment or unit price adjustment for the asphalt binder material in the asphalt mix.

PART 7 - BASIS OF PAYMENT

Price and payment will be full compensation for all the work specified under this section.

END OF SECTION 02513

SECTION 02556 – WATER DISTRIBUTION AND SERVICE LINES

PART 1 – GENERAL

1.01 General Description Of Work Covered

The Contractor shall furnish and install all pipes, fittings, structures and accessories required for water distribution and/or service lines in accordance with the requirements of the Construction Plans and related Contract Documents.

1.02 Quality Assurance

A. AWWA Standards

Construction materials and methods shall comply with the requirements of the latest published edition of American Water Works Association (AWWA) Standards. Applicable standards include, but may not be limited to, the following:

1	AWWA C104	Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water
2	AWWA C105	Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids
3	AWWA C110, C110a	Gray Iron and Ductile Iron Fittings, 2-inch through 48-inch for Water and Other Liquids
4	AWWA C111	Rubber Gasket Joints for Cast Iron Pressure Pipe and Fittings
5	AWWA C151	Ductile Iron Pipe, Centrifugally Cast in Metal Mold or Sand Lined Molds, for Water or Other Liquids
6	AWWA C153	Ductile Iron Compact Fittings, 3-inch through 12-inch for Water and Other Liquids
7	AWWA C502	Fire Hydrants
8	AWWA C509	Resilient Seated Gate Valves
9	AWWA C550	Protective Epoxy Interior Coatings for Valves and Hydrants
10	AWWA C600	Installation of Ductile Iron Water Main and Appurtenances
11	AWWA C605	Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water
12	AWWA C651	Disinfection of Water Mains
13	AWWA C800	Underground Service Line Valves and Fittings
14	AWWA C900	Polyvinyl Chloride (PVC) Pressure Pipe 4-inch through 12-inch for Water
15	AWWA C901	Polyethylene Pressure Pipe and Tubing 1/2-inch through 3-inch
16	AWWA C907	Polyvinyl Chloride (PVC) Pressure Fittings, 4-inch through 8-inch

B. ASTM Standards

In addition, construction materials and methods shall also comply with the requirements of the latest published editions of the American Society for Testing and Materials (ASTM) Standards, and the National Sanitation Foundation (NSF) Standard 61.

PART 2 – MATERIALS AND EQUIPMENT

2.01 General:

All pipe, fittings and accessories shall be new, and shall be suitable and rated for potable water use.

2.02 Delivery, Storage, And Handling:

Certificates of Compliance with the Specifications shall be required for all materials used on the Project. All materials shall be protected during transportation, storage, handling, and installation to avoid physical damage. All materials shall be stored to prevent physical deterioration due to sun and weather. The Owner/Engineer reserves the right to reject material, which in any way does not meet the requirements of these Specifications.

2.03 Water Mains

A. Polyvinyl Chloride Pipe (PVC)

PVC pipe shall meet AWWA Standard C900 or C905, or ASTM Standard D2241, with minimum designations per Table 2.3.1 below. PVC pipe shall be provided with push-on or insert-lock-type joints with the bell integrally cast into the pipe. PVC pipe shall be installed with elastomeric gaskets meeting ASTM Standard F477.

TABLE 2.3.1 - PVC PIPE STANDARDS

Standard	Nominal Size	Dimension Ratio	OD	Pressure Class (psi)	Pressure Rating (psi)
AWWA C900	4-inch thru 12-inch	DR25	CI	100	(165)*
AWWA C905	14-inch thru 36-inch	DR25	CI	(100)*	165
ASTM D2241	2-inch thru 3-inch	SDR26	IP	(95)*	160

*Pressure class and rating designations shown in parentheses are nominal designations.

1. Markings

PVC pipe shall be marked to indicate the following:

a. Nominal Pipe Size and OD Base
b. Material Code Designation
c. Dimension Ratio
d. Pressure Class or Pressure Rating
e. Manufacturer's Name or Trademark
f. National Sanitation Foundation Approved Marking
g. Appropriate AWWA or ASTM Standard Number

2. Color-Coding

PVC water pipe shall be color-coded blue in accordance with AWWA Standards and FDEP Rule 62-555.321(21)(b)3., F.A.C. If blue pigmented pipe is not available, white pipe may be substituted subject to the approval of the Director of Engineering or his designee. White pipe used for potable water shall be marked with 3 blue stripes (1/2 inch wide) in permanent ink along the entire length and evenly spaced around the pipe circumference with the word WATER in 3/4-inch letters every 21 inches along each stripe.

B. Ductile Iron Pipe (DIP)

Ductile iron pipe shall meet AWWA Standard C151 and pressure class based on Table 2.3.2 below for design operating pressures of up to 150 psig, installed in Type 3 Trenching conditions. Increase pressure class or bedding class as required by AWWA C151 for surface loads greater than indicated above or operating pressures greater than 150 psi. DIP shall be constructed with push-on joints using rubber gaskets in accordance with AWWA Standard C111. Other methods of joint construction, such as mechanical, flanged, or ball-and-socket, may be required in special applications as appropriate. DIP shall be lined in accordance with AWWA Standard C104, unless otherwise specified and approved.

TABLE 2.3.2 - DI PRESSURE CLASSES

Diameter	Class	Max. Depth of Bury
3-inch & 4-inch	350	32 feet
6-inch & 8-inch	350	28 feet
10-inch & 12-inch	350	14 feet
14-inch thru 20-inch	250	10 feet
24-inch thru 64-inch	200	8 feet

1. Markings

Each ductile iron pipe section shall be marked to indicate the weight class or nominal thickness, and casting period. The manufacturer's mark, country where cast, year in which the pipe was produced, and the letters DI or DUCTILE shall be cast or stamped on the pipe. All required markings shall be clear and legible, and all cast marks shall be on or near the bell. All letters and numerals on pipe sizes 14-inch and larger shall be not less than 0.5-inch in height.

All DIP and fittings shall be color coded blue in accordance with FDEP Rule 62-555.320(21)(b)3., F.A.C.

2. Soil Corrosion Protection Encasement

When required, DIP shall be encased in plastic sheet material in accordance with AWWA Standard C105 as stated on project plans/specifications if applicable.

C. Polyethylene Pipe (PE)

The pipe supplied under this specification shall be high performance, high molecular weight, high-density polyethylene pipe and shall conform to ASTM D1248 (Type III C, Class C, Category 5, p34). Minimum cell classification values shall be 345434C as referenced in ASTM D3350 - latest edition. 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. The fittings shall be molded or manufactured from a polyethylene compound having a cell classification equal to or exceeding the compound used in the pipe. To insure compatibility of polyethylene resins, all fittings supplied under this specification shall be of the same manufacturer as the pipe being supplied.

See Table 2.3.3 for typical physical properties of PE pipe.

TABLE 2.3.3 - TYPICAL PHYSICAL PROPERTIES OF PE PIPE			
Property	Test Method	Unit	Value
Density	ASTM D1505	gms/cc	0.957
Melt Flow	ASTM D 1238 (190/21.60)	gms/ 10 min.	1.5
Environmental Stress Cracking Resistance Condition A, B & C, F_0 Compressed Ring, F_0	 ASTM D1693 Proposed ASTM	 hrs. hrs.	 >5000 >5000
Tensile Strength, Ultimate Type IV Specimen	ASTM D 638 (2"/min.)	psi	5000
Tensile Strength, Yield Type IV Specimen	ASTM D 638 (2"/min.)	psi	3500
Elongation at Break Type IV Specimen	ASTM D 638 (2"/min.)	%	>600
Impact Strength Specimen Thickness 0.125 inch	ASTM D 256 Method A	ft.lbs./inch notch	>12
Vicat Softening Temperature	ASTM D 1525	°F	257
Brittleness Temperature	ASTM D 746	°F	<-180
Flexural Modulus	ASTM D 3350	psi	125,000
Hardness	ASTM D 2240	Shore D	65
Coefficient of Linear Thermal Expansion Molded Specimen Extruded Pipe	ASTM D 696	in./in./ °F	 $8.3x10^{-5}$ $1.2x10^{-4}$
Thermal Conductivity	Dynatech-Colora Thermoconductor	TRU, in./ $ft.^2$/hrs./ °F	2.7
Long Term Strength 73°F 140°F	ASTM D 2837	 psi psi	 1600 800
Material Cell Classification	ASTM D 3350		355434C
Material Designation	PPI		PE 3408

1. Quality Control

   The resin used for manufacture of the pipe shall be manufactured by the pipe manufacturer, thus maintaining complete control of the pipe quality. The pipe shall contain no recycled compound except that generated in the manufacturer's own plant from resin of the same specification and from the same raw material. The pipe shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, or other deleterious defects, and shall be identical in color, density, melt index, and other physical properties.

   Approved manufacturers shall be Driscopipe, Plexco and CPS; others as approved by Engineer in writing.

   The Engineer may request, as part of the quality control records submittal, certification that the pipe produced is represented by the quality assurance testing. Additionally, test results from manufacturer's testing or random manufacturer's representation, may be cause for rejection of pipe represented by the testing. These tests may include density and flow rate measurements from samples taken at selected locations within the pipe wall and thermal stability determinations according to ASTM D 3350, 10.1.9.

2. Verification

The owner or the specifying engineer may request certified lab data to verify the physical properties of the materials supplied under this specification or may take random samples and have them tested by an independent laboratory.

3. Rejection

Polyethylene pipe and fittings may be rejected for failure to meet any of the requirements of this specification.

4. Pipe Dimensions

Pipe supplied under this specification shall have a nominal DIPS (Ductile Iron Pipe Size) O.D. unless otherwise specified. Pipe shall have a SDR (Standard Dimension Ratio) of 11 unless otherwise specified.

5. Color-Coding

HDPE water pipe shall be color-coded with blue striping or have an integral, extruded blue coating in accordance with FDEP Rule 62-555.320(21)(b)3., F.A.C.

D. Alternate Pipe Materials

Engineer may consider other pipe materials as appropriate for the needs of the Project. Alternate pipe materials identified during design and approved for use on the Project shall be noted on the Construction Plans, and a detailed Technical Specification shall be prepared and included in the Contract Documents.

2.04 Water Main Appurtenances

A. Water Main Fittings

Water main fittings shall include Tees, Wyes, Bends, Reducers, and other appurtenances commonly used in pipe construction. Fittings shall meet AWWA Standard C110 or C153 with pressure ratings of not less than that specified for adjacent pipe. Fittings shall be constructed with mechanical joints, unless otherwise specified, and shall be supplied complete with low alloy bolts and nuts, EPR gaskets and other necessary parts required for field assembly. Fittings shall be cement-mortar lined in accordance with AWWA Standard C104/A21.4.

1. Pipe Couplings

Pipe couplings shall be solid sleeve type with mechanical joints at each end containing a compression gasket. Couplings shall be ductile iron, 12 inches minimum in length, with low alloy bolts and nuts, and EPR gaskets. Rings and gaskets shall be sized to conform exactly to the requirements of the pipe manufacturer.

2. Pipe Cut-in Sleeves

Cut-in sleeves shall be solid ductile iron, one end plain for insertion to female fitting, the other end flanged mechanical joint, furnished with loose attaching flange and fastener, nominal length of 20-21 inches. Specify pipe main size and type of pipe fabrication.

Approved Manufacturers

Manufacturer	Model	Application
Clow	F-1220	for centrifugally cast or sand cast pipe (special)
Clow	F-3459	for all classes of centrifugally cast pipe
Union Foundry	21-4520 21-4610 24-4800	MJ X PE FLG X PE MJ X FLG
Clow	F-3459	for all classes of centrifugally cast pipe
Others as approved by Engineer in writing.		

3. Repair Clamps

Repair clamps shall not be used in the installation of new pipe except with the written permission of the Engineer. Repair clamps shall be full circle and selected based on Table 2.4.1.3 below.

TABLE 2.4.1.3 - REPAIR CLAMP SIZES	
Pipe Diameter	Maximum Sections
Up to 12-inch	Single Section
14-inch to 24-inch	Double Section
26-inch and above	Triple Section

Repair clamps shall be composed of stainless steel bands and bolts, DI lugs and full gridded virgin EPR compounded gasket.

Repair clamps shall be sized so that the OD of the existing pipe being repaired falls within the designated range for the clamp size. Repair clamps shall have ample length to give full gasketing at both ends.

Approved Manufacturers

Manufacturer	Model
Ford	F1, FS1 (all SS), Fordflex (SS-DI Lugs)
Smith Blair	2XX*
JCM	101,102,103,104,131,132,133,134
Mueller	520, 530
Others as approved by Engineer in writing.	

*XX: See Mfr.'s catalog to complete model numbers by size.

4. Pipe Restraints

Joint restraints shall be used in conjunction with all water line pipe, fittings and appurtenances. Joint restraints shall be used on pipe and fittings in each direction in accordance with the Standard Details on drawings. Restraints shall have set or anchor screws used to secure body to pipe with torque limit break away head design. Stainless steel all-thread tie rods may be used at flanges with permission of the Engineer.

Approved Manufacturers

Manufacturer	Model
EBAA Iron Works	MegaLug Series 1100, 1500, 2000, 2500, 3000, 3600, 6500
Ford	UNI-Flange UAI, UBI, UI, 1300, 1340, 1390, 1400
JCM Industries	Sur-Grip Restrainers No. 620, 621
Others as approved by Engineer in writing.	

5. Expansion Joints

Expansion joint fittings shall be used where specified on the Construction Plans. They shall be of the rigid or flexible type as specified, and manufactured of ductile iron in accordance with 2.04-A above. They shall be capable of expanding or contracting to the extent shown on the plans, but in no case less than 4-inch axially, and designed to prevent separation beyond the maximum extension without the use of external tie rods.

