BOAT LIFTS AT THE OCEAN SPRINGS HARBOR

Project Manual

prepared for

MISSISSIPPI DEPARTMENT OF MARINE RESOURCES

VOLUME 1

MDMR PROJECT NO. 1450-17-R-IFBD-00003

JULY 2016

REV. C – ISSUED FOR BID (12/1/16)

216-015

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MISSISSIPPI DEPARTMENT OF MARINE RESOURCES

PROJECT MANUAL

FOR

BOAT LIFTS AT THE OCEAN SPRINGS HARBOR

***

CONSISTING OF:

BIDDING REQUIREMENTS

CONTRACT FORMS

CONDITIONS OF THE CONTRACT

SPECIFICATIONS

DRAWINGS

***

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COMPTON ENGINEERING, INC.
PASCAGOULA, MISSISSIPPI

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ADVERTISEMENT FOR BIDS
SECTION 00000

Sealed bids will be received at the office of the Mississippi Department of Marine Resources, 1141 Bayview Avenue, Biloxi, MS 39530, Fifth Floor Conference Rm., until 2:00:00 p.m. on

Thursday (*Day*), January 5, 2017 (*Date*)

Project # MDMR Project No. 1450-17-R-IFBD-00003

Boat Lifts at the Ocean Springs Harbor (Project Title)

Mississippi Department of Marine Resources (Using Agency)

Ocean Springs Harbor, Ocean Springs, Jackson County, MS (Location)

at which time they will be publicly opened and read. Contract Documents may be obtained from:

Plan House Printing
605 Main Street
Tupelo, MS 38804
Phone: (662) 407-0193
Email: tupelo@planhouseprinting.com

A deposit of $150.00 is required. Bid preparation will be in accordance with ***Instructions to Bidders*** bound in the Project Manual. The bid documents are being made available online at www.comptonengineeringplans.com. Cost includes shipping and handling for each set. The bid documents must be purchased through the website. All planholders are required to have a valid email address for online registration. For information regarding website registration and online orders, please contact Plan House Printing at the phone number shown above.

A Pre-Bid Conference is scheduled for Tuesday, December 13, 2016 at 1:00 P.M. at the site.

The Mississippi Department of Marine Resources reserves the right to waive irregularities and to reject any or all bids.

Signed:

Jamie Miller, Executive Director
Mississippi Department of Marine Resources

Dates of Publication: December 1, 2016
December 8, 2016

INSTRUCTIONS TO BIDDERS
SECTION 00100

PART 1 - GENERAL

1.01 **QUESTIONS:** Questions should be directed to the Professional. Should a Bidder find discrepancies in, or omissions from, the Drawings or Project Manual, or be in doubt as to their meaning, the Bidder should immediately notify the Professional. The Professional will send written instruction(s) or interpretation(s) to all known holders of the documents. Neither the Owner, nor the Professional, will be responsible for any oral instruction or interpretation.

1.02 **BIDDER'S QUALIFICATIONS:**

A. **Certificate of Responsibility:** The Mississippi State Board of Contractors is responsible for issuing Certificates of Responsibility to Contractors. To be awarded a Contract for public work, Sections 31-3-15 and 31-3-21 of the **Mississippi Code 1972, Annotated** requires a Contractor to have a current Certificate of Responsibility at bid time and during the entire length of the job. The Certificate of Responsibility number issued becomes a significant item in all public bidding.

B. **Bid Under $50,000:** If a Bidder submits a bid not exceeding $50,000, no Certificate of Responsibility number is required; however, a notation stating the *bid does not exceed $50,000* must appear on the face of the envelope, or a Certificate of Responsibility number.

C. **Bid Over $50,000:** Each Bidder submitting a bid in excess of $50,000 must show its Certificate of Responsibility number on the bid and on the face of the envelope containing the bid.

D. **Joint Venture Bid:** When multiple Contractors submit a joint venture bid in excess of $50,000, a *joint venture* Certificate of Responsibility number must be shown on the bid and on the face of the envelope containing the bid. If the Multiple-Contractor joint venture has no *joint venture* Certificate of Responsibility number, each of the Contractors participating in the bid must indicate their individual Certificate of Responsibility numbers on the bid and on the face of the envelope.

1.03 **NON-RESIDENT BIDDER:** When a non-resident Bidder (a Contractor whose principal place of business is outside the State of Mississippi) submits a bid for a Mississippi public works project, one of the following is required and shall be submitted with the Proposal Form:

A. **Copy of Law:** If the non-resident Bidder's state has a resident Bidder preference law, a copy of that CURRENT law shall be submitted with the Proposal Form. (modified to "current" August 2016)

B. **Statement:** If the state has no such law then a statement indicating *the State of (Name of State) has no resident Contractor preference law* shall be submitted with the Proposal Form.

1.04 **DISQUALIFICATION OF BIDDER:** A Bidder may be disqualified for any of the following reasons: (see 600.53)

A. Failure to comply with the bid requirements.

B. Bidder is in arrears on existing Contracts with the Bureau or another state agency.

C. Bidder is, or anticipates being, in litigation or arbitration with the Bureau or another state agency.

D. Bidder has defaulted on a previous Contract.

1.05 **CONDITIONS OF WORK:** Each Bidder must fully inform himself of all conditions relating to the construction of the Project and employment of labor thereon. Failure to do so will not relieve a successful Bidder of obligations to furnish all material and labor necessary to carry out the provisions of the Contract. Insofar as possible, the Bidder must employ methods, or means, which will not cause interruption of, or interference with, the work of any other Bidder, or Contractor.

1.06 **EXAMINATION OF SITE:** All Bidders, including the general Contractor and Subcontractors, shall visit the building site, compare the Drawings and Project Manual with any work in place and be informed of all conditions. Failure to visit the site will in no way relieve the successful Bidder from furnishing any materials or performing any work required to complete work in accordance with Drawings and Project Manual without additional cost to the Owner.

1.07 **LAWS AND REGULATIONS:** The Bidder's attention is directed to the fact that all applicable Mississippi state laws, rules and regulations of all authorities having jurisdiction over construction of the Project apply to the Contract.

1.08 **OBLIGATION OF BIDDER:** At the bid opening, each Bidder will be presumed to have inspected the site, read and become thoroughly familiar with the Drawings and the Project Manual, including all addenda.

1.09 **BID DOCUMENT DEPOSIT AND RETURN:** The deposit amount, if any, shall be established as the estimated actual cost of copying and reproduction plus shipping via USPS standard Ground Transportation, ~~is~~ shall be indicated in the Advertisement for Bids. Bidders may request shipping via express carrier or expedited delivery at their own additional cost. Upon returning the documents to the Professional within ten (10) working days of the bid date and in good condition, all document holders will be refunded the full deposit amount. Further, any document holder who is awarded the contract, related subcontracts and/or vendor agreements may elect to retain their documents and request refund of the full deposit amount upon execution of the construction contract and approval of general contractor, however; such documents shall be counted toward the total number of copies furnished free of charge to the general contractor. No partial sets of documents will be issued. Selected trade organizations, plan rooms and web-based distribution networks will be issued one (1) set of documents without charge. (modified August 2016) (see 600.50)

PART 2 - PROPOSAL FORM

2.01 **METHOD OF BIDDING:** Lump sum, single bids received on a general contract will include general, mechanical and electrical construction and all work shown on Drawings or specified in the Project Manual.

2.02 **PROPOSAL FORMS:** The Bidder shall make all proposals on forms provided and shall fill all applicable blank spaces without interlineations or alteration and must not contain recapitulation of the work to be done. No oral or telegraphic proposals will be considered.

2.03 **TIME OF COMPLETION:** The Bidder shall agree to commence work on, or before, a date specified in a written *Notice to Proceed* and fully complete the Project within the calendar days indicated on the Proposal Form.

2.04 **BASE BID AND ALTERNATES:**

A. On the Proposal Form, the Bidder shall write out the Base Bid amount in words and include the numerical amount. The written word shall govern.

B. The Proposal Form shall contain a brief description of each alternate modifying the scope. The Bidder shall write out the amount in words and include the numerical amount for each alternate. The written word shall govern. Refer to Section 01030 entitled *Alternates* for additional information.

2.05 **SUBSTITUTIONS:** No substitutions, qualifications or redefining of the Specification requirements are allowed to be marked on the Proposal Form, unless specifically required by the Bid Documents. Refer to Section 01630 entitled *Substitutions and Product Options* which covers procedures after the award of Contract (see 600.25.) (2.05 unchanged but modified 01630 August 2016)

2.06 **ADDENDA:** Any addenda to the Drawings or Project Manual issued before or during the time of bidding shall be included in the proposal and become a part of the Contract. The Proposal Form will have ample space to indicate the receipt of addenda. When completing the Proposal Form, the Bidder shall list the Addendum number in spaces provided. (see proposal form) (modified August 2016)

2.07 **BIDDER IDENTIFICATION:**

A. **Signature:** The Proposal Form shall be signed by any individual authorized to enter into a binding agreement for the Business making the bid proposal.

B. **Name of Business:** The name appearing on the Proposal Form should be the complete spelling of bidder's name - exact as recorded at the Secretary of State [http://www.sos.state.ms.us/busserv/corp/soskb/csearch.asp] which should be the same as you applied for at the Mississippi State Board of Contractors [http://www.msboc.us/Search2.CFM] (see 2.07, 3.01, 5.01, proposal form)

C. **Legal Address:** The address appearing on the Proposal Form should be the same address exact as recorded at the Secretary of State [http://www.sos.state.ms.us/busserv/corp/soskb/csearch.asp] which should be the same as you applied for at the Mississippi State Board of Contractors [http://www.msboc.us/Search2.CFM]

D. **Certificate of Responsibility Number(s):** The Certificate of Responsibility Number(s) appearing on the Proposal Form should be the same number appearing in the current Mississippi State Board of Contractors Roster.

2.08 **BID SECURITY:** The Bid Security shall be in the form of a Bid Bond, or a Certified Check: (modified Dec 2013 SoS) (see also 4.07 herein, 600.42, 600.57.9, 00600, 00650)

A. **Bid Bond:** The Bidder may submit a Bid Bond by a Surety licensed in Mississippi in the amount of five percent (5%) of the base bid. The Bid Bond shall be duly executed by the Bidder, a Mississippi Licensed Agent for said Surety approved by the Mississippi Insurance Department OR signed by the Surety AND countersigned by a Mississippi Licensed Agent for said Surety approved by the Mississippi Insurance Department.~~http://www.mid.state.ms.us/licapp/search_main.aspx~~ https://www.mid.ms.gov (or most up-to-date link) (No standard form is required for the Bid Bond.)

B. **Certified Check:** The Bidder may submit a certified check made out to the Mississippi Department of Marine Resources in the amount of five percent (5%) of the base bid. All checks received from Bidders will be returned upon request, unless a Bidder is one (1) of the three (3) apparent low Bidders. The three (3) apparent low Bidder's checks will be held for forty-five (45) days, unless a Contract is awarded and executed in less time.

2.09 **POWER OF ATTORNEY:** Each bid security must be accompanied by an appropriate Power of Attorney. No Power of Attorney is necessary with a certified check.

PART 3 - SUBMITTING THE PROPOSAL FORM

3.01 **SUBMITTAL:** A bid must be delivered to the address indicated on the Advertisement for Bids prior to the time and date stated. Only one original of Bid Proposal shall be submitted which should be sealed in an opaque envelope marked, mailed or hand-delivered as follows: (beginning 1/1/09 and for a reasonable time period, a duplicate copy will not disqualify your bid, but the second copy, without comparison, will be destroyed in the bid opening, not read aloud nor used thereafter, in order to prevent inadvertent differences in the duplicate forms): (also see 600.42)

(In upper left hand corner)
Name of Firm (complete spelling of bidder's name and address – exact as recorded at the Secretary of State which should be the same as you applied for at the Mississippi State Board of Contractors – see 2.07, 3.01, 5.01)

(Bid shall be addressed and delivered to)
Mississippi Department of Marine Resources
1141 Bayview Avenue
Biloxi, MS 39530

(In lower left hand corner)
Bid for Project # MDMR Project No. 1450-17-R-IFBD-00003
Title Boat Lifts at the Ocean Springs Harbor
Using Agency Mississippi Department of Marine Resources
Certificate of Responsibility # _____(for over $50,000.00)
Under $50,000.00 (add statement)

If the Bid is mailed, the bid envelope shall be placed inside a second envelope to prevent inadvertent premature opening of the Proposal.

3.02 **MODIFICATION TO BID:** A bidder may modify the bid prior to the scheduled closing time indicated in the Advertisement for Bids in the following manner:
A. **Notification on Envelope:** A modification may be written on the outside of the sealed envelope containing the bid.
B. **Facsimile:** A facsimile (fax) will not be acceptable.

3.03 **WITHDRAWAL OF BID:** Any bid may be withdrawn prior to the scheduled time for opening of bids. However, bids may not be withdrawn until forty-five (45) days after bid opening.

PART 4 - BID OPENING AND AWARD OF CONTRACT

4.01 **OPENING OF BIDS:** Bids will be publicly opened shortly after the time stated in the Advertisement for Bids. Bidder representatives are invited; however, attendance is not mandatory.