Fittings shall be flanged or provided with restrained mechanical joints, individually pressure tested to a minimum of 350 psi against their own restraints, and internally coated on all exposed surfaces with a minimum of 15 mils. of fusion bonded epoxy conforming to AWWA C213. They shall be capable of deflecting not less than 15º by means of an integral ball at each joint in the case of flexible types.

Approved Manufacturers

Type	Manufacturer	Model
Rigid	EBAA Iron, Inc.	EX-TEND 200
Flexible	EBAA Iron, Inc.	Flex-Tend
Others as approved by Engineer in writing.		

6. Tapping Sleeves

Tapping sleeves shall be designed for a working pressure of 200 psig without leakage. Tapping sleeves shall be stainless steel. The outlet branch connection shall have a recessed flanged face for connection of tapping valve with standard dimensions in accordance with Manufacturer's Standardization Society (MSS) SP-60. A complete set of neoprene or other elastomer gaskets shall be furnished. Sleeves shall be furnished to fit cast iron, cement-asbestos, or Class 160 or C900/905 PVC pipe with side connection as shown on plans or specifications in standard pipe sizes of 4-inch X 4-inch through 16-inch X 12-inch. Sleeves shall be furnished with all necessary installation parts such as mechanical joint loose flange ends, bolts, fasteners, seals and gaskets. Refer to Section 2.04-B-2 for Tapping Valve requirements.

Approved Manufacturers

Manufacturer	Main Material	Model
Clow	CI & C900 PVC Class 50, 100, 150, 200 10-inch & 12-inch Class 50, 100	F-5205 F-5207 4 F-5205
American Darling	CI & C900 PVC CI & CA	2800C 2800A
Ford		FAST A
Mueller	CI, DI - 4-inch - 12-inch CA - 4-inch - 8-inch CI Class C & D - 10-inch - 14-inch CA - 4-inch-12-inch	H615 H615 H616 H619
JCM Industries		432
Smith-Blair		662
Others as approved by Engineer in writing		

Note: To specify exact fitting when ordering, state line diameter and line material.

7. Pipe Hangers and Supports

Hangers and supports shall be in compliance with Federal Specification WW-H-171E, or MSS SP-69, or UL listed. Materials of construction shall be in accordance with the requirements outlined in Table 2.4.1.7 below.

TABLE 2.4.1.7 - PIPE HANGERS AND SUPPORTS MATERIALS OF CONSTRUCTION	
Part I.D.	Material
Clamps	Steel - Epoxy Coated or Galvanized Cast Iron – Galvanized Malleable Iron
Hanger Rods	Steel - Electro Galvanized Steel - Stainless 304
Roller Bases/Roller Stands	Cast Iron
Fasteners/Fittings	Galvanized Steel Stainless
Hanger Rod Inserts	Steel: Cadmium Plated Steel: Galvanized Universal Concrete Insert - Cast Iron - Galvanized
Rod Attachments	Clevis - Forged Steel Turnbuckle: 1) Forged Steel, 2) Malleable Iron Sockets, Eye Nuts, Extension - Malleable Iron
Roller Bases/Roller Stands	Cast Iron
Rollers	Steel or Iron Core, Insulated from Structure

Approved Manufacturers

Manufacturer	Part I.D.	Model No.
Utility Pipe Products	Clevis Hanger	590
	Socket Clamp	224 246
	Concrete Inserts: CB-Universal Screen Insert	 282 152
	Rod Attachments: Eye Nut Forged Clevis Forged Turnbuckle Carbon Steel Couplings Socket Eye Extension	 290 299 230 233 136 110R 157
	Pipe Rolls: Adjustable Swivel Adjustable Steel Yoke	 174 181
	Pipe Roll with Base	274
	Pipe Roll and Plate	277
Others as approved by Engineer in writing.		

B. Valves

All valves shall be manufactured in accordance with the current appropriate AWWA Standard and shall be NSF approved for use in potable water.

1. Resilient Seated Gate Valves

Resilient seated gate valves shall be designed and fabricated in accordance with the current AWWA Standards. The basic design of the gate valves shall have an iron body, elastomer encapsulated iron disc, bronze stem and operating nuts with non-rising stem design. Valves 16-inches and larger shall be equipped with right angle gears (bevel gearing) for horizontal installation, and shall be equipped with rollers, tracks and scrapers.

The valve working pressure for all sizes shall be a minimum of 200 psig with a test pressure of 400 psig.

a. General Materials and Construction

Valves shall open counterclockwise with a 2-inch square iron operating nut secured to the valve stem by a corrosion resistant nut to threads on the valve stem. The valve stem shall be made of high tensile strength bronze and shall be of one-piece construction sealed by O-Rings. The thrust collar shall be secured in place by a stuffing box or bonnet cover with a thrust washer located above the thrust collar. Valve construction shall be so that upper O-Rings can be replaced with the valve in service. The disc shall be cast iron encapsulated with an elastomer material bonded in accordance with ASTM D429 and shall be secured to the threaded stem by a bronze nut. The disc shall affect a seal that is bubble-tight at 200 psig.

b. Body - Disc - Bonnet - Operating Nut Material

Cast iron construction in accordance with current AWWA Standard C509; (or) Cast ductile iron construction in accordance with current AWWA Standard C515 and AWWA Standard C153.

c. Corrosion Resistant Coatings

All interior and exterior cast iron surfaces shall be coated with fusion bonded epoxy in accordance with AWWA Standard C550.

d. Body Sizing

Valve body length shall be per ANSI Standard B16.2 for the type of end connections specified. In the full open position, the valve internal bore shall be smooth and obstruction-free without cavities or projections that could accumulate solids. The internal cross-sectional area of the valve shall be approximately equal to the nominal cross-sectional area for Schedule 40 PVC pipe of the same nominal internal diameter.

e. End Connections

Valves shall be furnished with mechanical joint end connections, complete with flange kits, unless otherwise specified on the plans or purchase order.

When flanged ends are specified they shall be flat face nominal 125# ANSI B16.1 Standard with bolt holes straddling the vertical center line.

Approved Manufacturers

VALVE BODY CONNECTIONS				TAPPING VALVE
Manufacturer	MJ x MJ	MJ x FLG	FLG x FLG	MJ x SF
American Darling (Cast Iron)	4-inch - 12-inch CSR-80X	4-inch - 12-inch CSR-80X	CSR-80X Specify Ends	4-inch - 12-inch No. 862 16-inch - 24-inch*
(Ductile Iron)	4-inch - 24-inch Series 2500 (See Manufacturer's Catalog)			
Clow (Cast Iron)	2-inch - 12-inch F6100	4-inch - 12-inch F-6106	4-inch - 12-inch F-6102	4-inch - 12-inch F-6114 14-inch - 24-inch F-5093*
Kennedy (Cast Iron)	3-inch - 12-inch F-1571-XNRS	3-inch - 12-inch F-1572-XNRS	3-inch - 12-inch F-1561-XNRS	3-inch - 12-inch F-950X
M & H (Cast Iron)	4-inch - 12-inch S-4067-01		4-inch - 12-inch S-4067	2-inch - 12-inch H-667 200 PSI 14-inch - 24-inch H-667 150 PSI
Others as approved by Engineer in writing - Cast iron or ductile iron construction.				

*Metal seated only, specify bypass if required
14-inch and larger valves specify special appurtenances.

f. Horizontal Valve

Horizontal gate valves shall be furnished with a level-gear operator with 2” operating nut.

2. Resilient Seated Tapping (Gate) Valves

Resilient seated gate valves shall be designed and fabricated in accordance with the current AWWA Standard C509 or C515. The basic design of the gate valves shall have a cast iron body, elastomer encapsulated cast iron disc, bronze stem and operating nuts with non-rising stem design. The valve working pressure shall be a minimum of 200 psig with a test pressure of 400 psig.

a. Materials and Construction

Valves shall open counterclockwise with a 2-inch square iron operating nut secured to the valve stem by a corrosion resistant nut to threads on the valve stem. The valve stem shall be made of high tensile strength bronze and shall be of one piece construction sealed by O-Rings. The thrust collar shall be secured in place by a stuffing box or bonnet cover with a thrust washer located above the thrust collar. Valve construction shall be so that upper O-Rings can be replaced with the valve in service. The disc shall be iron encapsulated with an elastomer material bonded in accordance with ASTM D429 and shall be secured to the threaded stem by a bronze nut. The disk shall affect a seal that is bubble-tight at 200 psig.

b. Corrosion Resistant Coatings

All interior and exterior cast iron surfaces shall be coated with fusion bonded epoxy in accordance with AWWA Standard C550.

c. Body Sizing

Valve body length shall be per ANSI Standard B16.1 for tapping valves. Tapping valves shall conform to Specification AWWA C509, latest revision, covering gate valves except as modified for passage and clearance of tapping machine cutters. The opening through the valve shall be at least 1/4-inch larger than nominal valve diameter. Tapping valves shall allow full size shell cutters to be used.

d. End Connections

Valves shall be furnished with one end of the body with projecting face flange in accordance with specification MSS SP-60 for tapping valve/saddle connections to bolt to a standard tapping sleeve and the other end for mechanical joint.

Approved Manufacturers

See Section 2.04-B above.

3. Valve Boxes

Valve boxes shall be provided for all direct buried valves. Use nominal 6-inch cast-iron sliding-type pipe shaft with cover and base casting. The box top shall be set at finished grade and encased with a concrete ring in unpaved areas. Each valve box shall be furnished with a drop-in cover marked “WATER.”

C. Line Stops

Line stops are to be used where specified to temporarily stop water line water flow without depressurizing the entire line. The line stop parts and installation equipment are to be rated at a minimum of 150 psig working pressure unless otherwise specified.

1. Materials and Construction

Tapping saddles shall have 360º clamping on the main. Main sizes 4-inch to 8-inch to be fabricated of 304 Stainless Steel; 10-inch and greater to be fabricated Carbon Steel with epoxy coating. All bolts and fasteners are to be 304 Stainless Steel, and the saddle shall be installed with Buna-N or neoprene rubber full facing gasket.

The stopping device attaching nozzle to be vendor's standard with connecting threads or flange face, and the nozzle I.D. to be machine with a shelf to provide a position stop for the closure plug.

The closure plug is to be fabricated carbon steel, ductile iron, or malleable iron with at least one Buna-N or neoprene O-Ring seal on the outside diameter.

2. Corrosion Resistant Coatings

Non-stainless steel permanently installed parts to have manufacturer's standard red or black water base epoxy coating.

3. Connection

Tapping saddle shall be fabricated with dimensions to fit on concrete, steel, CA, PVC, CI, DI main as specified.

4. Installation

Temporary line stops shall only be installed by vendor personnel or contractor personnel trained and certified for stop by the vendor.

Approved Manufacturers (Main Sizes 3/4-inch to 42-inch)

Manufacturer	Contact	
Hydra-Stop, Inc.	Phone: FAX:	800-538-7867 708-389-5125
International Piping Services Co. (IPSCO)	Phone: FAX:	708-343-1333 708-343-1435
JCM 440	Phone: FAX:	800-527-8482 800-874-9524
Others as approved by Engineer in writing.		

D. Location Aids

All new water main and service line installations shall include an approved method for locating lines from the ground surface after completion.

1. Tracer Wire

Tracer wire for water lines shall be minimum 12-gauge copper with blue PVC insulation. Tracer wire systems shall be electrically continuous covering all mains and services within the project. Wire-to-wire connectors shall be made with silicone-filled wire nuts. Wire-to-appurtenance attachments shall be made with lug-type terminals. Wire shall be secured to the top of each pipe joint with nylon ties or PVC tape placed on 10-foot intervals. Wire shall be secured to pipe with blue colored PVC Tape.

Approved Manufacturers (Tracer Wire Silicone-filled Wire Nut Connectors)

Manufacturer	Model
Ideal Industries	Twister® DB Plus
King Technology, Inc.	Failsafe™
Others as approved by Engineer in writing.	

2. Pipeline Markers

Markers shall be of a passive electronic type that reflects a signal back to an electronic hand-held transmitter/detector. Electronic components shall be enclosed in a blue waterproof polyethylene housing. Markers shall have a different response frequency for each service line type.

Markers shall be ScotchMark® products manufactured by 3M Telecom Systems Group, Austin, Texas. Alternate manufacturers by Engineer in writing.

Application	Usable Depth	Dimension/ Configuration	Service	Model
Near Surface	2 feet	3½"L X 5/8" ∅ Cylinder	Water	1434
Medium Depth	4 feet	4" ∅ Ball	Water	1403
Deep	6 feet	8" ∅ X 1" Thick Disc	Water	1257

2.05 Hydrants And Flushing Equipment

A. Fire Hydrants

Fire Hydrants shall be current design in compliance with the AWWA Standard C502, with rated working pressure of 200 psig. The basic design of the fire hydrant shall be of the dry barrel type of breakaway traffic design.

1. Hydrant Construction

The hydrant inlet connection shall be 6-inch mechanical joint type complete with flange kit.

The hydrant shall be designed with a traffic breakaway feature incorporating a flanged design using breakable bolts and breakaway shaft coupling. Split ring retainer-type breakaway design with pinch bolts is not acceptable. The hydrant design shall allow the upper barrel to be rotated 360 degrees in order to assure proper nozzle orientation.

The drain valve shall assure quick and complete drainage of the hydrant and the drain hole shall be bushed with bronze if passing through cast iron. The drain valve sealing facing shall be made of Buna N, nylon or urethane. If the valve top plate comes in contact with the bronze seat ring to facilitate draining of the hydrant, the valve top plate shall be made of bronze.

2. Main Hydrant Valve

The main hydrant valve shall be compression type, opening counterclockwise against system pressure and closing clockwise with system pressure. The main valve connection opening shall not be less than 5¼-inches. The main valve shall have a resilient seat.