Closure of agency preventing the opening of bids at the advertised date and time due to Force Majeure Event reasons will result in bids being publicly opened . . . on the next business day that the agency shall be open and at the previously advertised time . . . . See 600.47 of the BoB Procedure Manual for wording in detail. (added Jan 2015)

4.02 **IRREGULARITIES:** The omission of any information requested on the Proposal Form may be considered as an informality, or irregularity, by the awarding public body when in their opinion the omitted information does not alter the amounts contained in the submitted bid proposal, or place other Bidders at a disadvantage.

4.03 **PROTEST:** Any protest must be delivered in writing to the Owner within twenty-four (24) hours after the bid opening.

4.04 **ERRORS:** Any claim of error and request for release from bid must be delivered in writing to the Owner within twenty-four (24) hours after the bid opening. The Bidder shall provide sufficient documentation with the written request clearly proving an error was made.

4.05 **AWARD OF CONTRACT:** The Owner reserves the right to reject any, or all bids. A Contract will be awarded on the basis of the low base bid, or low combination of base bid and those alternates selected by the Owner in any order determined to be in the best interest of the Using Agency and which produces a total within available funds.

4.06 **FAILURE TO ENTER INTO A CONTRACT:** The Bidder shall forfeit the Bid Security to the Owner as liquidated damages for failure, or refusal, to execute and deliver the Contract, Bond and Certificate of Insurance within ten (10) working days after notice of the acceptance of the bid/receipt of Contracts from the Professional. *("working" days added 11/3/10) (modified Jan 2015)*

4.07 **SECURITY FOR FAITHFUL PERFORMANCE:** (modified Dec 2013 SoS; Jan 2015 SoS) (see also 2.08 herein, 600.42, 600.57.9, 00600, 00650)

Simultaneously, with delivery of the executed Contract, the Contractor will furnish a Surety Bond, or Bonds, as security for faithful performance, the payment of all persons performing labor on the project, and furnishing materials in connection with this Contract. The Surety on such Bond, or Bonds, will be a duly authorized surety company satisfactory to the Owner and meeting all of the following requirements:

A. Licensed at the time of award by the State of Mississippi's Commissioner of Insurance for the purpose of providing surety. . ~~http://www.mid.state.ms.us/licapp/search_main.aspx~~ https://www.mid.ms.gov (or most up-to-date link)
B. Listed at the time of award in the Department of the Treasury's **Federal Register** as a company holding certificates of authority as acceptable sureties on Federal Bonds, commonly referred to as the Treasury List.
C. All Bonds shall be executed on the form provided in the Project Manual under Section 00600 entitled *Contract Bond*.
D. The Contract Bond shall be duly executed by the Bidder, a Surety licensed in Mississippi signed by a Mississippi Licensed Agent for said Surety approved by the Mississippi Insurance Department OR signed by the Surety AND countersigned by a Mississippi Licensed Agent for said Surety approved by the Mississippi Insurance Department with the name and address typed, or lettered legibly. (with Surety Seal, preferably embossed seal). ~~http://www.mid.state.ms.us/licapp/search_main.aspx~~ https://www.mid.ms.gov (or most up-to-date link)
E. All Bonds must be accompanied by an appropriate Power of Attorney dated same as Contract Bond (with Seal, preferably embossed seal).

PART 5 - BIDDER'S CHECKLIST

The following checklist is for the Bidder's assistance only. It is not inclusive and **is not a part of the bid documents**; therefore, this checklist does not have to be included with the Proposal Form when submitting a bid proposal.

5.01 **PROPOSAL FORM**: (only one original proposal form to be submitted) (also see 3.01 and 600.42 of Manual)

Base Bid

( ) Write in the amount of the base bid in words and numbers. The written word shall govern.

Alternates

( ) Write in each alternates amount in words and numbers. The written word shall govern.

Addenda

( ) Acknowledge the receipt of each addendum by writing in the number of the addendum. (modified August 2016)

Acceptance

( ) Proposal is signed by authorized person

( ) Name of Business - complete spelling of bidder's name and address - exact as recorded at the Secretary of State [http://www.sos.state.ms.us/busserv/corp/soskb/csearch.asp] which should be the same as you applied for at the Mississippi State Board of Contractors [http://www.msboc.us/Search2.CFM] (see 2.07, 3.01, 5.01, proposal form)

( ) Legal address of the business listed above (at SOS and Contractor's Board)

( ) Correct Certificate of Responsibility Number(s) as it appears in the current Mississippi State Board of Contractors Roster

Certificate of Responsibility Number(s) on envelope (see below for on proposal form)

( ) Base Bid is under $50,000 and no number is required

( ) Base Bid is under $50,000 and the statement "bid does not exceed $50,000" is on the outside of the sealed envelope

( ) Base Bid is over $50,000 and number is required

( ) Joint Venture and *joint venture* number is required

OR ( ) Joint Venture participants' numbers are required

5.02 **BID SECURITY:**

( ) Included Bid Bond

OR ( ) Included Certified Check

5.03 **POWER OF ATTORNEY:**

( ) Included Power of Attorney

5.04 **NON-RESIDENT BIDDER:**

( ) Attached a Copy of Non-Resident Bidder's Preference Law

OR ( ) Attached a Statement

5.05 **SUB-CONTRACTORS NAME** **Refer to 1.04 for responsiveness** (modified Dec 2013 SoS per 10/17/12 Addendum 1)

( ) List ~~your~~ any Mechanical, Plumbing, and/or Electrical Sub-Contractors regardless of cost. * List name even for under $50,000

* Fire Protection Sprinkler Contractors do not have to be listed
* If there is a separate HVAC/Plumbing Sub-Contractor, so notate as mentioned herein
* If Mechanical, Plumbing, and/or Electrical Sub-Contractor is performed by the General, be sure the General has a COR for said discipline
* If there is no Mechanical, Plumbing, and/or Electrical Sub-Contractor listed, then use of Sub-Contractor to perform such scope will not be permitted.

5.06 **SUB-CONTRACTORS' COR NUMBER** **Refer to 1.04 for responsiveness** (modified Dec 2013 SoS per 10/17/12 Addendum 1)

( ) * List Certificate of Responsibility Number for any listed Sub-Contractor over $50,000.00

* If under $50,000 – so notate on the COR line "under $50,000" (or can still show COR#)

***** END OF SECTION *****

PROPOSAL FORM
SECTION 00300

To: Mississippi Department of Marine Resources
1141 Bayview Avenue
Biloxi, MS 39530

Re: Project # MDMR Project No. 1450-17-R-IFBD-00003
Project Title Boat Lifts at the Ocean Springs Harbor
Location Ocean Springs Harbor, Ocean Springs, Jackson County, MS

I propose to complete all work in accordance with the Project Manual and Drawings within _____ consecutive calendar days for the sum of: (Professional must specify number of days)

BASE BID: **(**Write in the amount of the base bid in words and numbers. The written word shall govern.)

_____ Dollars ($_____)

ALTERNATES: **(**Write in the amount of all of the alternates in words and numbers. The written word shall govern.)

Alternate #1 ( ) Adds ( ) Deducts
_____
Dollars ($_____)
Description Pier 4: This alternate includes providing Pier 4 complete. See Section 01900 for a detailed scope.
_____

Alternate #2 ( ) Adds ( ) Deducts
_____
Dollars ($_____)
Description Boat Shelter: This alternate includes providing the wood shelter over the boat lifts. See Section 01900 detailed scope.
_____

Alternate #3 ( ) Adds ( ) Deducts
_____
Dollars ($_____)
Description _____
_____

Alternate #4 ( ) Adds ( ) Deducts
_____
Dollars ($_____)
Description _____
_____

Alternate #5 ( ) Adds ( ) Deducts
_____
Dollars ($_____)
Description _____
_____

ADDENDA ACKNOWLEDGMENT: (modified dates August 2016)

No. _____ No. _____ No. _____

No. _____ No. _____ No. _____

ACCEPTANCE:

I certify that I am authorized to enter into a binding contract, if this Proposal is accepted.

Signature _____ Date _____
Name and Title _____
Name of Business _____

Complete spelling of bidder's name and address - exact as recorded at the Secretary of State [http://www.sos.state.ms.us/busserv/corp/soskb/csearch.asp] which should be the same as you applied for at the Mississippi State Board of Contractors [http://www.msboc.us/Search2.CFM] (see 2.07, 3.01, 5.01) **PLEASE LOOK IT UP at SoS. SoS rules when the 2 are different.**

Address _____(mailing)
Address_____(physical)
City/State/Zip Code_____County _____
Phone _____ Fax _____ Email _____

- **Bidder's Certificate of Responsibility Numbers(s)**: _____
- **MINORITY BUSINESS ENTERPRISE? Yes _____ No _____** (to assist with Code 57-1-57)

- Attach copy of Non-Resident Bidder's Preference Law (5.04 of Bidder's Checklist)

- **Mechanical / Plumbing / Electrical Contractors:** (modified Dec 2013 SoS per 10/17/12 Addendum 1 & Feb 2014)

Regarding said Divisions of the Specifications of the BoB Standard Form of Agreement Between The Owner and The Contractor

List any Mechanical/Plumbing and/or Electrical Sub-Contractors that will perform work of this contract. COR must be included where sub-contract exceeds $50,000.00. If no sub-contractor is listed, and such work is within scope of contract, bidder's own COR classification(s) must be sufficient to self-perform any such work. If no sub-contractor is listed, then use of sub-contractor to perform such scope will not be permitted. This is in accordance with 5.05 and 5.06 of the Bidder's Checklist revised below.

Mechanical Contractor: _____ Certificate of Responsibility No. _____
Plumbing Contractor: _____ Certificate of Responsibility No. _____
Electrical Contractor: _____ Certificate of Responsibility No. _____

- Mississippi Department of Agriculture & Commerce
  Bureau of Plant Industry
  Landscape License Number _____ MS Code 69-19-1 – 69-19-15
  ↑Complete for prime landscaping projects

STANDARD FORM OF AGREEMENT BETWEEN THE OWNER AND THE CONTRACTOR
SECTION 00500

This Agreement made the _____ day of _____, 20_____ between the Owner,

Mississippi Department of Marine Resources
1141 Bayview Avenue
Biloxi, MS 39530

created by Section 7-1-451 et seq., and Section 31-11-1, et seq., **Mississippi Code of 1972, Annotated**, and acting for the State of Mississippi;

and between the Contractor:

Business Name _____
Address _____
City/State/Zip _____Fax:_____Email:_____

The Contractor is a (check and complete one of the following):

_____ ☐ CORPORATION or ☐ LLC solely organized and existing under the laws of the State of _____ and having its principal office in _____, _____, _____
(City) (County) (State

_____ PARTNERSHIP of the following (list all partners):
_____
_____
_____

_____ SOLE PROPRIETORSHIP

For the following Project:

GS#

This Agreement entered into as of the day and year first written above:

OWNER: MISSISSIPPI DEPARTMENT OF MARINE RESOURCES

By:_____
(Signature)

Jamie Miller, Executive Director
(Name and Title)

CONTRACTOR:

By:_____
(Signature)

_____
(Name and Title)

APPROVED AS TO FORM:

By: _____
(Signature of Attorney)

THE OWNER AND THE CONTRACTOR AGREE AS SET FORTH IN PAGES ONE THROUGH THREE, ARTICLES ONE THROUGH FIVE, AS FOLLOWS:

ARTICLE 1: THE WORK AND CONTRACT DOCUMENTS
THE WORK

1.1.1 The Contractor will perform all the work required by the Contract Documents for the Project indicated above.

1.2 **THE CONTRACT DOCUMENTS**

1.2.1 The Contract Documents which constitute the entire Agreement between the Owner and the Contractor, are enumerated as follows:

1.2.2 Project Manual dated 12/1/16

BIDDING REQUIREMENTS
- Advertisement for Bids
- Instructions to Bidders
- Proposal Form

STANDARD FORM OF AGREEMENT BETWEEN THE OWNER AND THE CONTRACTOR
CONTRACT BOND
POWER OF ATTORNEY
CERTIFICATE OF INSURANCE
CONDITIONS OF THE CONTRACT
- General Conditions
- Supplementary Conditions
- Labor Requirements
- Addenda

SPECIFICATIONS (check the specs listed on the contents and included in the manual)
- _X_ Division One: General Requirements
- _X_ Division One Supplements
- _X_ Division Two: Site Work
- _X_ Division Three: Concrete
- ____ Division Four: Masonry
- _X_ Division Five: Metals
- _X_ Division Six: Wood and Plastics
- _X_ Division Seven: Thermal and Moisture Protection
- ____ Division Eight: Doors and Windows
- ____ Division Nine: Finishes
- ____ Division Ten: Specialties
- ____ Division Eleven: Equipment
- ____ Division Twelve: Furnishings
- ____ Division Thirteen: Special Construction
- ____ Division Fourteen: Conveying Systems
- _X_ Division Fifteen: Mechanical
- _X_ Division Sixteen: Electrical
- ____ Division Seventeen: Commissioning

1.2.3 Addenda
Addendum No. 1, dated _____
Addendum No. 2, dated _____
Addendum No. 3, dated _____
Addendum No. 4, dated _____
Addendum No. 5, dated_____

1.2.4 Drawings dated 12/1/16
Sheets No. G0.0, G1.0, and G2.0
Sheets No. C1.0 and C2.0
Sheets No. D1.0, D1.1, and D1.2
Sheets No. S1.0, S1.1, S1.2, S2.1, S2.2, S2.3, S3.1, & S3.2
Sheets No. E1.1, E1.2, and E1.3

1.2.5.1 Other documents, dated
_____
_____

ARTICLE 2: CONTRACT SUM

2.1 **CONTRACT SUM**

2.1.1 The Owner will pay the Contractor in current funds for the performance of the work, subject to additions and deductions by Change Order as provided in the Contract Documents, the Contract sum of

_____Dollars

($ _____). The Contract sum is determined as follows:

Base Bid		$_____
Modifications	( ) Adds ( ) Deducts	$_____
Negotiations		$_____
Alternate No. _____	( ) Adds ( ) Deducts	$_____
Alternate No. _____	( ) Adds ( ) Deducts	$_____
Alternate No. _____	( ) Adds ( ) Deducts	$_____
Alternate No. _____	( ) Adds ( ) Deducts	$_____
Alternate No. _____	( ) Adds ( ) Deducts	$_____
Total Contract Sum		$_____

2.2 **LIQUIDATED DAMAGES**

2.2.1 The stipulated liquidated damages described in Paragraph 9.11 of the *Supplementary Conditions* are in the amount of_____ _____ Dollars ($ _____) for each calendar day.