The hydrant shall be designed such that the operating threads on the stem are prevented from coming in contact with potable water and shall be enclosed in an operating chamber and sealed by O-Rings at the top and bottom of the chamber. The chamber shall be constructed for grease or oil lubrication with an installed grease fitting for maintenance.

The operating nut shall be 1½-inches in size and pentagon in shape and of one-piece construction.

The hydrant shall have one 4½-inch pumper nozzle, and two 2½-inch pumper nozzles having National Standard Hose coupling threads. The nozzles shall be field replaceable utilizing either a threaded or quarter-turn fitting with an O-Ring seal.

3. Operation and Maintenance Features

The hydrant shall not incorporate parts requiring field adjustment for proper operation.

The hydrant shall be designed to permit the removal of all working parts from the hydrant through the barrel without disturbing the earth around the hydrant.

Removal of the working parts of the hydrant shall be accomplished by use of a seat. Hydrants requiring other special tools to perform removal of interior parts will not be accepted.

4. Materials

All operating parts including operating nut, hold-down nut, drain ring and seat ring shall be bronze. The valve seat ring shall thread into a bronze insert or drain ring to provide bronze-to-bronze seating. Breakaway stem coupling is to have bronze or stainless steel bolts or pins.

5. Markings

The fire hydrant shall have permanent markings identifying the manufacturer by name, initials or insignia, the size of the main valve opening, and the year of manufacture.

Approved Manufacturers

Manufacturer	Model No
Kennedy	81-A
Mueller	A423
American Darling	B84B
Clow	Medallion
M & H	129T
Others as approved by Engineer in writing.	

B. Fire Hydrant Appurtenances

1. Extension Kits

When specified, hydrants shall be installed using original manufacturer hydrant extension kits as necessary to position the hydrant breakaway above finish grade.

Stand extension shall be in standard lengths of 12, 24, 36, 48, and 60 inches.

2. Hydrant Connectors

Hydrant connector spools shall be ductile iron per AWWA C151 used for connection between the hydrant and lead valve, and shall incorporate joint restraints. One end of the connector spool shall have swivel flange.

a. Standard hydrant connector sizes shall be as follows:

(1) 6-inch X 12-inch long
(2) 6-inch X 24-inch long
(3) 6-inch X 36-inch long
(4) 6-inch X 48-inch long
(5) 6-inch X 60-inch long

b. Hydrant Offset Connectors

When a connector between the hydrant and lead valve specified to adjust hydrant height or to offset the hydrant from the valve, an offset connector shall be used. Material to be ductile iron per AWWA C153/ANSIA2153. Sizes shall be as follows:

(1) 6-inch X 18-inch long with 6-inch offset

(2) 6-inch X 30-inch long with 12-inch offset
(3) 6-inch X 41-inch long with 24-inch offset

Approved Manufacturers

Manufacturer	Straight Hydrant Connector	Offset Connector
Assured Flow Sales, Inc.	N/A	GRADELOK
Clow	✓	N/A
Others as approved by Engineer in writing.		

C. Flushing Hydrants

Flushing hydrants shall be current design and in general compliance with AWWA Standard C502, with rated working pressure of 200 psig.

1. Hydrant Construction

Flushing hydrants shall meet the requirements of Section 2.05-A-1, except breakaway feature is not required.

2. Main Valve

Generally the same as Section 2.05-A-2, except main valve opening shall be not less than 2-1/8 inches and the flushing hydrant shall have one (1) 2½-inch nozzle having national standard hose coupling threads.

3. Operation and Maintenance Features

Unless otherwise specified, the hydrant bury length shall be 36 inches. The bury length is the distance measured to the nearest 1/2 foot, from the bottom of the connecting pipe to the ground line of the hydrant.

4. Materials

All operating parts including operating nut, hold-down nut, drain ring and seat ring shall be bronze. The valve seat ring shall thread into a bronze insert or drain ring to provide bronze-to-bronze seating.

5. Markings

Flushing hydrant markings shall meet the requirements of Section 2.05-A for fire hydrants.

Approved Manufacturers

Manufacturer	Model
Clow	F-4764
M & H	Style 33
Mueller	A-411
Others as approved by Engineer in writing.	

2.06 Water Service Lines

A. Polyethylene (PE) - Tubing
Polyethylene service tubing for water supply shall conform to AWWA C901. PE tubing dimensions shall conform to ASTM D2737 with Copper Tubing OD base. Refer to Section 2.03-C for service lines greater than 2 inches in diameter.

1. Materials

PE tubing material shall conform to ASTM D3350, Standard Code PE 3408.

2. Pressure Rating

PE tubing shall be Pressure Class 200 psi with a minimum working pressure of 150 psig, and comply with ASTM D1598, D1599, D1693, D3350 and AWWA 901.

Dimensions and acceptable standard sizes

TABLE 2.6.1 - PE TUBING DIMENSIONS (DR9)			
NOM	OD	WALL	ID
1	1.125	.137	.851
1½	1.625	.200	1.225
2	2.125	.250	1.625

3. Markings

a. Nominal Size
b. Standard PE Code: 3408
c. Tubing: DR-9
d. Pressure Class: PC200
e. Manufacturer's Name or Trademark
f. Blue Markings and Stripes

Approved Manufacturers

Manufacturer	Model
Phillips	Driscopipe 5100 Ultra-line
Others as approved by Engineer in writing.	

B. Copper Water Service Tubing

Copper water service tubing shall be Type K suitable for underground potable water services. Tracer wire is not required with copper tubing.

1. Material

Tubing is to be supplied in conformance with ASTM B88 for dimension and materials.

2. Pressure Rating

Test Pressure: 200 PSIG
Operating Pressure: 150 PSIG

TABLE 2.6.2 - COPPER WATER TUBING DIMENSIONS (ASTM B88)		
Size (inches)	Nominal OD	Wall Thickness
1	1.125	.065
1½	1.625	.072
2	2.125	.083

3. Pipe Markings

a. Nominal Size
b. Type K
c. ASTM B88
d. Manufacturer’s name or logo
e. NSF seal

A. Fittings and Valves

Fittings and valves shall be manufactured in accordance with AWWA C-800 and be listed and approved by NSF for underground use in potable water service.

1. Material

Fitting and valve bodies, plugs, and compression nuts shall be bronze, copper alloy No. C83600 and meet chemical and mechanical requirements of ASTM B62 or ASTM B584.

Component parts such as fasteners, seals, and packings may be of other materials selected for adequate endurance, corrosion resistance and strength in accordance with AWWA C800.

2. Pressure

Fittings and valves shall be high pressure type for maximum allowable pressure of 150 PSIG, nominal operating pressure 100 PSIG.

3. Thread Specifications

Fittings and valves shall be of materials and fabricated in accordance with appropriate specification:

TABLE 2.7.1 - THREAD SPECIFICATIONS	
Thread Type	Standard
Unified Inch	ANSI/ASME B1.1
General Purpose Pipe	ANSI/ASME B1.20.1
Dryseal	ANSI/ASME B1.20.3

Fittings and valves shall be marked as appropriate with the following information: manufacturer's name or logo; pressure rating; direction of flow; and size.

Pack Joint Couplings - Acceptable Manufacturers		
Type	Manufacturer	Model
Joint Couplings		
Copper or Plastic Tube X MPT	Ford Mueller	C84-XX H-15428-X
Copper or Plastic Tube X FPT	Ford Mueller	C14-XX H-15451-X
Copper or Plastic Tube to Tube	Ford Mueller	C44-XX H-15403-X
Female Copper Pipe (replaces flare nut) X Copper or Plastic Tubing	Ford Mueller	CO4-XX H-15071-X
Others as approved by Engineer in writing.		

[X, XX: See Mfr.'s catalog to complete model numbers by size]

4. Tapping Saddles

Tapping saddles shall be either bronze or cast or ductile iron with shop coat. Saddles used to tap Class 160 PVC pipe shall be designed with mechanical features or stops to prevent over-tightening.

a. Saddle Sizes

1. Main Pipe: 2-inch - 16-inch
2. Tapping valve connections: 1-inch, 1½-inch, 2-inch

Acceptable Manufacturers

Manufacturer	Application	Model
Ford	1-inch tap on PVC/steel OD pipe 1-inch tap on DI and CI Pipe	S-70 and S-90 F-101 and F-202
Mueller		H-105
Smith Blair		313
Others as approved by Engineer in writing		

5. Water Tubing Couplings

Water tubing couplings in sizes 1-inch, 1½-inch, and 2-inch only shall be bronze compression-type, inlet and outlet for PE or copper tubing. Crimp-type couplings are not acceptable.

Acceptable Manufacturers

Manufacturer	Model
Ford	C44-XX*
Mueller	H-15403-XX*
Others as approved by Engineer in writing	

*XX: See Mfr.'s catalog to complete model numbers by size.

6. Meter Couplings

Meter couplings shall be bronze and sized as appropriate to accommodate the relevant meter. Inlet shall have male pipe thread.

Acceptable Manufacturers

Manufacturer	Model
Ford	C84-XX*
Mueller	H-15428-XX*
Others as approved by Engineer in writing	

*XX: See Mfr.'s catalog to complete model numbers by size.

B. Service Line Valves

1. Corporation Stops

Corporation stops shall be brass, high-pressure class, ball type, with inlet taper CC thread. Outlet shall be compression-type for PE or copper tubing. Corporation stops shall be sized for 1-inch, 1½-inch or 2-inch tubing as appropriate.

Acceptable Manufacturers

Manufacturer	Model
Ford	F-1000 and FB-1000
Mueller	300, Ball-type
Others as approved by Engineer in writing.	

2. Curb Stops

Curb stops shall be brass, high pressure, ball-type with locking wings. Inlet shall be compression-type for PE tubing. Outlet shall be female iron pipe threads. Curb stops shall be sized for 1-inch, 1½-inch or 2-inch tubing as appropriate.

Acceptable Manufacturers

Manufacturer	Size	Model
Ford	1-inch 1½-inch 2-inch	B41 - 444W B41 - 666 B41 - 727
Others as approved by Engineer in writing.		

2.08 Backflow Prevention Devices

Backflow prevention devices shall be manufactured in accordance with AWWA C506, and shall also be approved by ASSE and/or approved by NSF for use in potable water systems with a maximum continuous operating pressure of 150 psig, and capable of sustaining a hydrostatic test pressure of 300 psig.

A. Materials and Construction
The body shall be cast iron with hot dip galvanized coating or fusion bonded epoxy on the interior and exterior, or cast bronze with a maximum lead content 5%. Working parts and springs shall be bronze or stainless steel; valve discs shall be silicone rubber; diaphragms shall be fabric reinforced neoprene, and O-rings shall be Buna-N, neoprene, or silicone rubber. Check valve enclosures shall be glass-filled nylon or Teflon, or bronze or stainless steel. Other working parts shall be bronze or stainless steel.

B. Double-check Device
Double-check backflow preventers shall have two independent check valve assemblies. The body may consist of one or more castings, and shall be equipped with ports and valves as necessary to allow testing in place.

C. Reduced Pressure Principle Device
Reduced pressure principle backflow preventers shall have two independent check valves with an intermediate relief valve incorporating a pressure diaphragm valve assembly that maintains a minimum 2 psig differential pressure across the assembly.

D. End Connections
Devices shall be manufactured with standard female pipe thread, size 3/4-inch, 1-inch, 1-1/2-inch, or standard ANSI B16.2 125# flanged, sizes 2-inch and greater.

E. Appurtenances
All back flow devices shall be provided and installed as a complete assembly with all necessary fittings to enable testing in place. Tapped test ports shall be fitted with test petcocks in each body cavity. Inlet and outlet gate or ball valve shall be of the same line size as that of the body.

Acceptable Manufacturers

Manufacturer	Type Device Double Check	Double Check Detector	Reduced Pressure
Ames	2000 DCA OSY 2000 DCA NRS 2000 DCA OSY Epoxy 2000 DCA NRS Epoxy	3000 DCDA OSY 3000 DCDA NRS 3000 DCDA OSY Epoxy 3000 DCDA NRS Epoxy	4000 RP OSY 4000 RP NRS
Febco	850 NRS 850 OSY		860 NRS 860 OSY
Watts	709 OS&Y/BV	709 DDC	909 909 DDC (Detector)
Hersey	3/4" - 2" FDC 3" - 10" No. 2	3" - 10" DDC II	3/4" - 2" FRP II 2½" - 10" 6CM
Others as approved by Engineer in writing.			

2.09 Meter Box Assemblies

Meter box assemblies for 5/8-inch meters shall be cast iron open bottom per ASTM A-48 with cast iron lid. The box assembly shall include a ball valve with locking nuts, pack joint coupling for copper or PE tubing with expansion connection and gaskets as needed. Meter box and cover for meters 2-inch and larger shall be constructed in accordance with the Standard Detail drawings.

Acceptable Manufacturers

Manufacturer	Model	Meter Size
Ford	G148-133 (Modified) w/ 1" pack joint for copper or PE Tubing	5/8"
Others as approved by Engineer in writing.		

PART 3 – EXECUTION

3.01 General

The Contractor shall provide all labor, equipment and materials as required to install all pipes, valves, fittings, and other appurtenances as indicated on the construction plans or as specified in the contract documents.

3.02 Potable Water Line Separation From Gravity Sanitary Sewer, Force Main And Stormwater Lines (FDEP Rule 62-555.314(1) & (2), F.A.C.)

A. When a gravity sewer line, force main or storm water line must cross under a water line with less than 12-inch vertical clearance, one of the following methods may be used.