ARTICLE 3: CONTRACT TIME

3.1 **TIME**

3.1.1 The work to be performed under this Contract shall be commenced upon the date stated in the *Notice to Proceed*. The work is to be substantially complete, subject to approved Change Orders, no later than _____ calendar days from the date stated in the *Notice to Proceed*.

ARTICLE 4: PAYMENTS AND FINAL PAYMENTS

4.1 **PROGRESS PAYMENTS**

4.1.1 Based upon applications for payment submitted to the Professional by the Contractor and *Certificates for Payment* issued by the Professional, the Owner will make progress payments on account of the Contract sum to the Contractor as provided in the Contract Documents.

4.2 **FINAL PAYMENT**

4.2.1 Final payment constituting the entire balance of the Contract sum will be paid by the Owner to the Contractor when the work has been completed, the Contract fully performed and a final Certificate for Payment has been issued by the Professional and approved by the Owner.

ARTICLE 5: MISCELLANEOUS PROVISION

5.1 **DEFINITION OF TERMS**

5.1.1 Terms used in this Agreement which are defined in the Conditions of the Contract will have the meanings designated in those Conditions.

5.2 **CONTRACTOR'S INTEREST IN AGREEMENT**

5.2.1 The Contractor will not assign, sublet, or transfer the interest in this Contract agreement without the written consent of the Owner. The Owner and Contractor hereby agree to the full performance of the covenants contained herein.

5.3 **PROFESSIONAL**

5.3.1 The Professional assigned to this Project is as follows:

Name_____

Address_____

Telephone _____ Fax Number _____ E-Mail Address_____

***** END OF SECTION *****

CONTRACT BOND
SECTION 00600

I. PREAMBLE

KNOW ALL MEN BY THESE PRESENTS: THAT _____, Principal, a _____, residing at _____, authorized to do business in the State of Mississippi under the laws thereof, and _____Surety, a corporation of the State of _____, authorized to do business in the State of Mississippi under the laws thereof, are held and firmly bound unto the Mississippi Department of Marine Resources of the State of Mississippi, Obligee, hereinafter referred to as "Owner," for the use and benefit of the Owner and those claimants and others set forth herein below and described in Sections 31-5-51 and 31-5-3, **Mississippi Code of 1972, Annotated**, as amended, in the amount of _____ _____ Dollars ($_____), lawful money of the United States, for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these present.

WHEREAS, Principal has by written agreement dated _____, 20_____, entered into a Contract with the Owner for the following:

_____

_____

_____

as provided in said Contract and in accordance with the Contract Documents. All of the terms and provisions of the above mentioned Contract, drawings, Project Manual, and addenda are by reference made a part hereof and fully incorporated herein, and are hereinafter referred to as "the Contract." All of the terms and provisions of Sections 31-5-51, 31-5-3, supra, Section 31-5-53 of the **Mississippi Code of 1972, Annotated**, as amended, and all other code sections cited herein are also by reference made a part hereof and fully incorporated herein.

II. PERFORMANCE BOND

NOW, THEREFORE, the condition of this Performance Bond is such that if Principal shall promptly and faithfully perform said Contract, then this obligation shall be null and void; otherwise, it shall remain in full force and effect, subject however, to the following conditions:

Whenever the Owner has performed its obligation but the Principal has defaulted under the terms of the Contract, or any portion thereof, and the Owner has declared the Principal to be in default, the Surety shall promptly:

1. Remedy the default, or
2. Complete the Contract in accordance with its terms and conditions, or
3. Procure the completion of the Contract in accordance with its terms and conditions.

Even if there should be a succession of defaults, the Surety is responsible for completion of the Contract. The Surety shall provide sufficient funds to pay the cost of completion of the Contract in its entirety including other costs and damages for which the Surety may be liable thereunder, less the balance of the Contract price. The term "balance of the Contract price," as used in this paragraph, shall mean the total amount payable by Owner to Principal under the Contract and any Change Orders thereto, less the amount paid by Owner to Principal.

III. LABOR AND MATERIAL PAYMENT BOND

NOW, THEREFORE, the condition of this Labor and Material Payment Bond is such that if Principal shall promptly make payments to all persons supplying labor or material used in the prosecution of the work under said Contract, then this obligation shall be null and void; otherwise, it shall remain in full force and effect; however, the Owner shall not be liable for the payment of any costs or expenses of any suit described in Subsection (2) of Section 31-5-51, supra.

IV. BOND FOR PAYMENT OF TAXES AND OTHER ASSESSMENTS

NOW THEREFORE, the condition of this Bond for Payment of Taxes and Other Assessments is such that if Principal shall promptly make payment of all taxes, licenses, assignments, contributions, damages, penalties, and interest thereon, when and as the same may lawfully be due the State of Mississippi, or any County, Municipality, Board, Department, Commission, or political subdivision thereof, by reason of and directly connected with the performance of said Contract or any part thereof as provided by Sections 27-65-1, 27-65-21, 27-67-1, and 31-5-3, **Mississippi Code 1972, Annotated**, or any other applicable statute or other authority, then this obligation shall be null and void; otherwise, it shall remain in full force and effect.

V. GENERAL CONDITIONS

The following conditions apply to all three (3) of the above-mentioned Bonds:

1. The Performance Bond is for an amount equal to the full amount of said Contract.
2. The Labor and Material Payment Bond is for an amount equal to the full amount of said Contract.
3. If any changes are made in the work, or any extensions of time are granted, or any increases in the total dollar amount of the Contract are made, such changes, extensions, increases, or other forbearance on the part of either the Owner or the Principal will not, in any way, release the Principal and Surety, or either of them, from their liability hereunder, or any portion thereof, notice to the Surety of any such change, extension, increase, or forbearance being expressly waived.
4. These Bonds are governed by and shall be construed in accordance with Mississippi law. Any inconsistency with these Bonds and any provision of Mississippi law shall be remedied by deleting the inconsistent portion of these Bonds and leaving the remaining consistent portions in full force and effect.

Signed and sealed this _____ day of _____, 20_____.

SURETY _____
Mississippi NAIC number: _____

By: _____
(Signature)

_____ Attorney-in-Fact
(Typed Name) (Title)
Surety Agent Mississippi License Number: _____

_____
(Surety Address)

_____
(Surety City/State/Zip/Phone)

COUNTERSIGNED: (if applicable)

_____
MISSISSIPPI LICENSED AGENT COMPANY NAME
Mississippi NAIC number: _____

_____
(Signature)

_____ Licensed Mississippi Agent
(Typed Name) (Title)
Countersignature Agent MS License Number: _____

_____
(MS Licensed Agent Address)

_____
(MS Licensed Agent City/State/Zip/Phone)

PRINCIPAL _____

By: _____
(Signature) (same person on Bond and Contract page)

_____
(Typed Name and Title)

_____
(Address)

_____
(City/State/Zip/Phone)

Surety Company, Surety Agent's Name, Address, etc. should be typed and with seal (preferably embossed seal) on Bond and P/A. The P/A should be for the Attorney-in-Fact with seal (preferably embossed seal).

The Contract Bond shall be duly executed by the Bidder AND a MS Licensed Agent said Surety approved by the MS Ins Dept
OR
signed by the Surety's Agent AND countersigned by a MS Licensed Agent for said Surety approved by the MS Ins Dept.

Countersignature can be the same as the Attorney-in-Fact when the Attorney-in-Fact is licensed in Mississippi. Countersignature will be different when the Attorney-in-Fact is "not" licensed in Mississippi. P/A will be for the Attorney-in-Fact.

Check the Surety Company AND the Surety Agent
AND/OR the Countersignature at MS Ins Dept web:
~~http://www.mid.state.ms.us/licapp/search_main.aspx~~ https://www.mid.ms.gov
(or most up-to-date link)
Easier to locate Agent at MID when name agrees with MID licensed name.)

(Bond Agent MID or Code requirements are different from the Ins Cert Agent MID or Code requirements.)

STANDARD CONSTRUCTION CONTRACT
CERTIFICATE OF INSURANCE

This certificate of insurance neither affirmatively nor negatively amends, extends, or alters the coverage afforded by the policies below.

INSURED: (Contractor's Name & Address)		**COMPANIES PROVIDING COVERAGE w/ MID Lic or NAIC #**
	A	#
	B	#
PROJECT: (Number, Name & Location)	**C**	#
	D	#
	E	#
OWNER: Mississippi Department of Marine Resources	**F**	#
	G	#
	Companies above must be approved by the MS Ins Dept at https://www.mid.ms.gov (or most up-to-date link) per Code & WComp at http://www.mwcc.ms.gov/ (MID mod'd 041615)	

Type Insurance	Co	Policy Number	Policy Period	Coverage and Minimum Amount	
General Liability Commercial General Liability				General Aggregate	$ 1,000,000
				Products Comp/Ops (Aggregate)	$ 1,000.000
				Personal Injury (Per Occurrence)	$ 500,000
				BI & PD (Per Occurrence)	$ 1,000,000
				Fire Damage (Per Fire)	$ 50,000
				Medical Expense (Per Person)	$ 5,000
Owners/Contractors Protective Liability				General Aggregate	$ 1,000,000
				Per Occurrence	$ 500,000
Automobile Liability				Bodily Injury/Property Damage Combined Single Limit (Per Occurrence)	$ 500,000
				OR Bodily Injury (Per Person)	$ 250,000
				Bodily Injury (Per Accident)	$ 500,000
				Property Damage (Per Occurrence)	$ 100,000
* Excess Liability (Umbrella on projects over $500,000)				Aggregate	$ 1,000,000
				Per Occurrence	$ 1,000,000
Workers' Compensation (As required by Statute) Employers' Liability				Accident (Per Occurrence)	$ 100,000
				Disease-Policy Limit	$ 500,000
				Disease-Per Employee	$ 100,000
Property Insurance (not required when project is demolition ONLY – required for ALL other projects including paving)				**OR** Builders' Risk Installation Floater	Must be equal to Value of Work
Other					

Certification: I certify that these policies (subject to their terms, conditions and exclusions) have been (1) issued to the Insured for the coverages and at least the amounts as indicated by companies licensed in Mississippi; (2) countersigned by a Mississippi Licensed Agent; and (3) endorsed to require the company to give thirty (30) days written notice to the Owner prior to cancellation or non-renewal of above.

Producing Agent: (Name, Address and Telephone)	(Signature) (Date) MID Lic # or countersign below
	(Name and Title of Authorized Representative) (typed)
	Agent must be approved by the MS Ins Dept or countersign https://www.mid.ms.gov

☐ Check if Mississippi Licensed Agent
OR Countersign by Mississippi Licensed Agent MID Lic #

_____ _____

CERTIFICATE OF INSURANCE INSTRUCTIONS
SECTION 00650

1. The *Certificate of Insurance* is a tabulation of insurance required for this Project as specified in Article 11 entitled *Insurance and Bonds* in the General Conditions (AIA Document A201, Sixteenth Edition, 2007).

2. The *Certificate of Insurance* must be completed, certified by the original signature of a Mississippi Licensed Insurance Agent and/or countersignature, dated, and bound in each set of the Contract Documents. Insurance Companies providing coverage and Agent and/or Countersignature Agent must be approved by the Mississippi Insurance Department on their web at ~~http://www.mid.state.ms.us/licapp/search_main.aspx~~ https://www.mid.ms.gov (or most up-to-date link). (Agent does not have to be on the MID web "for providers necessarily" – but must be an approved Agent on MID web. Easier to locate Agent at MID when name agrees with MID licensed name.)

3. Indicate Insured, Project, Companies providing coverage, policy numbers and policy periods in the blanks as applicable.

4. If the "OWNERS/CONTRACTORS PROTECTIVE LIABILITY" insurance is part of the Commercial General Liability Insurance Policy, or included by endorsement, indicate the policy number and period of the CGL policy in the "OWNERS/CONTRACTORS PROTECTIVE LIABILITY" blank spaces.