1. Fully encase sewer line with a minimum of 4 inches of concrete (2500 psi) for a minimum distance of 10 feet either side of the point of crossing, which must be at least 5 feet from a water line joint. If the crossing is other than at right angles, increase the length of encasement so that the end of the encasement will be at least 12 feet from a water line joint.
2. Use equally rated pressure pipe for the sewer lines with no joints closer than 12 feet apart and at least 6-inch vertical clearance.

3. Install sewer pipe into at least a 20-foot section of steel casing (casing I.D. slightly larger than sewer pipe bell O.D.) and center over crossing so that end of casing will be at least 12 feet from water line joint. Seal the ends of the casing with non-shrink grout. Refer to Section 02224 – Pipe Boring, Drilling and Jacking, for casing and boring requirements.

B. When a gravity sewer or storm water line must cross over a potable water line, regardless of clearance, because the water line cannot be relayed above the line, use method 2 or 3 in subsection A. Concrete encasement will not be allowed.

C. When a sanitary or stormwater force main must cross under a potable water line with less than an 12-inch vertical clearance, or over the water line, use a higher rated pressure pipe as in method 2 or 3 in subsection A.

D. When the water line being crossed in A, B or C is a house or building service lateral, 2-inch or smaller and the service lateral is a continuous piece of PE DR9 or copper tubing, then the above rules do not apply; but locate so that the distance to a sewer or force main joint is as great as possible.

E. When a potable water line runs parallel to:

1. And less than 3 feet from a stormwater gravity or pressure pipe.
2. And less than 6 feet from a wastewater gravity or pressure pipe.
3. And less than 10 feet from an onsite septic system.

F. The non-potable water pipeline shall be constructed of AWWA C150 DIP:

1. 4” – 12” Class 350
2. 14” – 24” Class 256
3. 30”+ Class 150.

G. The potable or non-potable pipeline shall have welded, fused or mechanically restrained joints.

H. The potable or non-potable pipeline shall be inside a welded steel casing pipe, or concrete encased as per Part 3.02A.

3.03 Pipe Installation

The Contractor shall utilize equipment and methods in accordance with pipe manufacturer’s requirements and sound construction practices to insure pipe installation to line and grade as indicated.

A. Trench Excavation

Refer to Section 02221: Trench Excavation Backfill and Compaction. Maintain minimum of 30 inches and maximum of 36 inches of cover below finished grade unless shown otherwise on the construction plans.

B. Alignment

Pipe shall be installed along the alignment indicated by the construction plans. Accomplish horizontal and vertical changes in alignment of pipe with bends or other appropriate fittings. Limit joint deflection as recommended by the pipe manufacturer.

C. Pipe Preparation

The contractor shall clean the interior of all pipes, fittings, and joints prior to installation. Pipes shall be inspected for defects prior to installation. Damaged pipe shall be rejected and removed from the project.

D. Pipe Installation

Install pipe only when weather and trench conditions are suitable. Do not lay pipe in water. Join pipe in accordance with manufacturer's recommendations.

Provide initial backfill or anchoring as necessary to prevent displacement and preserve alignment after establishing final position.

Encase water pipe in steel casing or use ductile iron pipe when crossing under pipe, conduit, or structure when a 6-inch separation distance cannot be maintained. This protection shall extend a minimum of 5 feet beyond crossed structure. (See Section 3.02-D for Sanitary Sewer Lines.)

E. Protection

Prevent the introduction of foreign matter into the pipe at all times. Close open ends of pipe with water tight fitting closures or plugs. Do not let water fill trench, but include provisions to prevent flotation should water control measures prove inadequate. Remove water, sand, mud and other undesirable materials from trench before removal of pipe closure piece.

F. Cutting

PVC or PE pipe shall be cut in a neat workmanlike manner, and the spigot end shall be beveled per manufacturer's recommendation. Ductile iron pipe shall be cut in accordance with manufacturer's recommendation. Do not allow excessive heat to develop. Smooth and bevel cut end as per manufacturer's recommendation. Use of pipe with damaged lining is unacceptable.

G. Service Lines

Service lines shall be constructed where shown on plans and in accordance with the Standard Detail Drawings.

H. Closure Pieces

Closure pieces shall only be used where called for on plans, or with written permission of the Engineer. Closure may be accomplished with sleeve coupling as long as its length is such that gaskets are not less than 3 inches from pipe ends.

I. Restraints and Thrust Blocking

Mechanical joint restraints shall be furnished and installed for all water line fittings and appurtenances. Restraints and thrust blocks shall also be installed for 45º and 90º bends, tapping sleeves, tees and main dead ends.

3.04 Appurtenance Installation

A. Valves

Valves shall be installed with operating stems vertical when installation is direct burial. Valves shall be installed on a suitable bearing surface so as to prevent vertical displacement.

B. Valve Boxes

Valve boxes shall be centered on the valve. The earth shall be compacted around each valve box to a distance of 4 feet on all sides of box, or to undisturbed trench face if less than 4 feet. An 18-inch diameter by 4-inch thick collar shall be constructed and sloped to direct water away from the valve box. In lieu of the constructed collar, a 24-inch by 4-inch thick pre-cast, sloped, concrete collar may be used.

C. Tracer Wire

Tracer wire shall be installed on all new water mains and on water service lines installed in conjunction with new water mains. The tracer wire shall be placed directly above the pipe and electrically continuous throughout the project. Tracer wire shall be secured to the pipe with PVC tape the same color as the wire insulation, at a maximum of 10-feet on center between tapings. The tracer wire shall be brought to the ground surface at each valve location. Splices and/or connections in the tracer wire shall be installed with silicone-filled wire nuts designed for direct burial.

3.05 Fire Hydrant Flushing Equipment Installation

A. Hydrants

Hydrants shall be installed in accordance with the Standard Detail drawings.

B. Flush Stands and Valves

Flush stands shall be installed as shown on the Standard Detail drawings, depending on line size.

3.06 Service Line Installation

A. General

The Contractor shall install individual services with tracer wire from the new main to a convenient point on the right-of-way or property line for each house, building or unit that is to be served through a meter. This section will deal with service line tubing 2-inches in diameter and smaller, to serve 5/8-inch, 1-inch, 1-1/2-inch, and 2-inch meters. The installation of service lines for 3-inch meters and larger shall be in accordance with the requirements for water main installation. (See Section 3.03)

B. Service Line Connections

Service lines shall be installed in accordance with the Standard Detail drawings. Tubing shall be installed in one continuous length from corporation stop to curb stop with no intermediate fittings. Service lines damaged after initial installation but before acceptance may be repaired by means of a single splice, except that no repair fittings will be permitted under any paving. The tap location shall be not less than 10 feet from any sanitary sewer joint with less than 18 inches vertical clearance. Potable water taps shall be made with a tapping machine designed for the pipe material being tapped. Other makes of tapping machine may be used upon prior approval of the Engineer.

3.07 Taps On Pressurized Lines

The Contractor shall perform taps on pressurized lines for the installation of pipes other than service lines of 2-inch and smaller PE tubing in accordance with these requirements:

A. Materials

All materials used for taps on pressurized lines shall meet the requirements of these specifications. Tapping sleeves shall be properly sized for the pipe being tapped. (See Sec. 2.04-A-6) Resilient seated tapping valves shall be furnished with special end connections. (See Sec. 2.04-B-2) All other material used to accomplish the tap shall meet the standards set forth by the AWWA for potable water construction.

B. Procedure

The Contractor shall notify the Engineer three working days in advance of work. The Contractor shall in the presence of the Engineer:

1. Expose the existing pipe at the location shown on the plans, and clean the section of the pipe to receive the tapping sleeve.
2. Check the tapping sleeve and valve for defects and make sure the gate fully retracts in the valve to allow the shell cutter free passage.
3. Assemble the tapping sleeve on the pipe, then install the tapping valve.
4. Hydrostatically pressure test the tapping sleeve and valve after it has been assembled on the water main using the test plug on the sleeve. The test shall be 150 psi minimum. The duration of the test shall be 15 minutes.
5. Pour a thrust block behind the tapping sleeve sufficient to withstand the pressure of the new line. Also, provide a concrete pad sufficient to support the weight of the sleeve, valve, and tapping machine. Refer to Section 3.03-I. Concrete shall be in place a minimum of 24 hours prior to testing the main installation.
6. Assemble an approved tapping machine and proceed to make the necessary cut in accordance with the recommendation of the tapping machine manufacturer. Approved tapping machines shall be:

    a. In good working condition.
    b. Designed for and have a cutting bit for the pipe material to be cut.
    c. Equipped with a depth of cut gauge.
    d. Designed to capture the coupon.
    e. Equipped with the manufacturer's recommended diameter shell cutter for the tap to be made.
    f. Tapping machine power head to be hydraulic or pneumatic drive; use of electric motor drives expressly prohibited.
    g. Tapping maching shall be disinfected prior to each use for potable water taps.

Nominal Main Size	Tapping Valve ID AWWA Standard	Tapping Machine Shell Cutter OD
2-inch	2 1/8-inch	1½ -inch
3-inch	3 1/8-inch	2½-inch
4-inch	4 1/4-inch	3½ -inch
6-inch	6 1/4-inch	5½ -inch
8-inch	8 1/4-inch	7½ -inch
10-inch	10 1/4-inch	9½ -inch
12-inch	12 1/4-inch	11½ -inch
14-inch	14 1/4-inch	Per Manufacturer's Recommendation.
16-inch	16 1/4-inch	Contractor shall submit shop drawings for valves and tapping machine for approval, prior to use. Per Manufacturer's Recommendation.
18-inch	18 1/4-inch	
20-inch	20 1/4-inch	
24-inch	24 1/4-inch	

7. Tap coupon shall be given to the the Inspector. If the coupon is lost in the main, Contractor shall, at his expense, dismantle main to retrieve the coupon. Main will be reassembled, pressure tested and bacteriological tests retaken as required at Contractor's expense.

PART 4 – ACCEPTANCE REQUIREMENTS

4.01 Inspection

Upon completion of the installation, the system shall be inspected to ascertain that valves, fittings, fire hydrants, flush hydrants, etc. are located in conformance with the plans, and confirm that all 'as-built' measurements have been accurately taken. The Inspector shall observe all appropriate activities related to properly placing the line in service including flushing, pressure and leakage testing, disinfection, and bacteriological sampling. Final connections and testing of fire hydrants shall be accomplished after final clearance of lines. Tracer wire shall be tested for continuity by the Contractor with the Inspector present. The Contractor, with the Inspector, shall make sure all main valves and hydrant valves are open.

4.02 Flushing

All newly installed water lines shall be flushed with potable water to remove any sediment, solids and/or foreign matter prior to testing. Owner will make water available to the Contractor. Flushing shall be conducted at a sufficient velocity to clear the pipe. Discharge of flushing water must be through a 2-inch diameter pipe (or larger) and must be controlled so as not to cause any property damage. Flush water source connection shall incorporate backflow preventer when required by the Engineer.

4.03 Pressure/Leakage Test

A. General

All newly installed water lines and appurtenances shall be pressure/leak tested to assure the strength of materials and quality of workmanship of the installation. Testing shall be conducted in accordance with the requirements of AWWA Manual 23 for PVC and other flexible pipe or AWWA C600 for Ductile Iron Pipe. Leakage testing may be conducted concurrently with the pressure test.

B. Procedure

Contractor shall notify the Inspector three working days prior to a scheduled test. Tests are to be conducted in segments not to exceed 3,000 feet of pipe. Water in the new line shall be pumped up to a pressure of 150 psi minimum. This pressure shall be maintained for a minimum of one (1) hour by pumping a quantifiable amount of water into the line and recording the amount of water added during the test period. This represents the leakage.

Pressure/leakage tests shall be deemed acceptable when leakage does not exceed that determined by the following formula:

$$L = \frac{SD\sqrt{P}}{133200} \text{ (or 11.65 gpd/mi/inch/dia)}$$

or $L = \frac{ND\sqrt{P}}{7400}$ for DI pipe 18' lengths

or $L = \frac{ND\sqrt{P}}{6600}$ for PVC pipe 20' lengths

where: L = Maximum leakage, in gallons per hour.
S = Length of pipe under test, in feet.
N = Number of pipe joints in segment under test.
D = Nominal internal diameter of pipe, in inches.
P = Average actual leakage test pressure, psig.

Record all data for submission with as-built plans.

An Inspector shall be present during test.

Refit and replace all pipe not meeting the leakage requirements. Repair clamps are not permitted.

Repair all visible leaks regardless of the amount of leakage.

When a satisfactory pressure/leakage test has been completed, reduce the pressure at or below normal line pressure, and continue with line disinfection.

4.04 Disinfection

A. General

The Contractor shall provide all equipment, materials and testing apparatus required to perform disinfection in accordance with AWWA 651 or as modified herein.

B. Procedure

1. Prior to beginning disinfection, the Contractor shall submit information to the Engineer for approval of proposed materials and methods. Engineer will determine the number and location of all sampling points. Temporary sampling taps may be required consisting of a corporation cock with copper tube.
2. Add chlorine to attain an initial concentration of 25 mg/l chlorine with 10 mg/l remaining after 24 hours.

    a. Initial concentration is to be obtained by mixing proper amount of HTH granules (65% Cl) into auxiliary tank, then pump/meter into regulated flow into or through the pipe section.
    b. Alternate methods of disinfection by use of granular or tablet forms of chlorine will not be allowed. The “SLUG” method as described in AWWA 651 will not be allowed.
    c. Check the chlorine concentration at all sampling points after the line has been filled and air expelled.
    d. Check residual chlorine concentration at the end of 24 hours to confirm that 10 ppm (minimum) is present.

C. Owner shall supply water for testing from the nearest available source. Flush main until chlorine concentration is 2 mg/l or less prior to taking bacteriological samples. Contractor shall provide a backflow preventer device as required by the Engineer.