5. Automobile Liability Insurance may be provided which covers Bodily Injury and Property Damage in one (1) Combined Single Limit, or may be provided with separate minimum limits as shown on the Certificate of Insurance and specified in Article 11 of the Supplementary Conditions. The person signing the Certificate of Insurance should show which option the Contractor has selected by marking out the coverage that is not provided under the policies indicated.

6. OTHER INSURANCE (if required) will be indicated by typing in the "OTHER" block and detailed in Article 11 of the Supplementary Conditions.

7. CERTIFICATION wording may not be changed without specific written approval from the Owner.

8. "Riders", Binders, TBA, TBD, or other unsolicited attachments, are not allowed as part of the *Certificate of Insurance* unless specifically requested in writing by the Owner, or specified as part of the requirements for this Project.

9. CAUTION: The *Certificate of Insurance* is intended to be used for all Projects. The Contractor must provide all insurance specified in the Contract Documents for this Project, whether indicated on this form, or not. The Contractor must verify all insurance has been provided as required.

10. In accepting the Insurance Certificate by Owner, it would be helpful if some indication is given when, and if, the Provider is a Surplus Line Carrier, a Broker, or Self Insured (because they may not be on the MID web list referenced herein). (The Owner will have to ask MID (or know) at some point.)

11. The Workers Comp insurance provider must be approved and show up on the Workers Comp web at http://www.mwcc.state.ms.us / Services / Proof of Coverage Inquiry / accept / etc. and at the last step – enter the "contractor's name".

Note: Regarding #2 and #11. At the MID web – you enter the Surety Company / Provider / Agent. At the MWWC web – you enter the Vendor's name, then click on the policy number to see the MWWC Ins Provider.

***** END OF SECTION *****

GENERAL CONDITIONS
SECTION 00700

PART 1 - GENERAL

1.01 **DESCRIPTION**

A. **SCOPE:** The **General Conditions of the Contract for Construction**, AIA Document A201, Sixteenth Edition, 2007, Articles 1 through 15 inclusive, is a part of this Contract and is incorporated herein.

B. **BIDDING COPY:** For the purpose of bidding, Contractors are presumed to be familiar with AIA Document A201, a copy of which may be obtained from the Professional, or examined in the Professional's office.

***** END OF SECTION *****

2007 SUPPLEMENTARY CONDITIONS
SECTION 00800

PART 1 – GENERAL

1.01 **DESCRIPTION**

A. **Owner:** These supplements are necessary because the Owner is an agency, or political subdivision, of the State of Mississippi and occupies a different position from that of the usual Owner.

B. **Document:** The following supplements modify, change, delete from, or add to the **General Conditions of the Contract**, AIA Document A201, Sixteenth Edition, 2007. When any Article of the **General Conditions** is modified, or deleted, by these *Supplementary Conditions*, the unaltered provisions of that Article, Paragraph, Subparagraph, or Clause will remain in effect.

Article 1
GENERAL PROVISIONS

1.1 **BASIC DEFINITIONS**

1.1.1 **The Contract Documents**: Delete the last sentence of this Subparagraph and substitute the following sentence:

The Contract Documents include the Advertisement for Bids, Instructions to Bidders, Proposal Form, sample forms and all portions of addenda issued prior to execution of the Contract.

1.1.9 Add a new Subparagraph as follows:

COMMISSIONING AUTHORITY PROFESSIONAL
A professional independent of the project engineer or architect retained by the owner who manages a quality focused process for enhancing the delivery of the project. The process focuses upon verifying and documenting that the facility and all of its systems are planned, designed, installed, tested, operated, and maintained to meet the Owner's project requirements.

1.5 **OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE**

1.5.1 Add a new sentence at the end of this Subparagraph:

This Paragraph in no way supersedes the Owner's document rights set forth in the Agreement Between the Owner and the Professional.

1.5.3 Add a new Subparagraph as follows: (Added Sept-Dec 2013)

Transparency. In accordance with the Mississippi Accountability and Transparency Act of 2008, §27-104-151, et seq., of the Mississippi Code of 1972, as Amended, the American Accountability and Transparency Act of 2009 (P.L. 111-5), where applicable, and §31- 7-13 of the Mississippi Code of 1972, as amended, where applicable, a fully executed copy of this agreement shall be posted to the State of Mississippi's accountability website at: https://www.transparency.mississippi.gov

Article 2
OWNER

2.1 **GENERAL**

2.1.1 Change this Subparagraph to read as follows:

The Owner, as used in these Documents, refers to the Mississippi Department of Marine Resources, acting for and on behalf of the State of Mississippi and for the benefit of the Institution, Agency, or Department for which the Work under this Contract is being performed. The Owner is the entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner's representative, who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization, is the individual who signed the Construction Contract for the Owner. Except as otherwise provided in Subparagraph 4.2.1, the Architect does not have such authority. The term"Owner" means the Owner or the Owner's authorized representative.

2.2 **INFORMATION AND SERVICES REQUIRED OF THE OWNER**

2.2.5 Change this Subparagraph to read as follows:

Unless otherwise provided in the Contract Documents, the Contractor will be furnished, free of charge, such copies of Drawings and Project Manuals as are reasonably necessary, but in no instance to exceed twenty-five (25) copies, for the execution of the Work.

Article 3
CONTRACTOR

3.3 **SUPERVISION AND CONSTRUCTION PROCEDURES**

3.3.1 Change the last sentence to read as follows:

If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner and Architect shall be responsible for any resulting loss or damage.

3.4 **LABOR AND MATERIALS**

3.4.4 Modify the Subparagraph as follows: (Modified Sept-Dec 2013)

Employee Status Verification System *If applicable, the Contractor represents and warrants that it will ensure its compliance with the Mississippi Employment Protection Act, Section 71-11-1, et seq. of the Mississippi Code Annotated (Supp 2008), and will register and participate in the status verification system for all newly hired employees. The term "employee" as used herein means any person that is hired to perform work within the State of Mississippi. As used herein, "status verification system" means the Illegal Immigration Reform and Immigration Responsibility Act of 1996 that is operated by the United States Department of Homeland Security, also known as the E-Verify Program, or any other successor electronic verification system replacing the E-Verify Program. The Contractor agrees to maintain records of such compliance and, upon request of the State and approval of the Social Security Administration or Department of Homeland Security, where required, to provide a copy of each such verification to the State. The Contractor further represents and warrants that any person assigned to perform services hereunder meets the employment eligibility requirements of all immigration laws of the State of Mississippi. The Contractor understands and agrees that any breach of these warranties may subject the Contractor to the following: (a) termination of this Agreement and ineligibility for any state or public contract in Mississippi for up to three (3) years, with notice of such cancellation/termination being made public, or (b) the loss of any license, permit, certification or other document granted to the Contractor by an agency, department or governmental entity for the right to do business in Mississippi for up to one (1) year, or (c) both. In the event of such cancellation/termination, the Contractor would also be liable for any additional costs incurred by the State due to the contract cancellation or loss of license or permit.*

3.4.5 Add a new Subparagraph as follows: (Modified Sept-Dec 2013)

In providing labor for the proper execution and completion of the Work, the Contractor shall comply with the provisions of Section 31-5-17 and Section 31-5-19 of the Mississippi Code of 1972, Annotated.

3.4.6 Add a new Subparagraph as follows: (Modified Sept-Dec 2013)

In providing materials for the proper execution and completion of the Work, the Contractor shall comply with the provisions of Section 31-5-23 of the Mississippi Code of 1972, Annotated.

3.9 **SUPERINTENDENT**

3.9.2 Change the second line in this Subparagraph to read as follows:

The Architect shall, within a reasonable time, notify the Contractor in writing of any objection to the proposed superintendent.

3.15 **CLEANING UP**

3.15.2 Change this Subparagraph to read as follows:

If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost thereof shall be charged to the Contractor.

3.16 **ACCESS TO WORK**

Change this Paragraph to read as follows:

The Contractor shall provide the Owner, Architect, Commissioning Authority Professional, and their authorized representatives access to the Work in preparation and progress wherever located.

3.18 **INDEMNIFICATION**

3.18.3 Modify the Subparagraph as follows: (Modified Sept-Dec 2013)

Indemnification *To the fullest extent allowed by law, Contractor shall indemnify, defend, save and hold harmless, protect, and exonerate the State of Mississippi, its Commissioners, Board Members, officers, employees, agents, and representatives from and against all claims, demands, liabilities, suits, actions, damages, losses, and costs of every kind and nature whatsoever, including, without limitation, court costs, investigative fees and expenses, and attorneys' fees, arising out of or caused by Contractor's and/or its partners, principals, agents, employees, and/or subcontractors in the performance of or failure to perform this Agreement. In the State's sole discretion, Contractor may be allowed to control the defense of any such claim, suit, etc. In the event Contractor defends said claim, suit, etc., Contractor shall use legal counsel acceptable to the State; Contractor shall be solely liable for all reasonable costs and/or expenses associated with such defense and the State shall be entitled to participate in said defense. Contractor shall not settle any claim, suit, etc., without the State's concurrence, which the State shall not unreasonably withhold.*

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Article 4
ARCHITECT

4.1 **GENERAL**

4.1.4 Add a new Subparagraph as follows:

The term "Architect," "Engineer," or "Professional" as used in these Documents refers to the Professional firm indicated in Paragraph 5.3.1 of the Standard Form of Agreement Between the Owner and the Contractor who has been directed by the Owner to design and inspect construction of this Project.

4.2 **ADMINISTRATION OF THE CONTRACT**

4.2.1 Change the first line of this Subparagraph to read as follows:

The Architect will provide administration of the Contract as described in the Contract Documents, and will be the Owner's representative (1) during construction, (2) until the final payment is due and (3) with the Owner's concurrence, from time to time during the one year period for correction of Work described in Section 12.2.

Article 5

Division 0

SUBCONTRACTORS

5.2 **AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK**

5.2.1 Change the first line of this Subparagraph to read as follows: (modified Jan 2015) (see also 600.55; Div 1-01010.1.01.F)

Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, prior to award of the Contract by the Owner, shall furnish in writing to the Owner through the Professional, the names, disciplines, and COR #'s of Sub-Contractors over Fifty Thousand Dollars ($50,000.00) (as well as entities who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. Such list shall also include any Mechanical, Plumbing, or Electrical Sub-Contractor listed on Proposal Form regardless of amount.

Article 6
CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

No supplementary conditions.

Article 7
CHANGES IN THE WORK

7.2 **CHANGE ORDERS**

7.2.2 Add a new Subparagraph as follows:

The maximum cost included in a Change Order for profit and overhead is limited to twenty percent (20%) of the total of the actual cost for materials, labor and subcontracts. Profit and overhead include: all taxes, fees, permits, insurance, bond, job superintendent, job and home office expense. All Subcontractors shall acquiesce to the same requirements when participating in a Change Order.

7.3 **CONSTRUCTION CHANGE DIRECTIVES**

7.3.9 Delete this Subparagraph in its entirety.

Article 8
TIME

8.1 **DEFINITIONS**

8.1.2 Change this Subparagraph to read as follows:
The date of commencement of the Work is the date established in the Notice to Proceed.

8.3 **DELAYS AND EXTENSIONS OF TIME**

8.3.1 Change this Subparagraph to read as follows:

If the Contractor is delayed at any time in the commencement or progress of the Work by any act of neglect of the Owner or the Architect, or by any employee of either, or by changes ordered in the Work, or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or any causes beyond the Contractor's control, or by any other causes which the Architect determines may justify the delay, then the Contract Time may be extended by Change Order for such reasonable time as the Architect may determine, subject to the Owner's approval. Any claim for loss or any delay occasioned by any separate Contractor, or Subcontractor, shall be settled between the Contractor and such other separate Contractor, or Subcontractors.

Article 9

Division 0

9.2 **SCHEDULE OF VALUES**

Change this Paragraph to read as follows:

Where the Contract is based on a stipulated sum, the Contractor shall submit to the Architect, at least 10 days before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work, and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect or Owner, shall be used as a basis for reviewing the Contractor's Applications for Payment.

9.3 **APPLICATIONS FOR PAYMENT**

9.3.1 Add a new sentence to the end of this Subparagraph:

The form of Application for Payment will be AIA Document G702, Application and Certification for Payment, supported by AIA Document G703, Continuation Sheet, or a computer generated form containing similar data.

9.3.1.1 Delete this Subparagraph in its entirety.

9.3.1.3 Add a new Clause to Subparagraph 9.3.1 as follows: (see also Manual 700.28) (modified Sept-Dec 2013)

On any contract as described herein, of which the total amount is Two Hundred Fifty Thousand Dollars ($250,000.00) or greater, or on any contract with a subcontractor, regardless of amount, five percent (5%) shall be retained until the Work is at least fifty percent (50%) complete, on schedule and satisfactory in the architect's and/or engineer's opinion, at which time fifty percent (50%) of the retainage held to date shall be returned, subject to consent of surety, to the prime contractor for distribution to the appropriate subcontractors and suppliers; provided, however, that future retainage shall be withheld at the rate of two and one-half percent (2 1/2%). When submitting request for reduction in retainage, the Contractor will include, with the application, a Consent of Surety to Reduction which is AIA Form G707A, and a Power of Attorney. (Code 31-5-33)

9.3.1.4 Add a new Clause to Subparagraph 9.3.1 as follows:

The Contractor must submit each month with this Application for Payment a separate letter stating that he is requesting an extension of time or that he had no need for an extension for that period of time. No payment on a monthly application will be considered due and payable until the letter is received. Complete justification such as weather reports or other pertinent correspondence must be included for each day's request for extension. A Contractor's letter, or statement, will not be considered as adequate justification. The receipt of this request and data by the Owner will not be considered as Owner approval in any way.