1. Check concentration at all sample point locations.
2. Disposal of chlorinated water shall be the Contractor's responsibility and shall be done without damage to public or private property or surface waters of the United States or Florida. Chlorinated water disposal shall meet all State, Federal and local regulations.

D. Two (2) satisfactory bacterial sample sets taken 24 hours apart must meet State requirements before placing the main into service.

E. Repeat flushing and disinfection procedure should initial disinfection fail to yield acceptable bacteriological results at no additional cost to the Owner.

4.05 Other Connections

After new system piping has been satisfactorily tested and cleared for use, make any approved additional connections to the pre-existing distribution system. Exercise care in making connection and disinfect as needed. When total system is approved for use, an Inspector shall verify that the Contractor has opened all interior valves as required. Valves connecting new installations to existing distribution system shall then be opened by an Inspector.

4.06 Testing Fire Hydrants

All newly installed fire hydrants shall be flow tested prior to final acceptance in accordance with established procedures. (Refer to AWWA-M17 and AWWA C502.) Static Leak Test of hydrant shall be done in conjunction with Section 4.03 with hydrant valve open.

Hydrant flow tests not meeting the minimum Design Standard requirements shall be immediately reported to the Engineer-of-Record. The system shall not be placed into service until the system meets the minimum requirements.

END OF SECTION 02556

SECTION 02570 – SANITARY SEWERS

PART 1 – GENERAL

1.01 Related Requirements Specified Elsewhere

A. Trench Excavation, Backfill and Compaction: Section 02221.

1.02 Product Delivery, Storage and Handling

A. Store materials to prevent physical damage.

B. Protect materials during transportation and installation to avoid physical damage.

1.03 General Description of Work Covered

Furnish and install all sewer pipe, fittings and structures, and accessories required for sanitary sewer construction as indicated.

1.04 Quality Assurance

Comply with latest published editions of American Society of Testing and Materials (ASTM) Standards:

A. ASTM C478 - Concrete Pipe Manholes.

B. ASTM D1784 - Rigid Poly (vinyl chloride) (PVC) Compounds and Chlorinated Poly (vinyl chloride) (CPVC) Compounds.

C. ASTM D2321 - Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.

D. ASTM D2564 - Solvent Cements for Poly Plastic Pipe and Fittings.

E. ASTM D3212 - Joints for Drain and Sewer Plastic Pipes using Flexible Elastomeric Seals.

F. ASTM D3034 Type PSM - PVC Sewer Pipe and Fittings 4” through 15inches.

G. ASTM F679 – PVC Sewer Pipe and Fittings 18” through 27inches.

PART 2 – MATERIALS AND EQUIPMENT

2.01 General Requirements

A. Pipe furnished shall be PVC for sanitary sewer construction unless shown otherwise on plans or bid forms.

B. All pipes shall be marked in accordance with applicable standard specification under which pipe is manufactured unless otherwise specified.

2.02 Delivery, Storage and Handling

Certificates of Compliance with the Specifications shall be required for all materials used on the Project. All materials shall be protected during transportation, storage, handling, and installation to avoid physical deterioration due to sun and weather. The Engineer reserves the right to reject material, which in any way does not meet the requirements of these Specifications.

2.03 Sewer Mains

A. Polyvinyl Chloride Plastic Pipe (PVC)

1. Comply with ASTM D3034 or F679 for pipe using material conforming to ASTM D1784 for pipe and fittings.
2. Use single elastomeric gasket push-on joints complying with ASTM D3212.
3. Provide pipe and fittings with minimum SDR-35 dimension ratio.
4. SDR 35 shall be used for service laterals.
5. Pipe shall be color coded by one of the following methods:

   a. 3 green stripes (½ inch high) with permanent ink along the entire length, evenly spaced around the pipe, with the word "Sewer" in ¾-inch letters every 21 inches along each stripe.
   b. Use pipe pigment to color code pipe green.

B. Glass Fiber Reinforced Thermosetting Resin Pipe

1. Acceptable for lines 18 inches diameter and larger.
2. Use pipe to comply with AWWA C950 (Latest Edition).
3. Use minimum pipe stiffness: 36 psi.
4. Use joints per AWWA C950 (Latest Edition).
5. Pipe shall be color coded by one of the following methods:

   a. 3 green stripes (½ inch high) with permanent ink along the entire length with ¾-inch letters every 21 inches along each stripe designating SEWER.
   b. Use pipe pigment to color code pipe green.

2.04 Structures and Pipe Accessories

A. Fittings

1. Fittings shall be allowed only on service laterals and drop manholes.
2. Fittings shall equal or exceed quality and strength of pipe.
3. Wyes shall be long bell type.

B. Manholes & Sections

1. Construction shall be precast reinforced concrete capable of sustaining an H-20 loading.
2. Manholes shall be constructed in accordance with ASTM C478, using Type II or Type III Portland Cement.
3. Leakage shall not exceed 1 gallon per day per vertical foot of manhole.
4. Manholes shall have a minimum I.D. of 48 inches, unless otherwise noted on plans.
5. Base section shall be monolithic to a point 6" above the crown of the incoming pipe with minimum thick bottom section and 5" wall section and made in accordance with ASTM C478.

6. Pipe holes shall be properly located and either cast in place with appropriate boot or required shape, or core drilled after concrete has set. Minor field adjustments may be made with approval of Engineer. The invert of the lowest pipe shall be a minimum of 4" above the inside floor of the base section.
7. Cone (top) sections shall be eccentric narrowing from 48" to 24" I.D., unless otherwise noted on plans.
8. Flat top sections shall be used in place of cone sections for manholes less than 5 feet deep. The access hole shall be offset to allow easy access to steps (if used) and shall be reinforced to support an H-20 loading.
9. Shallow manholes less then 3 feet deep shall be constructed according to detail drawing.
10. The joints between sections shall be one of the following:
    a. Lap joint design with the upper lip inside and suitably shaped to accommodate a bitumastic joint sealer,
    b. Rubber "O" ring gasket.
11. Pipe to manhole seals shall be made utilizing one of the following or approved equivalents:
    a. Kore-N-Seal or, Lock-Joint, with stainless steel bands and screws.
    b. A-LOK.
12. Brick manholes shall only be used with consent of Engineer.

C. Manhole Accessories

1. Manhole Lid and Cover

    a) Manufacturer

        1. Manhole cover and frame shall be GMI Composites GMI Product Series 2600AAEG05 or equivalent with at least 24” diameter clear opening for OSHA compliance.

    b) General

        1. Materials – Fiber Reinforced Polymer containing 45% - 70% fiber reinforcement
        2. Resin matrix must be thermoset

    c) Use-ability

        1. Product must facilitate easy removal by one person
        2. Minimum strength to weight ratio = 750:1
        3. There shall be no possibility of corrosion welding between the cover and the frame, preventing damage to the infrastructure when opening
        4. Integrated gasket system to reduce traffic shock and abatement of noise and malodors

    d) Pedestrian Safety

        1. Non-conductivity of electricity
        2. Heat insulating
        3. Skid slip performance greater than 0.6 as described in ASTM C1028 Standard

    e) Load Carrying Capacity

        1. US Load Specification
        2. AASHTO M306-05 H-20 & H-25 traffic requirements of 50,000lbs., with 100,000lb ultimate load bearing

f) Fatigue Performance

1. 2 million cycles at 16,000 lbs.
2. No visible damage
3. Must meet allowable permanent set for the applicable class
4. Performed in a manner approximating the field installation as accurately as possible
5. Must then pass the proof load requirements U.S. AASHTO M306-05 H-20 and H-25.

g) Markings

1. AASHTO M 306-05
2. Country of origin

h) Quality & Warranty Statement

1. Warranty products for 5 years
2. Dimensional Tolerance of 1/16 of an inch
3. Random sampling from production

2. Manhole Coating

a. Apply two coats of a foundation coating or approved equivalent to the exterior.
b. All manholes shall be lined with an Engineer approved HDPE or polypropylene liner. Other liners may be installed if approved by Engineer in writing.
c. Refer to Section 07147 for waterproofing requirements.

3. Steps

a. Shall be embedded in the concrete by the manhole manufacturer at 12" on center spacing from the top of the manhole cone to bench.
b. Steps shall be grade 60 steel bar reinforced ABS plastic, with non-slip rungs, guaranteed for use in sewers.

4. Exterior Joint Sealant Membrane

a. A 6-inch minimum width joint sealant adhesive membrane, thermally cured, shall be applied to all extension joints below the top cone or flat top section. The membrane shall be capable of sealing manhole joints against groundwater and sand infiltration.

PART 3 – EXECUTION

3.01 General

Provide all labor, equipment and materials and install all pipe, fitting, specials and appurtenances as indicated or specified.

3.02 Pipe Installation

A. Handling

1. Handle and store pipe in a manner to insure installation in sound and undamaged condition, and in accordance with pipe manufacturer's requirements.

a. Do not drop, bump, roll or drag.
b. Use slings, lifting lugs, hooks and other devices designed to protect pipe, joint elements, and coatings.

2. Ship, move and store with provisions to prevent movement or shock contact with adjacent units.
3. Handle with equipment capable of work with adequate factor of safety against overturning or other unsafe procedures.

B. Installation

1. Utilize equipment, methods, and materials insuring installation to lines and grades as indicated.
    a. Do not lay on blocks unless pipe is to receive total concrete encasement.
    b. Use calibrated laser or minimum of 3 batter boards for control of line and grade.
2. Install pipe of size, material, strength class, and joint type with embedment shown for plan location.
3. Insofar as possible, commence laying at downstream end of line and install pipe with bell ends in direction of laying (upstream). Sewer pipe shall have spigot ends in direction of flow. Obtain approval for deviations therefrom.
4. Clean interior of all pipe, fittings and joints prior to installation. Exclude entrance of foreign matter during discontinuance of installation.
    a. Close open ends of pipe with watertight plugs at the end of each workday.
    b. Do not let water enter trench. Pipe shall be laid in a dry trench. Include provisions to prevent pipe flotation and displacement should water control measures prove inadequate.
    c. Remove water, sand, mud and other undesirable materials from trench before removal of end cap or plugs.
5. Inspect pipe prior to installation to determine if any pipe defects are present.
6. Brace or anchor as required to prevent displacement after establishing final position.
7. Perform only when weather and trench conditions are suitable.
8. Observe extra precaution when hazardous atmospheres might be encountered, especially when connecting to existing, active sanitary sewers.
9. Separation of Sanitary Sewer Lines and Potable Water Lines. (FDEP Rule 62-555.314 (1) & (2), F.A.C.)
   See details in contract plans and Section 02556, Part 3.02 of this project manual.
10. Auger or jack casing in place where shown on plans.
11. Maintain minimum of 30 inches of cover unless directed by Engineer.
12. Encase sewer pipe in steel casing or use ductile iron pipe when crossing under pipe, conduit, or structure of 24 inches in diameter or greater when a 6-inch separation distance cannot be maintained. This protection shall extend a minimum of 5 feet beyond crossed structure.

C. Jointing: General Requirements

1. Perform in accordance with manufacturer's recommendations.
2. Clean and lubricate all joint and gasket surfaces with lubricant recommended.
3. Utilize methods and equipment capable of fully homing or making up joints without damage.
4. Check joint opening and deflection for specification limits.

D. Closure Pieces

1. Connect two segments of pipelines or a pipeline segment and existing structure with short sections of pipe fabricated for the purpose.
2. Observe specifications regarding location of joints, type of joints and pipe materials and strength classifications.

E. Temporary Plugs

1. Furnish, install and secure water tight, temporary plugs at all ends of the work at the end of each work day, or after laying each pipe section, if there is a delay in installing the next pipe section.
2. Furnish, install and secure water tight temporary plugs at each end of work for removal by others when completed ahead of adjacent contract or where indicated.
3. Remove from pipe laid under separate or prior contract in order to complete pipe connection when work by other contractor is finished prior to work at connection point under this contract.

F. Permanent Plugs

1. Use test plugs as manufactured by pipe supplier, or
2. Fabricate by Contractor of substantially same construction.
3. Must be watertight against heads up to 20 feet of water.
4. Secure in place in a manner to facilitate removal when required to connect pipe.

3.03 Manhole Installation

A. Precast Bases

1. Place on 12-inch layer of compacted sand, gravel or sandy material as approved by Engineer.
2. Base shall be leveled prior to installation of manhole sections.

B. Cast In Place Bases

1. Cast on 12-inch layer of compacted sand, gravel or sandy material as approved by Engineer.
2. Manhole bases and channel inverts may be constructed integrally.

C. Manhole Sections

1. Use precast sections unless cast-in-place manholes approved by Engineer.
2. Precast sections may be installed after base concrete has attained 75% of design strength.
3. Full circumference seals between manhole sections shall use one of the following or approved equivalent:

    a. Bitumastic Seal (Kent No. 2, Ram Neck)
    b. Rubber "O" ring gasket
4. For the joint sealant membrane, the 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 accommodations of the membrane manufacturer.

D. Invert Channels

1. Form invert channel as indicated.
2. Alternate invert and shelf may be constructed of mortar over concrete fill with approval of Engineer.
3. Make changes in direction of flow with smooth curves of as large a radius as size of manhole permits.
4. Make changes in size and grade smoothly and uniformly.
5. Slope shelf of manhole adjacent to channels, toward the channels, and rough broom finish to provide a non-slip surface.

6. Finish channel bottom smoothly without roughness, irregularity, or pockets.
7. On straight through single pipe manholes, half sections of same pipe may be used with mortar and concrete with approval of Engineer.
8. Precast inverts in base sections are acceptable with approval from Engineer Engineering Department.

E. Pipe Connection Into Manholes

1. Make watertight.
2. Use specified pipe to manhole seals or other as approved by Engineer.
3. Repair liner as needed to effect a watertight seal.