9.3.2.1 Add a new Clause to Subparagraph 9.3.2 as follows:

Payment on materials stored at some location other than the building site, may be approved by the Architect and the Owner after the Contractor has submitted the following items:

.1 *An acceptable Lease Agreement between the General Contractor and the owner of the land, or building, where the materials are stored covering the specific area where the materials are located.*
.2 *Consent of Surety, or other acceptable Bond, to cover the materials stored off-site.*
.3 *All Perils Insurance coverage for the full value of the materials stored off-site.*
.4 *A Bill of Sale from the Manufacturer to the General Contractor for the stored materials.*
.5 *A complete list and inventory of materials manufactured, stored and delivered to the storage site and of materials removed from the storage site and delivered to the job site.*
.6 *A review by the Architect of the materials stored off-site prior to release of payment.*
.7 *Guarantee no storage costs, additional delivery fees, or subsequent costs to the Owner.*

9.5 **DECISIONS TO WITHHOLD CERTIFICATION**

9.5.3 Delete this Subparagraph in its entirety.

9.6 **PROGRESS PAYMENTS**

9.6.2 Change the first line of this Subparagraph to read as follows:

The Contractor shall pay each Subcontractor, in accordance with Section 31-5-27 of the Mississippi Code 1972, Annotated, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work.

9.6.8 Add a new Subparagraph as follows:

The amount retained by the Contractor from each payment to each Subcontractor and material supplier will not exceed the percentage retained by the Owner from the Contractor.

9.6.8.1 Add a new Clause to Subparagraph 9.6.8 as follows:

The Contractors shall submit monthly certification, in accordance with Section 31-5-25 of the Mississippi Code 1972, Annotated, on Owner's "Affidavit Certifying Payment to All Subcontractors" form, to the project engineer or architect indicating payments to subcontractors on prior payment request. (attached as Exhibit "A" at the end of Division 0 Section 00800 herein)

9.6.9 Modify the Subparagraph as follows: (Modified Sept-Dec 2013; SAAS modified 092414)

The DFA agrees to make payment in accordance with Mississippi law on "Timely Payments for Purchases by Public Bodies", Section 31-7-301, et seq. of the Mississippi Code of 1972, as amended, which generally provides for payment of undisputed amounts within forty-five (45) days of receipt of the invoice. The State requires the Contractor to submit invoices electronically throughout the term of the agreement. Vendor invoices shall be submitted to the state agency using the processes and procedures identified by the State. Payments by state agencies using the statewide electronic payment and remittance vehicle shall be made and remittance information provided electronically as directed by the State. These payments shall be deposited into the bank account of the Contractor's choice. Contractor understands and agrees that the State is exempt from the payment of taxes. All payments shall be in United States currency. No payment, including final payment, shall be construed as acceptance of defective or incomplete work, and the Contractor shall remain responsible and liable for full performance.

9.7 **FAILURE OF PAYMENT**

Change this Paragraph to read as follows:

The Contractor and the Owner shall be subject to the remedies as prescribed in Section 31-5-25 of the Mississippi Code 1972, Annotated.

9.8 **SUBSTANTIAL COMPLETION**

9.8.1 Add the following sentence to the end this Subparagraph to read as follows:

Commissioning requirements must be complete except for thermographs of electrical systems, trend log monitoring, seasonal testing, near-warranty end activities and verification of training sessions.

9.8.4 Change the first line this Subparagraph to read as follows:

When the Work or designated portion thereof is substantially complete and affirmed by the Owner, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate.

9.10 **FINAL COMPLETION AND FINAL PAYMENT**

9.10.1 Change this Subparagraph to read as follows:

When, in the opinion of the Contractor, the Work is ready for final inspection and acceptance by the Owner, the Contractor shall make such notice to the Architect in writing.

1. *Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance by the Owner, the Architect will promptly inspect the Work and compile a list of deficiencies. If, in the Architect's judgment, the Work is not ready for inspection, another inspection will be scheduled.*
2. *Once the Architect has made inspection and all deficiencies listed by the Architect have been corrected and the Architect determines the Work is ready for final inspection, the Architect will call for final inspection of the Project with the Owner for the purpose of determining whether the Work is acceptable under the Contract Documents.*
3. *The final inspection shall be conducted in the presence of the Owner and a list of defects or discrepancies, if any, will be compiled into a punch list furnished to all parties.*
4. *Once corrections of all punch list items have been confirmed by the Architect, the Architect will provide a letter recommending final acceptance of the Work to the Owner.*

9.10.2 Change this Subparagraph to read as follows:

Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) final application for payment, (2) consent of surety to final payment, (3) power of attorney, (4) Contractor's affidavit of release of liens, (5) Contractor's affidavit of payment of debts and claims, (6) Contractor's guarantee of work, (7) Project Record Documents and (8) certificates, warranties, guarantees, bonds or documents as called for in the individual sections of the Project Manual.

9.11 **LIQUIDATED DAMAGES**

9.11.1 Add a new Paragraph as follows:

Time being of the essence and a matter of material consideration thereof, a reasonable estimate in advance is established to cover losses incurred by the Owner if the project is not substantially complete on the date set forth in the Contract Documents. The Contractor and his Surety will be liable for and will pay the Owner the sums stipulated in Paragraph 2.2 of the Standard Form of Agreement Between the Owner and the Contractor as fixed and agreed as liquidated damages for each calendar day of delay until the work is substantially complete unless circumstances dictate otherwise in the discretion of the Owner.

Article 10
PROTECTION OF PERSONS AND PROPERTY

10.2 **SAFETY OF PERSONS AND PROPERTY**

10.2.5 Change this Subparagraph to read as follows:

The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Clauses 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-Subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible for Clauses 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Paragraph 3.18.

10.3 **HAZARDOUS MATERIALS**

10.3.2 Delete this Subparagraph in its entirety.

10.3.3 Delete this Subparagraph in its entirety.

10.3.4 Delete this Subparagraph in its entirety.

10.3.5 Delete this Subparagraph in its entirety.

10.3.6 Delete this Subparagraph in its entirety.

Article 11
INSURANCE AND BONDS

11.1 **CONTRACTOR'S LIABILITY INSURANCE**

11.1.4 Delete this Subparagraph in its entirety.

11.1.5 Add a new Subparagraph as follows: Modified 11.1.5.1 BI and PD on 030116 per Code 31-5-51(7) and 31-7-13(v)

The Contractor's limits of liability shall be written for not less than the following:

.1 GENERAL LIABILITY:
Commercial General Liability
(Including XCU)

General Aggregate	*$*	*1,000,000.00 Aggregate*
Products & Completed Operations	*$*	*1,000,000.00 Aggregate*
Personal & Advertising Injury	*$*	*500,000.00 Per Occurrence*
Bodily Injury & Property Damage	*$*	*1,000,000.00 Per Occurrence*
Fire Damage Liability	*$*	*50,000.00 Per Occurrence*
Medical Expense	*$*	*5,000.00 Per Person*

.2 OWNERS & CONTRACTORS PROTECTIVE LIABILITY:

Bodily Injury & Property Damage	*$*	*1,000,000.00 Aggregate*
Bodily Injury & Property Damage	*$*	*500,000.00 Per Occurrence*

.3 AUTOMOBILE LIABILITY:
(Owned, Non-owned & Hired Vehicles)
Contractor Insurance Option Number 1:

Bodily Injury & Property Damage	*$*	*500,000.00 Per Occurrence*

(Combined Single Limit)
Contractor Insurance Option Number 2:

Bodily Injury	*$*	*250,000.00 Per Person*
Bodily Injury	*$*	*500,000.00 Per Accident*
Property Damage	*$*	*100,000.00 Per Occurrence*

.4 EXCESS LIABILITY:
(Umbrella on projects over $500,000)

Bodily Injury & Property Damage	*$*	*1,000,000.00 Aggregate*

(Combined Single Limit)

.5 WORKERS' COMPENSATION:
(As required by Statute)
EMPLOYERS' LIABILITY:

Accident	*$*	*100,000.00 Per Occurrence*
Disease	*$*	*500,000.00 Policy Limit*
Disease	*$*	*100,000.00 Per Employee*

.6 PROPERTY INSURANCE:

Builder's Risk	*$*	*Equal to Value of Work*
or		
Installation Floater	*$*	*Equal to Value of Work*

11.1.6 Add a new Subparagraph as follows:

Furnish one (1) copy of the Standard Construction Contract Certificate of Insurance Form for each copy of the Standard Form of Agreement Between Owner and Contractor specifically setting forth evidence of all coverage required by Subparagraphs 11.1.1, 11.1.2 and 11.1.3. Furnish to the Owner copies of any endorsements that are subsequently issued amending limits of coverage.

11.1.7 Add a new Subparagraph as follows:

If the coverages are provided on a claims-made basis, the policy date or retroactive date shall predate the Contract; the termination date, or the policy, or applicable extended reporting period shall be no earlier than the termination date of coverages required to be maintained after final payment.

11.2 **OWNER'S LIABILITY INSURANCE**

Delete this Paragraph in its entirety and substitute the following:

The Contractor shall purchase and maintain such insurance as will protect the Owner from his contingent liability to others for damages because of bodily injury, including death, and property damage, which may arise from operations under this Contract and other liability for damages which the Contractor is required to insure under any provision of this Contract. Certificate of this insurance will be filed with the Owner and will be the same limits set forth in 11.1.5.

11.3 **PROPERTY INSURANCE (BUILDER'S RISK OR INSTALLATION FLOATER)**

11.3.1 Change the first line in this Subparagraph to read as follows:

The Contractor shall purchase....

11.3.1.2 Delete this Clause under Subparagraph 11.3.1 in its entirety.

11.3.1.3 Change the following Clause in this Subparagraph to read as follows:

If the property insurance requires deductibles, the Contractor shall pay costs not covered because of such deductibles.

11.3.2 Delete this Subparagraph in its entirety.

11.3.3 Delete this Subparagraph in its entirety.

11.3.4 Delete this Subparagraph in its entirety.

11.3.5 Delete this Subparagraph in its entirety.

11.3.6 Delete this Subparagraph in its entirety.

11.3.10 Change this Subparagraph to read as follows:

The Owner as fiduciary shall have power to adjust and settle a loss with Insurers unless one of the parties in interest shall object in writing within five (5) days after occurrence of loss.

Article 12
UNCOVERING AND CORRECTION OF WORK

No supplementary conditions.

Article 13
MISCELLANEOUS PROVISIONS

13.1 **GOVERNING LAW**

Change this Paragraph to read as follows:

The Contract shall be governed by the laws of the State of Mississippi.

13.5 **TESTS AND INSPECTIONS**

13.5.1 Change the third line of this Subparagraph by adding "*and Commissioning Authority Professional*" after each instance of the word "*Architect*".

13.5.3 Change this Subparagraph by inserting "*and the Commissioning Authority Professional's*" after the word "*Architect*".

13.5.5 Change this Subparagraph by adding "*and/or the Commissioning Authority Professional*" after each instance of the word "*Architect*".

13.7 Change this Paragraph title and contents to read as follows: (modified Sept-Dec 2013)

13.7 **COMMENCEMENT OF STATUTORY LIMITATION PERIOD**

13.7.1 *The Owner and Contractor shall commence all claims and causes of action within the time period specified by applicable state law.*

Article 14
TERMINATION OR SUSPENSION OF THE CONTRACT

No supplementary conditions.

Article 15
CLAIMS AND DISPUTES

15.2 **INITIAL DECISION**

15.2.1 Change this Subparagraph to read as follows:

Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker. An initial decision by the Initial Decision Maker shall be required as a condition precedent to arbitration or litigation of all Claims between the Contractor and Owner arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered by the Initial Decision Maker. The Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

15.2.5 Change the last line of this Subparagraph to read as follows:

The initial decision shall be final and binding on the parties but subject to arbitration or litigation.

15.2.6 Delete this Subparagraph in its entirety.

15.2.6.1 Delete this Clause in its entirety.

15.3 **MEDIATION**

15.3.1 Delete this Subparagraph in its entirety.

15.3.2 Delete this Subparagraph in its entirety.

15.3.3 Delete this Subparagraph in its entirety.

15.4 **ARBITRATION**

15.4.1 Delete this Subparagraph in its entirety.

15.4.1.1 Delete this Clause in its entirety.

15.4.1.2 Delete this Clause in its entirety.

15.4.2 Delete this Subparagraph in its entirety.

15.4.3 Delete this Subparagraph in its entirety.

15.4.4 Delete this Subparagraph in its entirety.

15.5 Add a new Paragraph as follows:

ARBITRATION PROCEDURES FOR THE OWNER

All matters of dispute arising out of any agreement with the Owner for planning, design, engineering, construction, erection, repair, or alteration of any building, structure, fixture, road, highway, utility or any part thereof, or any agreement with the Owner for architectural, engineering, surveying, planning, and related professional services which provides for mediation or arbitration, shall comply with the following course for resolution. No arbitration hearing shall be granted on any claim in excess of One Hundred Thousand Dollars ($100,000.00).

15.5.1 Add a new Subparagraph as follows:

CONDITIONS PRECEDENT TO ARBITRATION

.1 The aggrieved party must first notify opposing party in writing in detail of the matter(s) in dispute, the amount involved, and the remedy sought. Such writing shall include copies of any documents, writings, plans, or other matter pertinent to the resolution of the dispute. The Head of the Owner's Agency and a principle of the opposing party shall be the proper parties for such notice and shall be active parties in any subsequent dispute resolution.

.2 If the dispute cannot be satisfactorily resolved, within thirty (30) days of the complaint being rejected in writing by either party, notice by certified mail shall be given to the Deputy Director of the Owner. A copy of the notice shall be sent by certified mail to the opposing party. Such notice shall be in writing setting forth in detail the matter(s) in dispute, the amount involved, the remedy sought and state that informal resolution between the parties cannot be reached. Such writing shall include copies of any documents, writings, plans, or other matter pertinent to the resolution of the dispute. Opposing party shall have the opportunity to set forth in writing a rebuttal with pertinent documents attached. At the sole discretion of the Deputy Director, oral testimony may be had on the matter.

15.5.2 Add a new Subparagraph as follows:

REQUESTS FOR ARBITRATION: *Within thirty (30) days of a claim being rejected in writing by the Deputy Director of the Owner, either party may request arbitration. Notices for requests for arbitration shall be made in writing to the Head of the Owner's Agency. Such notice shall set forth in detail the matter(s) in dispute, the amount involved, and the remedy sought. A copy of the request shall be mailed to the opposite party. The party requesting arbitration must deposit the sum of two hundred ($200.00) with its request as a deposit against costs incurred by the arbitrators. Each party will be notified in writing in any manner provided by law of certified mail not less than twenty (20) days before the hearing of the date, time and place for the hearing. Appearance at the hearing waives a party's right to notice.*

15.5.3 Add a new Subparagraph as follows:

SELECTION OF ARBITRATORS: *Upon request for arbitration, a panel of three (3) arbitrators shall be chosen. One (1) member shall be appointed by the Head of the Owner's Agency. One (1) member shall be appointed by the executive director of a professional or trade association which represents interests similar to that of the non-state party. The third member shall be appointed by the first two.*

15.5.4 Add a new Subparagraph as follows:

HEARINGS: *All hearings shall be open to the public. All hearings will be held in Jackson, Mississippi, unless another location is mutually agreed to by the parties. The hearings shall be conducted as prescribed by* ***Mississippi Code 1972, Annotated****, Sections 11-15-113, 11-15-115, and 11-15-117. A full and complete record of all proceedings shall be taken by a certified court reporter. The scheduling and cost of retaining the court reporter shall be the responsibility of the party requesting arbitration. The costs of transcription of the record shall be the responsibility of the party requesting such transcript. No arbitration hearing shall be held without a certified court reporter. Deliberations of the arbitrators shall not be part of the record.*

15.5.5 Add a new Subparagraph as follows:

AWARDS: *Awards shall be made in writing and signed by the arbitrators joining in the award. A copy of the award shall be delivered to the parties by certified mail.*

15.5.6 Add a new Subparagraph as follows:

FEES AND EXPENSES: *Reasonable fees and expenses, excluding counsel fees, incurred in the conduct of the arbitration shall be at the discretion of the Arbitrator except each party shall bear its own attorney's fees and costs of expert witnesses.*

15.5.7 Add a new Subparagraph as follows:

MODIFICATIONS, CONFIRMATIONS, AND APPEALS: *All modifications, confirmations and appeals shall be as prescribed by* ***Mississippi Code 1972, Annotated****, Section 11-15-123 et seq. All awards shall be reduced to judgment and satisfied in the same manner other judgments against the State are satisfied.*

15.5.8 Add a new Subparagraph as follows:

SECRETARY FOR THE ARBITRATORS: *All notices, requests, or other correspondence intended for the arbitrators shall be sent to the Head of the Owner's Agency.*

AFFIDAVIT CERTIFYING PAYMENT TO ALL SUBCONTRACTORS

I acknowledge that, pursuant to Miss. Code Ann. §31-5-25 and H.B. 1562, Laws of 2002,
that I am required to submit monthly certification indicating payments to subcontractors on prior payment requests. I, the undersigned Contractor, do hereby certify that I have paid the following amounts to subcontractors for Work which has been performed and incorporated into previous Applications for Payment which were issued and payment received from the Owner on the project listed below. I understand that this document must be submitted on a monthly basis after the submittal, approval and payment of Application for Payment #1. I understand that the Owner reserves the right to require me, the undersigned, to provide verification of payment and/ or additional information.

Division O
Section 00800 SUPPLEMENTARY CONDITIONS
Article 9.6 Progress Payments
Article 9.6.8.1
Pursuant to Code §31-5-25 and HB1562, Laws of 2002
. . .Contractors shall submit monthly certification to the project engineer or architect indicating payments to subcontractors on prior payment request. . . .

Project Name and Number: _____

Using Agency: _____

Subcontractor: _____ Amount: $_____

Subcontractor: _____ Amount: $_____

Subcontractor: _____ Amount: $_____

Subcontractor: _____ Amount: $_____

Subcontractor: _____ Amount: $_____

Subcontractor: _____ Amount: $_____

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Subcontractor: _____ Amount: $_____

Subcontractor: _____ Amount: $_____

Subcontractor: _____ Amount: $_____

Subcontractor: _____ Amount: $_____

(Attach additional list of subcontractors and amounts, if necessary)

Contractor Name and Title: _____

Contractor Certificate of Responsibility Number: _____

Contractor Signature: _____ Date: _____

STATE OF MISSISSIPPI

COUNTY OF _____

SWORN TO AND SUBSCRIBED BEFORE ME, the undersigned notary public,

this the _____ day of _____, 20____.

_____
NOTARY PUBLIC

My Commission Expires:
_____

LABOR REQUIREMENTS
SECTION 00820

PART 1 - EQUAL OPPORTUNITY

1.01 **GENERAL**

The Contractor will maintain policies of employment as follows:

A. The Contractor and all Subcontractors will not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin or age. The Contractor will take affirmative action to insure that applicants are employed and that employees are treated during employment without regard to their race, religion, color, sex, national origin, or age. Such action will include, but not be limited to the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of non-discrimination.

B. The Contractor and all Subcontractors will, in all solicitations or advertisements for employees placed by them or on their behalf, state that all qualified applicants receive consideration for employment without regard to race, religion, color, sex, national origin or age.

PART 2 - DAVIS-BACON ACT REGULATIONS

.....
.....
.....

~~5.5~~ ~~**CONTRACT PROVISIONS AND RELATED MATTERS**~~

~~(a)~~ ~~1.~~ ~~**Minimum Wages**: (i) All mechanics and laborers employed or working upon the site of the work, will be paid unconditionally and not less often than once a week and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act, 29 CFR Part 3), the full amounts due at time of payment computed at wage rates not less than those contained in the wage determination decision of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics, and the wage determination decision will be posted by the Contractor at the site of the work in a prominent place where it can be easily seen by the workers. For the purpose of this clause, contributions made or costs reasonably anticipated under Section 1 (b) (2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5 (a) (1) (iv). Also for the purpose of this clause, regular contributions made or costs incurred for more than a weekly period under plans, funds or programs, but covering the particular weekly period, are deemed to be constructively made or incurred during such weekly periods.~~

~~(ii) The contracting officer will require that any class of laborers or mechanics, including apprentices and trainees, which is not listed in the wage determination and which is to be employed under the contract, will be classified or reclassified conformably to wage determination and a report of the action taken will be sent by the State Agency to the Secretary of Labor. In the event the interested parties cannot agree on the proper classification or reclassification of a particular class of laborers and mechanics, including apprentices and trainees to be used, the question, accompanied by the recommendation of the contracting officer, will be referred to the Secretary for final determination.~~

~~(iii) The contracting officer will require, whenever the minimum wage rate prescribed in the Contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly wage rate and the Contractor is obligated to pay a cash equivalent of such a fringe benefit, an hourly cash equivalent thereof to be established. In the event the interested parties cannot agree upon a cash equivalent of the fringe benefit, the question, accompanied by the recommendation of the contracting officer, shall be referred to the Secretary of Labor for determination.~~

(iv) If the Contractor does not make payments to a trustee or other third person, he may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing benefits under a plan or program of a type expressly listed in the wage determination decision of the Secretary of Labor which is a part of this Contract. Provided, however, the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan, or program.

2. **Withholding**: The State may withhold or cause to be withheld from the Contractor so much of the accrued payments or advances as may be considered necessary to laborers and mechanics, including apprentices and trainees, employed by the Contractor or any Subcontractor on the work the full amount of wages required by the Contract. In the event of failure to pay any laborer or mechanic, including any apprentice or trainee, employed or working on the site of the work in the construction or development of the Project, all or part of the wages required by the Contract, the State may, after written notice to the Contractor, sponsor, applicant of Owner, take such action as may be necessary to cause the suspension of any further payment, advance or guarantee of funds until such violations have ceased.

3. **Payrolls and Basic Records**: (i) Payrolls and basic records relating thereto will be maintained during the course of the work and preserved for a period of three (3) years thereafter for all laborers and mechanics working at the site of the work in the construction or development of the Project. Such records will contain the name and address of each such employee, his correct classification, rates of pay (including rates of contributions or costs anticipated of the types described in Section 1 (b) (2) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5 (a) (1) (iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1 (b) (2) (b) of the Davis-Bacon Act, the Contractor will maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible and that the plan or program has been communicated in writing to the laborers or mechanics affected and records which show the costs anticipated or the actual cost incurred in providing such benefits.

(ii) The Contractor will submit weekly a copy of all payrolls to the Project Architect/Engineer or will submit payrolls to the applicant, sponsor or Using Agency as the case may be, for transmission to the State. The copy will be accompanied by a statement signed by the employer or his agent indicating that the payrolls are correct and complete, that the wage rates contained therein are not less than those determined by the Secretary of Labor and that the classifications set forth for each laborer or mechanic conform with the work he performed. A submission of a "Weekly Statement of Compliance" which is required under this Contract and the Copeland regulations of the Secretary of Labor (29 DFR, Part 3) and the filing with the initial payroll or any subsequent payroll of a copy of any findings by the Secretary of Labor under 29 CFR 5.5 (a) (1) (iv) will satisfy this requirement. The Prime Contractor will be responsible for the submission of copies of payrolls of all Subcontractors. The Contractor will make the records required under the labor standards clauses of the Contract available for inspection by authorized representatives of the State and the Department of Labor, and will permit such representatives to interview employees during working hours on the job.

4. **Apprentices and Trainees**: (i) Apprentices: Apprentices will be permitted to work as such only when they are registered individually under a bona fide apprenticeship program registered with a State apprenticeship agency which is recognized by the Bureau of Apprenticeship and Training, U.S. Department of Labor or, if no such recognized agency exists in a State, under a program registered with the Bureau of Apprenticeship and Training, U.S. Department of Labor. The allowable ratio of apprentices to journeymen in any craft classification will not be greater than the ratio permitted to the Contractor as to his entire work force under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not a trainee as defined in subdivision (kk) of this subparagraph or is not registered as above, will be paid the wage rate determined by the Secretary of Labor for the classification of work he actually performed. The Contractor or Subcontractor will be required to furnish to the contracting officer written evidence of the registration of his program and apprentices, as well as of the appropriate ratios and wage rates, for the area of construction prior to using any apprentices on the contract work.

(ii) **Trainees**: Trainees will be permitted to work as such when they are bona fide trainees employed pursuant to a program approved by the U.S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training, and where subdivision (iii) of this subparagraph is applicable, in accordance with the provisions of Part 5a of this subtitle.

(iii) **Application of 29 CFR part 5a**: On contracts in excess of $10,000, the employment of all laborers and mechanics, including apprentices and trainees, as defined in 5.2 (c), will also be subject to the provisions of Part 5a of this subtitle. Apprentices and trainees will be hired in accordance with the requirements of Part 5a of this subtitle.

5. **Compliance With Copeland Regulations 29CFR Part 3**: The Contractor will comply with the Copeland Regulations (29 CFR Part 3) of the Secretary of Labor which are herein incorporated by reference.

6. **Subcontracts**: The Contractor will insert in any subcontracts the clauses contained in 29 CFR 5.5 (a) (1) through (5) and (7) and such other clauses as the State may, by appropriate instructions, require and also a clause requiring the Subcontractors to include these clauses in any lower tier subcontracts which they may enter into, together with a clause requiring this insertion in any further subcontracts that may in turn be made.

7. **Contract Termination, Debarment**: A breach of clauses (1) through (6) may be grounds for termination of the Contract for debarment as provided in 29 CFR 5.6.

PART 5a - LABOR STANDARDS FOR RATIOS OF APPRENTICES AND TRAINEES TO JOURNEYMEN ON FEDERAL AND FEDERALLY ASSISTED CONSTRUCTION

5a.3 APPRENTICE AND TRAINEE EMPLOYMENT REQUIREMENTS

(a) The following Contract clauses will be conditions of each Federal or Federally assisted construction Contract in excess of $10,000 and each Federal agency concerned will include the clauses, or provide for their inclusion in each such Contract.