F. Field applied coatings shall be applied after Engineer's approval of structure.

3.04 Service Connections

A. Service lines shall be located in accordance with requirements in the City of Fort Walton Code. Refer to the Code for clarification of availability of facilities and responsibilities of customer for the installation of service lines.

B. Install service connections to each residential lot or individual business lot or property, or as directed by Engineer.

C. Service wyes: install long bell type wyes, 4-inch branch diameter unless shown otherwise on plans.

D. Risers: may be used with wyes for service connections where invert of sewer is 7 feet or more below ground surface or where shown on plans. Terminate each connection as shown on plans or as directed by Engineer. Glued 45 degree bends may be used on end of lateral, within grassy, or unpaved, areas.

E. Glue cap on end of stub out.

F. Backfill trench only after recording exact location and depth of service connection.

G. Street crossings shall have a minimum of 2 feet of cover to subgrade unless approved by Engineer.

H. Drive a ½-inch metal rebar adjacent to each service connection, with top of post 1 foot below ground surface.

3.05 Connection of Service Lines and Sewer System Facilities

A. Existing Service Lines and New Sewer Main:
Connect existing sanitary service lines, which cross new sewer line through equal sized wye.

B. New Service Line Connections to Existing Manholes:

1. Insert new sewer pipe flush with inside of manhole.
2. Connect new lines to existing manholes. Seal new pipe in place to be watertight.
3. Reconstruct manhole channel and shelf to suit new connection.
4. All debris to be removed.

C. Connections to Existing Sewer

1. Build new manhole around existing sewer.
2. Break out existing sewer inside of manhole and construct channel and shelf to suit new connection.

PART 4 – ACCEPTANCE

4.01 Acceptance Tests for Sewer Pipelines and Manholes

A. Infiltration Testing

1. General

a. Maximum infiltration for each section of sewer pipe shall not exceed 25 gal/mile/day/ inch of pipe diameter.
b. Infiltration, ex-filtration or air test may be used to prove compliance with infiltration requirement.
c. Acceptance of air test or ex-filtration results will not preclude rejection of work if infiltration is measured and exceeds limitation.
d. Maximum infiltration for each manhole shall not exceed 1 gallon per vertical foot per 24 hours.
e. All tests to be witnessed by Engineer.

2. Air Test

a. Furnish all facilities required including:

1) Necessary piping connections.
2) Test pumping equipment.
3) Pressure gauges or manometers.
4) Bulkheads.
5) All miscellaneous items required.

b. Obtain approval from Engineer of equipment and methods proposed for use.
c. Test pipe in sections determined by Contractor and approved by Engineer.
d. Plug ends of line and cap or plug all connections to withstand internal test pressures.
e. Introduce low-pressure air until internal air pressure is 4.0 psi greater than the average back pressure of ground water above the pipe. (Add 0.43 psi for each vertical foot of ground water over the top of pipe.)
f. Allow two minutes for air pressure to stabilize.
g. Time required for pressure to decrease from 3.5 to 2.5 psi greater than average back pressure of any ground water above pipe shall not be less than time in following table for given diameters.

Pipe Diameter	
(Inches)	Minutes
6	3.0
8	4.0
10	5.0
12	5.5
15	7.0
18	8.5
21	10.0
24	11.5
27	12.75
30	14.0
36	17.0

h. Repeat test as necessary after all leaks and defects have been repaired.

B. Ex-filtration Test

1. Furnish all facilities required to plug pipe sections and fill with water to attain a minimum elevation of water in upstream manhole two feet higher than top of pipe in line being tested, or two feet above existing ground water in trench, whichever is higher elevation.
2. Maintain water level in manhole at start of test period for one hour.
3. Water added to maintain level (water lost) shall not exceed the following amounts:

   a. 8" pipe – 0.63 gallon per 100 feet.
   b. 10" pipe – 0.79 gallon per 100 feet.
   c. 12" pipe – 0.95 gallon per 100 feet.
   d. 15" pipe – 1.19 gallon per 100 feet.
   e. 18" pipe – 1.42 gallon per 100 feet.
   f. 21" pipe – 1.66 gallon per 100 feet.
   g. 24" pipe – 1.90 gallon per 100 feet.

   Allowable leakage may be increased by 5% for each foot of head above water elevation indicated above.

C. Infiltration Test

1. May be used in lieu of air test or ex-filtration test if contractor can prove that ground water conditions are such that crown of pipe is covered with not less than two feet of water at highest point in section being tested. The test head shall be maintained for not less than 24 hours before a weir measurement is made.
2. Infiltration shall be measured with weir at manhole and shall not exceed amounts stated in paragraph B., Ex-filtration Test, number 3.
3. Engineer will require ex-filtration or air test if contractor cannot prove to satisfaction of Engineer that ground water conditions are satisfactory.

END OF SECTION 02570

SECTION 03300 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Description of scope and intent:

1. Contractor to provide all material, labor, and tools required to complete the installation of specified system.
2. Any omission of reference to items required to complete the full operational and functional system specified in the section does not relieve the contractor of the obligation to provide same.
3. To provide installation of all items, including delivery, dispersing to the proper locations within the building, and affixing in place.
4. Installation shall be accomplished by workers skilled in their craft who will perform their work in a professional manner and will leave the premises safe, orderly and clean.
5. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section
6. Contractor is responsible for coordination of work included in this specification with all other specification sections related to furnishing of all materials, labor, permits, fees and services necessary for completion of work in this section.

B. Section Includes:

1. Formwork for cast-in-place concrete, with shoring, bracing, and anchorage.
2. Formwork accessories.
3. Form stripping.
4. Reinforcing steel for cast-in-place concrete.
5. Cast-in-place concrete, including concrete for the following:
    a. Foundations, footings.
    b. Slabs on grade.
    c. Elevated slabs.
    d. Walls.
    e. Sidewalks.
    g. Reinforced masonry.
6. Concrete curing.
7. Shoring and Reshoring.

1.2 REFERENCES

Comply with the following documents, except where requirements of the Contract Documents or of governing codes and governing authorities are more stringent. All referenced standards refer to the edition in force at the time these plans and specifications are issued.

A. AASHTO M 182 -- Standard Specification for Burlap Cloth Made from Jute or Kenaf; American Association of State Highway and Transportation Officials.

B. ACI 117 -- Standard Tolerances for Concrete Construction and Materials; American Concrete Institute.

C. ACI 201.2R -- Guide to Durable Concrete; American Concrete Institute.

D. ACI 211.1 -- Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute.

E. ACI 224R – Control of Cracking in Concrete Structures, American Concrete Institute

F. ACI 232.1R – Use of Raw or Processed Natural Pozzolans in Concrete, American Concrete Institute

G. ACI 232.2R – Use of Fly Ash in Concrete, American Concrete Institute

H. ACI 301 -- Specifications for Structural Concrete for Buildings; American Concrete Institute.

I. ACI 302.1R -- Guide for Concrete Floor and Slab Construction; American Concrete Institute.

J. ACI 304R -- Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute.

K. ACI 305R -- Hot Weather Concreting; American Concrete Institute.

L. ACI 306R -- Cold Weather Concreting; American Concrete Institute.

M. ACI 308R – Guide to Curing Concrete, American Concrete Institute

N. ACI 309R – Guide to Consolidation of Concrete, American Concrete Institute

O. ACI 318 -- Building Code Requirements for Reinforced Concrete; American Concrete Institute.

P. ACI SP-66 -- ACI Detailing Manual; American Concrete Institute.

Q. ASTM A 185 -- Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.

R. ASTM A 615 -- Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

S. ASTM C 31 -- Standard Practice for Making and Curing Concrete Test Specimens in the Field.

T. ASTM C 33 -- Standard Specification for Concrete Aggregates.

U. ASTM C 39 -- Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

V. ASTM C 42 -- Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

W. ASTM C 94 -- Standard Specification for Ready-Mixed Concrete.

X. ASTM C 143 -- Standard Test Method for Slump of Hydraulic Cement Concrete.

Y. ASTM C 150 -- Standard Specification for Portland Cement.

Z. ASTM C 171 -- Standard Specification for Sheet Materials for Curing Concrete.

AA. ASTM C 172 -- Standard Practice for Sampling Freshly Mixed Concrete.

BB. ASTM C 173 -- Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

CC. ASTM C 231 -- Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

DD. ASTM C 260 -- Standard Specification for Air-Entraining Admixtures for Concrete.

EE. ASTM C 494 -- Standard Specification for Chemical Admixtures for Concrete.

FF. ASTM C 618 -- Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

GG. ASTM C 685 -- Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.

HH. ASTM C 881 -- Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.

II. ASTM C 1059 -- Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.

JJ. ASTM C 1107 -- Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

KK. ASTM D 1751 -- Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

LL. ASTM D 1752 -- Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

MM. ASTM E 154 -- Standard Test Methods for Water Vapor Retarders Used in Contact with Earth under Concrete Slabs, on Walls, or as Ground Cover.

NN. ASTM E 329 -- Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

OO. CRSI -- Manual of Standard Practice; Concrete Reinforcing Steel Institute.

PP. FBC, Building -- Florida Building Code, Building

1.3 DEFINITIONS

A. Unexposed Finish: A general-use finish, with no appearance criteria, applicable to all formed concrete concealed from view after completion of construction.

B. Exposed Finish: A general-use finish applicable to all formed concrete exposed to view except those indicated to receive textured finish, and including surfaces which may receive a paint coating (if any).

C. Textured Finish: An exposed architectural finish achieved by means of form liners or special construction of the formwork.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product data for the following:

1. Formwork accessories.
2. Form liners.
3. Concrete admixtures.
4. Grout.
5. Bonding compound.
6. Epoxy bonding system.

B. Aggregates: Submit test reports showing compliance with specified quality and gradation.

C. Shop Drawings: Submit shop drawings for fabrication and placement of the following:

1. Reinforcement: Comply with ACI SP-66. Include bar schedules, diagrams of bent bars, arrangement of concrete reinforcement, and splices.

    a. Show construction joints.
    b. Include details of reinforcement at openings through concrete structures.
    c. Include elevations of reinforcement in walls.
    d. Show stirrup spacing.
    e. Concrete embedments.

2. Shoring and reshoring for elevated concrete placement shall include:

    a. Location, size, and type of all shoring members.
    b. Location, size, and type of all reshoring members.
    c. Location, size, and type of all mud sills, blocking, temporary lateral bracing and other accessories necessary to safely support and brace the structure during construction.
    d. Prepare shop drawings under seal of professional structural engineer registered in the state in which the project is located.

D. Quality Control Submittals: Submit the following information related to quality assurance requirements specified:

1. Design data: Submit proposed mix designs and test data before concrete operations begin. Identify for each mix submitted the method by which proportions have been selected.

    a. For mix designs based on trial mixtures, include trial mix proportions, test results, and graphical analysis and show required average compressive strength f(cr).
    b. Indicate quantity of each ingredient per cubic yard of concrete.
    c. Indicate type and quantity of admixtures proposed or required.

2. Test reports: Submit laboratory test reports for all testing specified.
3. Certifications: Submit affidavits from an independent testing agency certifying that all materials furnished under this section conform to specifications.
4. Certifications: Provide certification from manufacturers of concrete admixtures that chloride content complies with specified requirements.
5. Certifications: Submit mill test certificates for all reinforcing steel furnished under this section, showing physical and chemical analysis.
6. Placement schedule: Submit concrete placement schedule prior to start of any concrete placement operations. Include location of all joints indicated on drawings, plus anticipated construction joints.
7. Cold weather concreting: Submit description of planned protective measures.
8. Hot weather concreting: Submit description of planned protective measures.

1.5 QUALITY ASSURANCE

A. Codes and Standards: Comply with the following documents, except where requirements of the contract documents or of governing codes and governing authorities are more stringent:

1. ACI 301.
2. ACI 318.
3. CRSI Manual of Standard Practice.

B. Testing Agency Services:

1. Employ, at contractor's expense, an independent testing agency acceptable to the engineer to perform specified tests and other services required for quality assurance.

    a. Testing agency shall meet ASTM E 329 requirements.

C. Source of Materials: Obtain materials of each type from same source for the entire project.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver reinforcement to project site bundled and tagged with metal tags indicating bar size, lengths, and other data corresponding to information shown on placement drawings.

1. Store concrete reinforcement materials at the site to prevent damage and accumulation of dirt or rust.

B. Store cementitious materials in a dry, weather tight location. Maintain accurate records of shipment and use.

C. Store aggregates to permit free drainage and to avoid contamination with deleterious matter or other aggregates. When stockpiled on ground, discard bottom 6 inches of pile.

D. Handle aggregates to avoid segregation.

1.7 PROJECT CONDITIONS

A. Cold-Weather Concreting: Comply fully with the recommendations of ACI 306.

1. Well in advance of proposed concreting operations, advise the engineer of planned protective measures including but not limited to heating of materials, heated enclosures, and insulating blankets.

B. Hot-Weather Concreting: Comply fully with the recommendations of ACI 305R.

1. Well in advance of proposed concreting operations, advise the engineer of planned protective measures including but not limited to cooling of materials before or during mixing, placement during evening to dawn hours, fogging during finishing and curing, shading, and windbreaks.

PART 2 - PRODUCTS

2.1 FORMWORK

A. Facing Materials:

1. Unexposed finish concrete: Any standard form materials that produce structurally sound concrete.
2. Exposed finish concrete: Materials selected to offer optimum smooth, stain-free final appearance and minimum number of joints. Provide materials with sufficient strength to resist hydrostatic head without bow or deflection in excess of allowable tolerances.
3. Textured finish concrete: Materials or linings as indicated on the drawings, or as required to match architect's control sample.