(1) The Contractor agrees: (i) That he will make a diligent effort to hire for the performance of the Contract a number of apprentices or trainees, or both, in each occupation, which bears to the average number of the journeymen in that occupation to be employed in the performance of the Contract the applicable ratio as determined by the Secretary of Labor.

(ii) That he will assure that twenty-five percent (25%) of such apprentices or trainees in each occupation are in their first year of training, where feasible. Feasibility here involves a consideration of: (a) the availability of training opportunities for first year apprentices; (b) the hazardous nature of the work for beginning workers; and (c) excessive unemployment of apprentices in their second and subsequent years of training.

(iii) That during the performance of the Contract, he will, to the greatest extent possible, employ the number of apprentices or trainees necessary to meet currently the requirements of subdivisions (i) and (ii) of this subparagraph.

(2) The Contractor agrees to maintain records of employment by trade of the number of apprentices and trainees, apprentices and trainees by first year of training, and of journeymen and the wages paid and hours of work of such apprentices, trainees and journeymen. The Contractor agrees to make these records available for inspection upon request of the Department of Labor and the Federal agency concerned.

(3) The Contractor who claims compliance based on the criterion stated in 5a.4(a) agrees to maintain records of employment, as described in 5a.3(a) (2), on non-Federal and Non-federally assisted construction work done during the performance of this Contract in the same labor market area. The Contractor agrees to make these records available for inspection upon request of the Department of Labor and the Federal agency concerned.

5a.4 CRITERIA FOR MEASURING DILIGENT EFFORT

(a) The Contractor employs, on all his public and private construction work combined in the labor market area of this Project, an average number of apprentices and trainees by craft as required by the Contract clauses, at least equal to the ratios established in accordance with 5a.5.

5a.5 DETERMINATION OF RATIOS OF APPRENTICES OR TRAINEES TO JOURNEYMEN

The Secretary of Labor has determined that the applicable ratios of apprentices and trainees to journeymen in an occupation will be as follows:

(a) In any occupation the applicable ratio of apprentices and trainees to journeymen will be equal to the predominant ratio for the occupation in the area where the construction is to be undertaken, set forth in collective bargaining agreements or other employment agreements, and available through the Regional Manager for the Bureau of Apprenticeship and Training for the applicable area.

(b) For any occupation for which no such ratio is found, the ratio of apprentices and trainees to journeymen will be determined by the Contractor in accordance with the recommendations set forth in the standards of the National Joint Apprentice Committee for the occupation, which are filed with the U.S. Department of Labor's Bureau of Apprenticeship and Training.

(c) For any occupation for which no such recommendations are found, the ratio of apprentices and trainees to journeymen will be at least one (1) apprentice or trainee for every five (5) journeymen.

PART 3 - WAGE RATES

3.01 **GENERAL**

The following pages are the Federal Government Wage Determination for this project:

ADDENDA
SECTION 00900

1.01 **ADDENDA**

Any Addendum issued on this Project will be included in Section 00900 and become a part of the *Standard Form of Agreement Between the Owner and*

SUMMARY OF WORK
SECTION 01010

1.01 **WORK COVERED BY CONTRACT DOCUMENTS**

A. **Work Covered**: Work covered by the Contract Documents is as shown in drawings and described in words in the Project Manual. The Project Title and location is indicated on the first page of this Project Manual.

B. **Start of Work**: Work shall be started immediately upon issuance of a *Notice to Proceed*. Prior to this, all Contracts and beginning documents will have been executed and insurance in force.

C. **Time of Completion**: The completion of this Work is to be on, or before, the time indicated in the *Standard Form of Agreement Between the Owner and the Contractor*.

D. **Contractor's Duties**:

1. Except as specifically noted, provide and pay for:
   a. Labor, materials and equipment.
   b. Tools, construction equipment and machinery.
   c. Water, heat and utilities required for construction.
   d. Other facilities and services necessary for proper execution and completion of the Work.
2. Pay legally required sales, consumer, use, payroll, privilege and other taxes.
3. Secure and pay for, as necessary for proper execution and completion of work, and as applicable at the time of the receipt of the bids:
   a. Permits.
   b. Government fees.
   c. Licenses.
4. Give required notices.
5. Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of work.
6. Promptly submit written notice to Professional of observed variance of Contract Documents from legal requirements. It is not the Contractor's responsibility to make certain that drawings and specifications comply with codes and regulations. Appropriate modifications to Contract Documents will adjust necessary changes. Assume responsibility for work known to be contrary to such requirements, without notice.
7. Enforce strict discipline and good order among employees. Do not employ or work unfit persons, or persons, not skilled in assigned task.
8. Provide a written safety plan.

E. **Hazardous Materials**: The Prime General Contractor is responsible for the removal and disposal of any hazardous materials encountered in the performance of the Contract requirements. Hazardous Containing Materials [HCM] include, but are not limited to, Asbestos and Lead Paint and should be identified and removed as a part of the Contract. The absence of details does not relieve the Prime General Contractor from the responsibility of removal and disposal; but, a Change Order could be executed in the absence of identified HCM in the documents.

F. **Subcontractor's List**: The Prime General Contractor will submit to the Owner a list of all Subcontractors, including disciplines and COR #'s, over Fifty Thousand Dollars ($50,000.00) to be used on the Project ~~within~~ prior to contract award by the Owner. Any Sub-Contractor listed must be acceptable to the Owner. Additionally, include any Mechanical, Plumbing, or Electrical Sub-Contractor listed on Proposal Form regardless of amount.
(Modified Jan 2015) (see also 600.55; Div 0-5.2.1)

The Prime General Contractor will submit to the Owner within seven (7) days from the Notice to Proceed, a completed *Minority Tracking Form* (attached as Exhibit "A" at the end of Division 1 Section 01900) outlining the use of minority subcontractors that will be used on the project.

G. **Coordination**: The Prime General Contractor is responsible for the coordination of the total project. All other

Prime Contractors and all Subcontractors will cooperate with the Prime General Contractor so as to facilitate the general progress of the Work. Each trade shall afford all other trades every reasonable opportunity for the installation of their work. Refer to Section 01041 entitled *Project Coordination*.

1.02 **CONTRACTS**

Contracts: Construct work under a single Prime General Contract. Refer to Section 00500 entitled *Standard Form of Agreement Between the Owner and the Contractor*.

1.03 **WORK BY OTHERS**

Work by Others shall be described in each appropriate Project Manual section and noted on the Drawings.

1.04 **OWNER-FURNISHED PRODUCTS**

A. **Products Furnished By Owner**: Products furnished by Owner shall be described in each appropriate Project Manual section and noted on the Drawings.

B. **Products**: Delivered and unloaded at site.

C. **Owner's Duties**:
1. Schedule delivery date with Supplier in accordance with construction schedule.
2. Obtain installation drawings and instructions.
3. Submit claims for transportation damages.
4. Arrange Guarantees, Warranties, etc..

D. **Contractor's Duties**:
1. Designate required delivery date for each product in construction schedule.
2. Promptly inspect delivered products, report missing, damaged, or defective items.
3. Handle at site, including uncrating and storage.
4. Protect from exposure to elements and from damage.
5. Repair or replace damaged items resulting from Contractor's operations.
6. Install and make final connections.

1.05 **CONTRACTOR'S USE OF PREMISES**

A. Confine operations at site to areas permitted by:
1. Law.
2. Ordinances.
3. Permits.
4. Contract Documents.
5. Owner.

B. Do not unreasonably encumber site with materials or equipment.

C. Do not load structure with weight that will endanger structure.

D. Assume full responsibility for protection and safekeeping of products stored on premises.

E. Move any stored products which interfere with operations of Owner or other Contractors.

F. Obtain and pay for use of additional storage or work areas needed for operations.

G. Limit use of site for work and storage to the area indicated in the drawings.

1.06 **SUMMARY OF WORK SUPPLEMENT**

A. Refer to Section 01900 entitled *Division One Supplement* for Project specific summary of work requirements.

ALLOWANCES
SECTION 01020

1.01 **DESCRIPTION**

A. **Related Work Specified Elsewhere**: Sections of Specifications as listed under Schedule of Allowances.

B. **Allowances for Products**:
1. Purchase products under each allowance as directed by the Professional.
2. Amount of each allowance includes:
   a. Net cost of product.
   b. Delivery and unloading at site.
   c. Applicable taxes.
3. In addition to amounts of allowances, include in bid, for inclusion in Contract sum, Contractor's costs for:
   a. Handling at site, including uncrating and storage.
   b. Protection from elements and damage.
   c. Labor, installation and finishing.
   d. Other expenses required to complete installation.
   e. Overhead and profit.

C. **Selection of Products**:
1. **Architect's Duties**: Consult with Contractor in consideration of products and Suppliers; make selections, designate products to be used; and, notify Contractor in writing.
2. **Contractor's Duties**: Assist Professional in determining qualified Suppliers; obtain proposals from Suppliers when requested by the Professional; and, make appropriate recommendations for consideration of the Professional. Upon notification of selection, enter into Purchase Agreement with designated Supplier.

D. **Delivery**: The Contractor is responsible for arranging all delivery and unloading and should promptly inspect products for damage or defects and submit claims for transportation damage.

E. **Installation**: Comply with requirements of referenced specification section.

F. **Adjustment of Costs**: Should actual purchase cost be more, or less, than the specified allowance amount, the Contract Sum will be adjusted by Change Order equal to the amount of the difference.

1.02 **SCHEDULE OF ALLOWANCES**

A. Refer to Section 01900 entitled *Division One Supplement* for Project specific Schedule of Allowances.

SCHEDULE OF VALUES
SECTION 01025

1.01 **DESCRIPTION**

A. **Scope**: Submit a *Schedule of Values* to the Professional at least ten (10) days prior to submitting the first Application for Payment. Upon the Professional's request, the Contractor will provide supportive data substantiating their correctness. Use *Schedule of Values* only as basis for Contractor's Application for Payment.

B. **Form of Submittal**: Submit Schedule of Values on AIA Document G703, or computer generated form containing similar style, using Table of Contents of these Specifications as basis for format for listing costs of work for sections under Divisions 2-16. Identify each line item with number and title as listed in Table of Contents in these Specifications.

C. **Preparing Schedule of Values**:

1. Itemize separate line item cost for each of the following general cost items: Performance and Payment Bonds, field supervision and layout, temporary facilities and controls.
2. Itemize separate line item cost for work required by each Section of these Specifications. Break down installed cost with overhead and profit.
3. For each line item which has installed value of more than $20,000, break down costs to list major products for operations under each item, rounding figures to nearest dollar. Make sum of total costs of all items listed in Schedule equal to total Contract sum.

D. **Preparing Schedule of Unit Material Values**:

1. Submit separate Schedule of unit prices for materials to be stored on which progress payments will be made. Make form of submittal parallel to Schedule of Values with each line item identified same as line item in Schedule of Values. Include in unit prices only: cost of material, delivery, unloading at site, and sales tax.
2. Make sure unit prices multiplied by quantities equal material cost of that item in Schedule of Values.

E. **Review and Resubmittal**: After Professional's review, if requested, revise and resubmit Schedule of Values in same manner.

APPLICATIONS FOR PAYMENT
SECTION 01027

1.01 **SCOPE**

A. This Section describes procedures for preparing and submitting Applications for Payment by the Contractor.

1.02 **APPLICATIONS FOR PAYMENT**

A. **Format**:

1. Applications for Payments will be prepared on AIA forms G702 - *Application and Certificate for Payment* and G703 - *Continuation Sheet*; or, a computer generated form containing similar data may be used.

B. **Preparation of Application**:

1. Present required information in typewritten form
2. Execute certification by signature of authorized officer
3. Use data from approved *Schedule of Values*. Provide dollar value in each column for each line item for portion of Work performed and for stored products.
4. List each authorized Change Order as an extension on continuation sheet, listing Change Order number and dollar amount as for an original Item of Work.
5. Prepare Application for Final Payment as specified in Section 01700 entitled *Contract Closeout.*

C. **Submittal Procedures**: (#1 modified Dec 2013 SoS and Jan 2015)

1. Submit original and one (1) copy of each Application for Payment (see also 700.22)
2. Submit an updated construction schedule with each Application for Payment as described in Section 01310 entitled *Progress Schedule* or Section 01311 entitled *Network Analysis Schedules*.
3. Submit requests for payment at intervals agreed upon by the Professional, Owner and Contractor.
4. Submit requests to the Professional at agreed upon times, or as may be directed otherwise.

D. **Substantiating Data**:

1. Submit data justifying dollar amounts in question when such information is needed.
2. Provide one (1) copy of the data with a cover letter for each submittal.
3. Indicate the Application number, date and line item number and description.

CHANGE ORDER PROCEDURES
SECTION 01028

1.01 **SCOPE**

A. This Section describes the procedures for processing Change Orders by the Professional and the Contractor.

1.02 **CHANGE ORDER PROCEDURES**

A. **Change Proposed by Professional**: The Professional may issue a Proposal Request to the Contractor which includes a detailed description of a proposed change with supplementary or revised Drawings and Specifications and a change in Contract Time for executing the change. The Contractor will prepare and submit an estimate within ten (10) days.

B. **Change Proposed by Contractor**: The Contractor may propose a change by submitting a request for change to the Professional, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on Work by separate or other Contractors. Document any requested substitutions in accordance with Section 01630 entitled *Substitutions and Product Options*.