B. Formwork Accessories:

1. Form coating: Form release agent that will not adversely affect concrete surfaces or prevent subsequent application of concrete coatings.
2. Metal ties: Commercially manufactured types; cone snap ties, taper removable bolt, or other type which will leave no metal closer than 1-1/2 inches from surface of concrete when forms are removed, leaving not more than a 1-inch-diameter hole in concrete surface.
3. Fillets: Wood or plastic fillets for chamfered corners, in maximum lengths possible.

2.2 REINFORCING MATERIALS

A. Reinforcing Bars: Provide deformed bars complying with the following, except where otherwise indicated:

1. ASTM A 615, Grade 60.

B. Welded Wire Fabric: ASTM A 185, cold-drawn steel, plain.

C. Reinforcing Accessories:

1. Tie wire: Black annealed type, 16-1/2 gage or heavier.
2. Supports: Bar supports conforming to specifications of CRSI "Manual of Standard Practice."

c. Class 1 (plastic protected) at all formed surfaces which will be exposed to weather.
d. Class 1 (plastic protected) or Class 2 (stainless steel protected) at all formed surfaces which will be exposed to view but not to weather.
e. Precast concrete blocks of strength equal to or greater than specified strength of concrete or Class 3 supports equipped with sand plates, where concrete will be cast against earth. Concrete masonry units will not be accepted.

2.3 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, and as follows:

1. Type II, All concrete

B. Fly Ash: ASTM C 618, Type C or F.

C. Silica Fume: ASTM C1240

D. Water: Potable.

E. Aggregates:

1. Normal weight concrete: ASTM C 33.

e. Class 5M.
f. Gradation as specified below under mix design.

F. Admixtures - General: Admixtures which result in more than 0.1 percent of soluble chloride ions by weight of cement are prohibited.

G. Air-Entraining Admixture: ASTM C 260 and certified by manufacturer for compatibility with other mix components.

1. Products: The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:

a. "Air Mix"; The Euclid Chemical Company.
b. "Sika-Aer"; Sika Corporation.
c. "Micro-Air"; Master Builders, Inc.
d. "Darex AEA"; W. R. Grace & Co.

H. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.

1. Products: The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:

   a. "Pozzolith Retarder"; Master Builders, Inc.
   b. "Eucon Retarder 75"; The Euclid Chemical Company.
   c. "Daratard-17"; W. R. Grace & Co.
   d. "PSI-R Plus"; Cormix Construction Chemicals.
   e. "Plastiment"; Sika Corporation.
   f. "Protard"; Master Builders, Inc. (former Conchem product).

I. Water-Reducing and Accelerating Admixtures: ASTM C 494, Type E.

1. Products: The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:

   a. "Accelguard 80"; The Euclid Chemical Company.
   b. "Pozzutec 20"; Master Builders, Inc.
   c. "Gilco Accelerator"; Cormix Construction Chemicals.

J. High-Range Water-Reducing Admixture (Superplasticizer): ASTM C 494, Type F or G.

1. Products: The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:

   a. "WRDA 19" or "Daracem-100"; W. R. Grace & Co.
   b. "PSP Superplasticizer"; Master Builders, Inc. (former Conchem product).
   c. "Sikament 300"; Sika Corporation.
   d. "Eucon 37"; The Euclid Chemical Company.
   e. "PSI Super"; Cormix Construction Chemicals.
   f. "Rheobuild"; Master Builders, Inc.

2.4 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Nonshrink Grout: ASTM C 1107.

1. Type: Provide nonmetallic type only.
2. Products: The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:

   a. Nonmetallic type:

      (1) "Masterflow 928"; Master Builders, Inc.
      (2) "Sonogrout 14k"; Sonneborn Building Products Division/ChemRex, Inc.
      (3) "Euco N-S Grout"; The Euclid Chemical Company.
      (4) "Supreme"; Cormix Construction Chemicals.
      (5) "Five Star Grout"; Five Star Products, Inc.

B. Burlap: AASHTO M 182, Class 2 jute or kenaf cloth.

C. Moisture-Retaining Cover: ASTM C 171, and as follows:

1. Curing paper.
2. Polyethylene film.
3. White burlap-polyethylene sheeting.

D. Bonding Compound: Non-redispersable acrylic bonding admixture, ASTM C 1059, Type II.

1. Products: The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:

a. "Everbond"; L & M Construction Chemicals, Inc.
b. "Flex-Con"; The Euclid Chemical Company.

E. Epoxy Bonding Systems: ASTM C 881; type, grade, and class as required for project conditions.

1. Products: The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:

a. "Concresive LPL"; Master Builders, Inc.
b. "Sikadur 32 Hi-Mod"; Sika Corporation.
c. "Euco #452 Epoxy System"; The Euclid Chemical Company.

F. Expansion Joint Filler:

1. Nonextruding bituminous type: ASTM D 1751.
2. Sponge rubber type: ASTM D 1752, Type I.
3. Cork type: ASTM D 1752, Type II.
4. Self-expanding cork type: ASTM D 1752, Type III.

2.5 CONCRETE MIX DESIGN

A. Review: Do not begin concrete operations until proposed mix has been reviewed by the engineer.

B. Proportioning of Normal Weight Concrete: Comply with recommendations of ACI 211.1.

C. Required Average Strength: Establish the required average strength f(cr) of the design mix on the basis of trial mixtures as specified in ACI 301, and proportion mixes accordingly. Employ an independent testing agency acceptable to the engineer for preparing and reporting proposed mix design.

D. Proportion normal-weight concrete mix to produce an average strength at 28 day as indicated on the drawings:

E. Fly Ash:

1. The contractor may elect to replace a portion of the Portland cement with fly ash up to a maximum of 25 percent by weight of cement plus fly ash.

F. Silica Fume:

1. Provide for both the boat and kayak ramps at a minimum rate of 7 percent by weight of cementitious material.

G. Admixtures:

1. Air-entraining admixture: Add at rate to achieve specified air content.

a. Do not use in slabs-on-grade scheduled to receive topping, unless manufacturer of topping recommends use over air-entrained concrete.

2. Water-reducing and retarding admixture: Add as required in concrete mixes to be placed at ambient temperatures above 90 degrees F.
3. Water-reducing and accelerating admixture: Add as required in concrete mixes to be placed at ambient temperatures below 50 degrees F.
4. High-range water-reducing admixture (superplasticizer): Add as required for placement and workability.
5. Do not use admixtures not specified or approved.

H. Design mix to meet or exceed each requirement specified. Where more than one criterion is specified, the most stringent shall apply. For example, a minimum cement content or maximum water-cement ratio might result in strengths greater than the minimum specified; likewise, a greater cement content or lower water-cement ratio may be required in order to achieve the required strength.

1. Specified compressive strength f'(c) (ASTM C 39): As noted on the drawings.
2. Maximum water-cement ratio by weight:
    a. 0.4 for boat and kayak ramps
    b. 0.45 for all other concrete
3. Maximum slump: As recommended in ACI 211.1.
4. Gradation of coarse aggregate: ASTM C 33 standard gradation with maximum nominal size of 3/4 inches.
5. Total air content (ASTM C 173 or ASTM C 231): 5 percent.
6. Maximum water soluble chloride ion content shall not exceed percent by weight of cement by 0.10.

I. Mix Adjustments: Provided that no additional expense to owner is involved, contractor may submit for engineer's approval requests for adjustment to approved concrete mixes when circumstances such as changed project conditions, weather, or unfavorable test results occur. Include laboratory test data substantiating specified properties with mix adjustment requests.

2.6 CONTROL OF MIX IN THE FIELD

A. Slump: A tolerance of up to 1 inch above that specified will be permitted for 1 batch in 5 consecutive batches tested. Concrete of lower slump than that specified may be used, provided proper placing and consolidation is obtained.

1. If slump upon arrival at the site is lower than 1 inch below the value specified, one addition of water in accordance with ASTM C 94 will be permitted to bring slump within tolerance, provided that:
    a. A positive means is available to measure the amount of water added at the site.
    b. The specified (or approved) maximum water-cement ratio is not exceeded.
    c. Not more than 45 minutes have elapsed since batching.

B. Total Air Content: A tolerance of plus or minus 1-1/2 percent of that specified will be allowed for field measurements.

C. Do not use batches that exceed tolerances.

2.7 CONCRETE MIXING

A. On-Site Equipment: Mix concrete materials in appropriate drum type batch machine mixer, in compliance with ASTM C 685. Mix each batch minimum of 1-1/2 minutes and maximum of 5 minutes before discharging concrete. Clean thoroughly at end of day and before changing concrete type.

B. Transit Mixers: Mix concrete materials in transit mixers, complying with requirements of ASTM C 94.

1. At ambient temperatures of 85 to 90 degrees F, reduce mixing and delivery time to 75 minutes.
2. At ambient temperatures above 90 degrees F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 CONCRETE FORM PREPARATION

A. General: Comply with requirements of ACI 301 for formwork, and as herein specified. The contractor is responsible for design, engineering, and construction of formwork, and for its timely removal.

B. Earth Forms: Hand-trim bottoms and sides of earth forms to profiles indicated on the drawings. Remove loose dirt before placing concrete.

C. Design: Design and fabricate forms for easy removal, without impact, shock, or damage to concrete surfaces or other portions of the work. Design to support all applied loads until concrete is adequately cured, within allowable tolerances and deflection limits.

D. Construction: Construct and brace formwork to accurately achieve end results required by contract documents, with all elements properly located and free of distortion. Provide for necessary openings, inserts, anchorages, and other features shown or otherwise required.

1. Joints: Minimize form joints and make watertight to prevent leakage of concrete.
    a. Align joints symmetrically at exposed conditions.
2. Chamfers: Provide chamfered edges and corners at exposed locations, unless specifically indicated otherwise on the drawings.
3. Permanent openings: Provide openings to accommodate work of other trades, sized and located accurately. Securely support items built into forms; provide additional bracing at openings and discontinuities in formwork.
4. Temporary openings: Provide temporary openings for cleaning and inspection in most inconspicuous locations at base of forms, closed with tight-fitting panels designed to minimize appearance of joints in finished concrete work.

E. Tolerances for Formed Surfaces: Comply with minimum tolerances established in ACI 117, unless more stringent requirements are indicated on the drawings.

F. Release Agent: Provide either form materials with factory-applied nonabsorptive liner or field-applied form coating. If field-applied coating is employed, thoroughly clean and recondition formwork and reapply coating before each use. Rust on form surfaces is unacceptable.

3.2 VAPOR RETARDER INSTALLATION

A. General: When specified, place vapor retarder sheet over prepared base material as recommended by manufacturer.

3.3 PLACING REINFORCEMENT

A. General: Comply with requirements of ACI 301 and as herein specified.

B. Preparation: Clean reinforcement of loose rust and mill scale, soil, and other materials which adversely affect bond with concrete.

C. Placement: Place reinforcement to achieve not less than minimum concrete coverage required for protection. Accurately position, support, and secure reinforcement against displacement. Provide Class C tension lap splices complying with ACI 318 unless otherwise indicated. Do not field-bend partially embedded bars unless otherwise indicated or approved.

1. Use approved bar supports and tie wire, as required. Set wire ties to avoid contact with or penetration of exposed concrete surfaces. Tack welding of reinforcing is not permitted.
2. Wire fabric: Install in maximum lengths possible, lapping adjoining pieces not less than one full mesh. Offset end laps to prevent continuous laps in either direction, and splice laps with tie wire.

D. Welding: Welding of reinforcement is not permitted.

3.4 JOINT CONSTRUCTION

A. Construction Joints: Locate and install construction joints as indicated on drawings. If construction joints are not indicated, locate in manner which will not impair strength and will have least impact on appearance, as acceptable to the engineer.

1. Keyways: Provide keyways not less than 1-1/2 inches deep.
2. Reinforcement: Continue reinforcement across and perpendicular to construction joints, unless details specifically indicate otherwise.
3. Provide waterstop in all joints below grade exposed to earth or below water.

B. Isolation Joints: Construct isolation joints in slabs poured on grade at points of contact with vertical components, such as foundation walls and column pedestals. Install expansion joint filler to full concrete depth. Recess top edge of filler 1/8 inch where joints are unsealed.

C. Expansion Joints: Construct expansion joints where indicated. Install expansion joint filler to full depth of concrete. Recess edge of filler to depth indicated to receive joint sealant (and backer rod where necessary) specified in Division 7.

D. Control Joints: Construct contraction joints in slabs poured on grade to form panels of sizes indicated on drawings, but not more than 20 feet apart in either direction.

1. Saw cuts: Form control joints by means of saw cuts one-fourth the depth of the slab, performed as soon as possible after slab finishing without dislodging aggregate.

3.5 INSTALLATION OF EMBEDDED ITEMS

A. General: Set anchorage devices and other items required for other work connected to or supported by cast-in-place concrete, using templates, setting drawings, and instructions from suppliers of items to be embedded.

1. Edge Forms and Screeds: Set edge forms and intermediate screeds as necessary to achieve final elevations indicated for finished slab surfaces.

3.6 CONCRETE PLACEMENT

A. Preparation: Provide materials necessary to ensure adequate protection of concrete during inclement weather before beginning installation of concrete.

B. Inspection: Before beginning concrete placement, inspect formwork, reinforcing steel, and items to be embedded, verifying that all such work has been completed.

1. Wood forms: Moisten immediately before placing concrete in locations where form coatings are not used.

C. Placement - General: Comply with requirements of ACI 304 and as follows:

1. Concreting should be carried on at such a rate that the concrete is at all times plastic and flows readily into spaces between reinforcement.
2. Schedule continuous placement of concrete to prevent the formation of cold joints.
3. Provide construction joints if concrete for a particular element or component cannot be placed in a continuous operation.
4. Deposit concrete as close as possible to its final location, to avoid segregation.
5. Concrete shall be worked around reinforcement and embedded fixtures and into corners of forms.
6. The following shall be prohibited from use:

    a. Partially hardened concrete.
    b. Contaminated concrete.
    c. Re-tempered concrete.
    d. Re-mixed concrete after initial set has occurred.

D. Placement in Forms: Limit horizontal layers to depths which can be properly consolidated, but in no event greater than 24 inches.

1. Consolidate concrete by means of mechanical vibrators, inserted vertically in freshly placed concrete in a systematic pattern at close intervals. Penetrate previously placed concrete to ensure that separate concrete layers are knitted together.
2. Vibrate concrete sufficiently to achieve consistent consolidation without segregation of coarse aggregates.
3. Do not use vibrators to move concrete laterally.

E. Slab Placement: Schedule continuous placement and consolidation of concrete within planned construction joints.

1. Thoroughly consolidate concrete without displacing reinforcement or embedded items, using internal vibrators, vibrating screeds, roller pipe screeds, or other means acceptable to engineer.
2. Strike off and level concrete slab surfaces, using highway straightedges, darbies, or bull floats before bleed water can collect on surface. Do not work concrete further until finishing operations are commenced.

F. Cold Weather Placement: Comply with recommendations of ACI 306 when air temperatures are expected to drop below 40 degrees F either during concrete placement operations or before concrete has cured.

1. Do not use frozen or ice-laden materials.
2. Do not place concrete on frozen substrates.

G. Hot Weather Placement: Comply with recommendations of ACI 305R when ambient temperature before, during, or after concrete placement is expected to exceed 90 degrees F or when combinations of high air temperature, low relative humidity, and wind speed are such that the rate of evaporation from freshly poured concrete would otherwise exceed 0.2 pounds per square foot per hour.

1. Do not add water to approved concrete mixes under hot weather conditions.
2. Provide mixing water at lowest feasible temperature, and provide adequate protection of poured concrete to reduce rate of evaporation.
3. Use fog nozzle to cool formwork and reinforcing steel immediately prior to placing concrete.

3.7 FINISHING FORMED SURFACES

A. Repairs, General: Repair surface defects, including tie holes, immediately after removing formwork.

1. Remove honeycombed areas and other defective concrete down to sound concrete, cutting perpendicular to surface or slightly undercutting. Dampen patch location and area immediately surrounding it prior to applying bonding compound or patching mortar.
2. Before bonding compound has dried, apply patching mixture matching original concrete in materials and mix except for omission of coarse aggregate, and using a blend of white and normal portland cement as necessary to achieve color match. Consolidate thoroughly and strike off slightly higher than surrounding surface.

B. Textured Form Finish: Repair tie holes and patch defective areas to match pattern created by form construction or form liners.

C. Unexposed Form Finish: Repair tie holes and patch defective areas. Rub down or chip off fins or other raised areas exceeding 1/4 inch height.

D. Exposed Form Finish: Repair and patch defective areas, with fins or other projections completely removed and smoothed.

1. Smooth rubbed finish: Apply to surfaces indicated no later than 24 hours after form removal.

a. Wet concrete surfaces to be finished and rub with Carborundum brick or other abrasive until uniform color and texture are achieved.
b. Do not apply separate grout mixture.

2. Related unformed surfaces: Strike smooth and float to a similar texture tops of walls, horizontal offsets, and other unformed surfaces adjacent to or contiguous with formed surfaces. Continue final finish of formed surfaces across unformed surfaces, unless otherwise specifically indicated.

3.8 FINISHING SLABS

A. Finishing Operations - General:

1. Do not directly apply water to slab surface or dust with cement.
2. Use hand or powered equipment only as recommended in ACI 302.1R.
3. Screeding: Strike off to required grade and within surface tolerances indicated. Verify conformance to surface tolerances. Correct deficiencies while concrete is still plastic.
4. Bull Floating: Immediately following screeding, bull float or darby before bleed water appears to eliminate ridges, fill in voids, and embed coarse aggregate. Recheck and correct surface tolerances.
5. Do not perform subsequent finishing until excess moisture or bleed water has disappeared and concrete will support either foot pressure with less than 1/4-inch indentation or weight of power floats without damaging flatness.
6. Final floating: Float to embed coarse aggregate, to eliminate ridges, to compact concrete, to consolidate mortar at surface, and to achieve uniform, sandy texture. Recheck and correct surface tolerances.

B. Final Finishes:

1. Steel Towel Finish: After floating, provide smooth, hard dense surface for all pavilion roof slabs.

2. Broomed Float Finish: After floating and when water sheen has practically disappeared, apply uniform transverse corrugations approximately 1/16 inch deep, without tearing surface for all pavilion slab-on-grade.

3. V-groove Finish: After floating, provide 1x1-inch v-grooves at a 60-degree angle to the centerline of the boat and kayak ramps.

C. Slab Surface Tolerances:

1. Achieve flat, level planes except where grades are indicated. Slope uniformly to drains.
2. Light Steel-troweled finish: Class 2, F_F35 / F_L25

D. Repair of Slab Surfaces: Test slab surfaces for smoothness and to verify surface plane to tolerance specified. Repair defects as follows:

1. High areas: Correct by grinding after concrete has cured for not less than 14 days.
2. Low areas: Immediately after completion of surface finishing operations, cut out low areas and replace with fresh concrete. Finish repaired areas to blend with adjacent concrete.
3. Crazed or cracked areas: Cut out defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts. Dampen exposed concrete and apply bonding compound. Mix, place, compact, and finish patching concrete to match adjacent concrete.
4. Isolated cracks and holes: Groove top of cracks and cut out holes not over 1 inch in diameter. Dampen cleaned concrete surfaces and apply bonding compound; place dry pack while bonding compound is still active:

    a. Dry-pack mix: One part Portland cement to 2-1/2 parts fine aggregate and enough water as required for handling and placing.
    b. Install patching mixture and consolidate thoroughly, striking off level with and matching surrounding surface. Do not allow patched areas to dry out prematurely.

3.9 CONCRETE CURING AND PROTECTION

A. General:

1. Prevent premature drying of freshly placed concrete, and protect from excessively cold or hot temperatures until concrete has cured.
2. Provide curing of concrete by one of the methods listed and as appropriate to service conditions and type of applied finish in each case.

B. Curing Period:

1. Not less than 7 days for standard cements and mixes.
2. Not less than 4 days for high early strength concrete using Type III cement.

C. Curing Temperature:

1. Concrete shall be maintained above 50^{o} F and in moist condition during the entire curing period.

D. Formed Surfaces: Cure formed concrete surfaces by moist curing with forms in place for full curing period.

1. Keep wooden or metal forms moist when exposed to heat of the sun.
2. If forms are removed prior to completion of curing process, continue curing by one of the applicable methods specified.

E. Surfaces Not in Contact with Forms:

1. Start initial curing as soon as free water has disappeared, but before surface is dry.
2. Keep continuously moist for not less than 3 days by uninterrupted use of any of the following:

    a. Water ponding.
    b. Water-saturated sand.
    c. Water-fog spray.
    d. Saturated burlap: Provide 4-inch minimum overlap at joints.

3. Begin final curing procedures immediately following initial curing and before concrete has dried.

   a. Moisture-retaining cover: Lap not less than 3 inches at edges and ends, and seal with waterproof tape or adhesive. Repair holes or tears during curing period with same tape or adhesive. Maintain covering in intimate contact with concrete surface. Secure to avoid displacement.

      (1) Extend covering past slab edges at least twice the thickness of slab.
      (2) Do not use plastic sheeting on surfaces which will be exposed to view when in service.

4. Continue final curing to end of curing period.

F. Avoid rapid drying at end of curing period.

G. During and following curing period, protect concrete from temperature changes of adjacent air in excess of 5 degrees F per hour and 50 degrees F per 24 hours. Progressively adjust protective measures to provide uniform temperature changes over entire concrete surface.

3.10 SHORES AND SUPPORTS

A. General: Comply with recommendations of ACI 347 for shoring and reshoring in multistory construction.

B. Low-Rise Construction: Extend shoring from ground to roof for structures 4 stories or less in height.

C. Reshoring: Remove shores and reshore in a planned sequence, to avoid damage to partly cured concrete. Locate and provide adequate reshoring to safely support work without excessive stress or deflection.

D. Provide as a package, shoring and reshoring drawings prepared by or under the direct supervision of a specialty engineer registered in the State the project is located.

3.11 REMOVAL OF FORMS AND SUPPORTS

A. Non-Load-Bearing Formwork: Provided that concrete has hardened sufficiently that it will not be damaged, forms not actually supporting weight of concrete or weight of soffit forms may be removed after concrete has cured at not less than 50 degrees F for 24 hours. Maintain curing and protection operations after form removal.

B. Load-Bearing Formwork: Do not remove shoring and forms supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, until concrete has attained at least the specified compressive strength f'(c) and until the contractor has determined that the actual compressive strength attained is adequate to support the weight of the concrete and superimposed loads.

C. Keep reshores in place a minimum of 15 days after placing upper tier, and longer if required, until concrete has attained at least the specified compressive strength f'(c) and until the contractor has determined that the actual compressive strength attained is adequate to support the weight of the concrete and superimposed loads.

D. Keep supports in place until heavy loads due to construction operations have been removed.

E. Test field-cured specimens to determine potential compressive strength of concrete for specific locations.

3.12 MISCELLANEOUS CONCRETE ITEMS

A. Fill-in: Fill in holes and openings left in concrete structures for passage of work by other trades after such work is in place. Place such fill-in concrete to blend with existing construction, using same mix and curing methods.

B. Reinforced Masonry: Provide concrete grout for reinforced masonry where indicated on drawings and as scheduled.

3.13 CONCRETE REPAIRS

A. General: Repairs due to poor workmanship shall be made by the contractor at the contractor's expense and shall be approved by the Engineer prior to repair procedure being implicated.

B. Perform cosmetic repairs of concrete surfaces as specified under concrete application.

C. Perform structural repairs with prior approval of the engineer for method and procedure, using epoxy bonding systems. The engineer's approval is required for repair methods using materials other than those specified.

3.14 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. Testing Agency Services: Employ, at Contractor's expense, an independent testing agency acceptable to the owner and engineer to perform the specified tests and other services required for quality assurance as listed below.

B. Composite Sampling, and Making and Curing of Specimens: ASTM C 172 and ASTM C 31.

1. Take samples at point of discharge.
2. For pumped concrete, perform sampling and testing at the frequencies specified herein at point of delivery to pump, and perform additional sampling and testing at the same frequency at discharge from line. Results obtained at discharge from line shall be used for acceptance of concrete.

C. Slump: ASTM C 143. One test per strength test and additional tests if concrete consistency changes.

1. Modify sampling to comply with ASTM C 94.

D. Air Content of Normal Weight Concrete: ASTM C 173 or ASTM C 231. One test per strength test performed on air-entrained concrete.

E. Concrete Temperature:

1. Test hourly when air temperature is 40 degrees F or below.
2. Test hourly when air temperature is 90 degrees F or above.
3. Test each time a set of strength test specimens is made.

F. Compressive Strength Tests: ASTM C 39.

1. Compression test specimens: Mold and cure one set of 4 standard cylinders for each compressive strength test required.
2. Testing for acceptance of potential strength of as-delivered concrete:

    a. Obtain samples on a statistically sound, random basis.
    b. Minimum frequency:

        (1) One set per 100 cubic yards or fraction thereof for each day's pour of each concrete class.

(2) One set per 3500 square feet of slab or wall area or fraction thereof for each day's pour of each concrete class.

(3) When the above testing frequency would provide fewer than 5 strength tests for a given class of concrete during the project, conduct testing from not less than 5 randomly selected batches, or from each batch if fewer than 5.

c. Test one specimen per set at 7 days for information unless an earlier age is required.

d. Test 2 specimens per set for acceptance of strength potential; test at 28 days unless other age is specified. The test result shall be the average of the two specimens. If one specimen shows evidence of improper sampling, molding, or testing, the test result shall be the result of the remaining specimen; if both show such evidence, discard the test result and inform the engineer.

e. Retain one specimen from each set for later testing, if required.

f. Strength potential of as-delivered concrete will be considered acceptable if all of the following criteria are met:

(1) No individual test result falls below specified compressive strength by more than 500 psi.

(2) Average of any 3 consecutive strength test results equals or exceeds specified compressive strength f'c.

3. Testing for evaluation of field curing:

a. Frequency: 1 field set of specimens per strength acceptance test.

b. Mold specimens from same sample used for strength acceptance tests. Field-cure, and test at same age as for strength acceptance tests.

c. Evaluate construction and curing procedures and implement corrective action when strength results for field-cured specimens are less than 85 percent of test values for companion laboratory-cured specimens.

4. Removal of forms or supports: Mold additional specimens and field-cure with concrete represented; test to determine strength of concrete at proposed time of form or support removal.

G. Test Results: Testing agency shall report test results in writing to engineer and contractor within 24 hours of test.

1. Test reports shall contain the following data:

a. Project name, number, and other identification.

b. Name of concrete testing agency.

c. Date and time of sampling.

d. Concrete type and class.

e. Location of concrete batch in the completed work.

f. All information required by respective ASTM test methods.

2. Nondestructive testing devices such as impact hammer or sonoscope may be used at engineer's option for assistance in determining probable concrete strength at various locations or for selecting areas to be cored, but such tests shall not be the sole basis for acceptance or rejection.

3. The testing agency shall make additional tests of in-place concrete as directed by the engineer when test results indicate that specified strength and other concrete characteristics have not been attained.

a. Testing agency may conduct tests of cored cylinders complying with ASTM C 42, or tests as directed.

b. Cost of additional testing shall be borne by the contractor when unacceptable concrete has been verified.

END OF SECTION 03300