C. **Contractor's Documentation**:
1. Maintain detailed records of Work completed on a time and material basis. Provide full information required for evaluation of proposed changes, and substantiate costs of changes in the Work.
2. Document each quotation for a change in cost or time with sufficient data allowing evaluation of the quotation.
3. On request, provide additional data to support computations:
   a. Quantities of products, labor, and equipment
   b. Taxes, insurance and bonds
   c. Overhead and profit
   d. Justification for any change in Contract Time
   e. Credit for deletions from Contract, similarly documented
4. Support each claim for additional costs, and for Work completed on a time and material basis, with additional information:
   a. Origin and date of claim
   b. Dates and times work was performed and by whom
   c. Time records and wage rates paid
   d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

D. **Construction Change Directive**: The Professional may issue a document, approved by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. The document will describe changes in the Work, and will designate method of determining any change in Contract Sum or Contract Time. The change in Work will be promptly executed.

E. **Format**: The Professional will prepare five (5) originals of the Change Order using the Bureau of Building, Grounds and Real Property Management's *Change Order Form*. (see also 700.20)

F. **Types of Change Orders**:
1. **Stipulated Sum Change Order**: Based on Proposal Request and Contractor's fixed price quotation, or Contractor's request for a Change Order as approved by the Professional.
2. **Unit Price Change Order**: For pre-determined unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, execute Work under a Construction Change Directive. Changes in Contract Sum or Contract Time will be computed as specified for Time and Material Change Order.

3. **Time and Material Change Order**: Submit itemized account and supporting data after completion of change, within time limits indicated in the *Standard Form of Agreement Between the Owner and the Contractor*. The Professional will determine the change allowable in Contract Sum and Contract Time as provided in the Contract Documents. The Contractor shall maintain detailed records of Work accomplished on Time and Material basis and shall provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

G. **Execution of Change Order**: The Professional will issue Change Orders for signatures of parties as provided in the *Standard Form of Agreement Between the Owner and the Contractor*. Final execution of all Change Orders requires approval by the Owner.

H. **Correlation of Contractor Submittals**: The Contract shall promptly revise *Schedule of Values* and the *Application for Payment* forms to record each authorized Change Order as a separate line item and adjust the Contract Sum. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust time for other items of Work affected by the change and resubmit. Promptly enter changes in Project Record Documents.

ALTERNATES
SECTION 01030

1.01 **DESCRIPTION**

A. **Scope**: This section describes the changes to be made under each alternate.

B. **General**: The referenced Specification sections contain the pertinent requirements for materials and methods to achieve the work described herein. Coordinate related work and modify surrounding work, as required, to complete the Project under each alternate designated in the Contract.

1.02 **DESCRIPTION OF ALTERNATES**

A. Refer to Section 01900 entitled *Division One Supplement* for Project specific description of project Alternates.

PROJECT COORDINATION
SECTION 01041

1.01 **DESCRIPTION**

A. **Scope**: To set forth procedures, conditions and responsibility for coordination of the total project.

B. **Project Coordinator**: The General Contractor will designate one (1) individual as Project Coordinator or Superintendent, as referred to in the General Conditions. Prior to beginning the Work, the name and qualifications will be submitted, in writing, to the Professional. Upon the approval of the Professional and the Owner, the Project Coordinator will remain until the Project is completed and cannot be removed during construction without the written consent of the Owner and the Professional.

1.02 **DUTIES OF PROJECT COORDINATOR**

A. **General**:
1. **Coordination**: Coordinate the work of all Subcontractors and Material Suppliers.
2. **Supervision**: Supervise the activities of every phase of work taking place on the Project.
3. **Mechanical/Electrical**: Take special care to coordinate and supervise the work of the plumbing, heating and cooling and electrical Subcontractors.
4. **Communication**: Establish lines of authority and communication at the job site.
5. **Location**: The Project Coordinator must be present on the job all of the time.
6. **Permits**: Assist in obtaining building and special permits required for construction.

B. **Interpretations of Contract Documents**:
   1. **Consultation**: Consult with Architects and Engineers to obtain interpretations.
   2. **Assistance**: Assist in resolution of any questions.
   3. **Transmission**: Transmit written interpretations to concerned parties.

C. **Cessation of Work**: Stop all work not in accordance with the requirements of the Contract Documents.

D. **Division One**: Coordinate and assist in the preparation of all requirements of Division One and specifically as follows:
   1. **Cutting and Patching**: Supervise and control all cutting and patching of other trades' work.
   2. **Project Meetings**: Schedule and preside at all project meetings.
   3. **Construction Schedules**: Prepare and submit all construction schedules; supervise work to monitor compliance with schedules.
   4. **Shop Drawings, Product Data and Samples**: Administer the processing of all submittals required by the Project Manual.
   5. **Schedule of Values**: Assist in preparation and be knowledgeable of each entry in the Schedule of Values.
   6. **Testing**: Coordinate all required testing.
   7. **Temporary Facilities and Controls**: Allocate, maintain and monitor all temporary facilities.
   8. **Substitutions and Product Options**: Administer the processing of all substitutions.
   9. **Project Closeout**: Conduct final inspections and assist in collection and preparation of closeout documents.
   10. **Cleaning**: Direct and execute a continuing cleaning program throughout construction, requiring each trade to dispose their own debris.
   11. **Project Record Documents**: Maintain up-to-date project record documents.
   12. **Safety Measures**: Plan and enforce all safety requirements.

E. **Changes**: Recommend and assist in the preparation of requests to the Professional for any changes in the Contract.

F. **Application for Payment**: Assist in the preparation and be knowledgeable of each entry in the Application and Certificate for Payment.

1.03 **SUBCONTRACTOR'S DUTIES**

A. **General**: The Subcontractor is responsible for coordinating and supervising employees in the work to be accomplished under their part of the Contract.

B. **Schedules**: Conduct work to assure compliance with construction schedules.

C. **Suppliers**: Transmit all instructions to Material Suppliers.

D. **Cooperation**: Cooperate with the Project Coordinator and other Subcontractors.

1.04 **OWNER-PURCHASED PRODUCTS**

A. **General**: Cooperate, accept delivery, arrange storage and protect Owner-purchased products until installation, or final acceptance.

CUTTING AND PATCHING
SECTION 01045

1.01 **GENERAL DESCRIPTION**

A. **Scope**: To set forth broad, general conditions covering cutting and patching that applies to everyone and everything on the job.

B. Execute cutting including excavating, fitting, or patching of work required to:
1. Make several parts fit properly.
2. Uncover work to provide for installation of ill-timed work.
3. Remove and replace defective work.
4. Remove and replace work not conforming to Contract requirements.
5. Install specified work in existing construction.

C. In addition to Contract requirements, upon Professional's written instructions:
1. Uncover work for observation of covered work.
2. Remove samples of installed materials for testing.
3. Remove work to provide alteration of existing work.

D. Do not cut or alter work of another Contractor without permission.

E. **Payment of Costs**: Costs caused by ill-timed, or defective work, or work not conforming to Contract Documents will be borne by party responsible for ill-timed, defective work, or non-conforming work.

1.02 **MATERIALS/PRODUCTS**

A. **Materials for Replacement or Work Removed**: Comply with Specifications for type of work to be accomplished.

1.03 **EXECUTION**

A. **Inspection**: Inspect existing conditions of work, including elements subject to movement, or damage during cutting and patching.

B. **Preparation Prior to Cutting**: Provide shoring, bracing and support, as required, to maintain structural integrity of the building. Provide protection for other portions of work and protection from the elements.

C. **Performance**:
1. Execute cutting and demolition by methods which prevent damage to other work and will provide surfaces to receive installation of repairs and new work.
2. Execute excavating and backfilling by methods which prevent damage to other work and prevent settlement.
3. Restore work which has been cut or removed; install new products to provide completed work in accordance with requirements of Contract Documents.
4. Refinish entire surfaces, as necessary, to provide an even finish. Refinish continuous surfaces to the nearest intersection and assemblies entirely.

PROJECT MEETINGS
SECTION 01200

1.01 **DESCRIPTION**

A. **Contractor's Responsibilities**: The General Contractor will administer all progress meetings which include the following:
1. Prepare agenda
2. Distribute written notice of meetings seven (7) days in advance
3. Make physical arrangements for and presiding at the meetings
4. Record minutes
5. Distribute copies of the minutes to participants within four (4) days

B. **Pre-Construction Meeting**: The Owner will schedule a pre-construction meeting as soon as possible after the award of Contract and the issuance of a *Notice to Proceed*.
1. **Attendance**:
   a. Owner
   b. Professional and Consultants
   c. General Contractor
   d. Major Subcontractors, including mechanical and electrical
   e. Representatives of governmental or other regulatory agencies
   f. Commissioning Authority Professional (if Cx on project)
2. **Minimum Agenda**: (prepared by the General Contractor)
   a. Distribute and discuss list of major Subcontractors and construction schedule
   b. Critical work sequencing
   c. Designation of responsible personnel
   d. Procedures for maintaining record documents
   e. Use of premises, including office and storage areas
   f. Owner's requirements
   g. Security procedures
   h. Housekeeping procedures
   i. Commissioning issues (if Cx on project)
3. **Utilities**: A written agreement must be reached on how all utilities will be furnished and the rates the Contractor will be charged. This agreement should be resolved at this meeting. Refer to Section 1500 entitled *Construction Facilities and Temporary Controls* of this Project Manual for additional utility requirements.

C. **Progress Meetings**:
1. The Owner will schedule regular meetings at the time of the pre-construction conference
2. Hold all meetings as progress of work dictates
3. **Attendance**:
   a. Owner
   b. Professional and Consultants
   c. General Contractor
   d. Subcontractors, as pertinent to the agenda
   e. Commissioning Authority Professional (if Cx on project)
4. **Minimum Agenda**:
   a. Review, approve minutes of the previous meeting
   b. Review work progress since last meeting
   c. Note field inspections, problems and decisions
   d. Identify problems which impede planned progress
   e. Review off-site fabrication problems
   f. Revise construction schedule, as indicated
   g. Plan progress during the next work period
   h. Review proposed changes
   i. Complete other current business
   j. Commissioning issues (if Cx on project)

D. Commissioning Meetings: (if Cx on project) The Owner will schedule a commissioning scoping meeting at the pre-construction conference. Regular Commissioning Meetings will coincide with regularly scheduled Progress Meetings until such time that the Commissioning Process requires additional meetings. The Commissioning Authority Professional will chair, facilitate and document Commissioning Meetings.

1. Attendance:
   a. Owner
   b. Commissioning Authority Professional
   c. Professional and Consultants
   d. General Contractor
   e. Subcontractors, as pertinent to unresolved issues identified in current Issues Log
   f. Testing, Adjusting and Balancing Contractor
   g. Using Agency's Building Operator/Physical Plant Representative
2. Minimum Agenda:
   a. Review, approve minutes of the previous meeting
   b. Review Issues Log

PROGRESS SCHEDULES
SECTION 01310

1.01 **DESCRIPTION**

A. **Scope**: Provide projected construction schedules for entire work and revise periodically. The following is a minimum requirement and other type schedules are acceptable with Owner's approval. This type of schedule is acceptable for any Project whose initial Contract award amount if **less than** one (1) million dollars ($1,000,000).

B. **Form of Schedules**: Prepare in form of horizontal bar chart.
1. Provide separate horizontal bar column for each trade or operation.
2. Place in order of the Table of Contents of Specifications.
3. Identify each column by major Specification section number.
4. Identify the first work day of each week by horizontal time scale.
5. Scale and space to allow for updating.

C. **Contents of Schedule**:
1. Provide complete sequence of construction by activity.
2. Indicate dates for beginning and completion of each stage of construction.
3. Identify work of separate floors, separate phases, or other logically grouped activities.
4. Show projected percentage of completion for each item of work as of first day of month.

D. **Updating**:
1. Show all changes occurring since previous submission of updated schedule.
2. Indicate progress of each activity and completion dates.

E. **Submittals**:
1. Submit initial schedules to the Professional within fifteen (15) days after date of Notice to Proceed.
2. Submit to Professional periodically updated schedules accurately depicting progress to first day of each month.
3. Submit two (2) copies, one (1) to be retained by the Professional and the other forwarded to the Owner.

NETWORK ANALYSIS SCHEDULE
SECTION 01311

1.01 **DESCRIPTION**

A. **Scope**: Provide projected network analysis schedules for the entire Work and revise periodically. This type of schedule is acceptable for any Project whose initial Contract award amount is one million dollars ($1,000,000), **or greater**.

1.02 **REFERENCES**

A. **CPM in Construction**: The latest edition of the Manual entitled **The Use of CPM in Construction, A Manual for General Contractors and the Construction Industry**, published by the Associated General Contractors of America (AGC) - Washington, D.C. shall be used.

1.03 **QUALITY ASSURANCE**

A. **Contractor's Administrative Personnel**: Two (2) years minimum experience in using and monitoring CPM schedules on comparable Projects is required.

1.04 **FORMAT**

A. **Listings**: Reading from left to right, in ascending order for each activity, identify each activity with the applicable specification section number.

B. **Diagram Sheet Size**: Height and width as required.

C. **Scale and Spacing**: To allow for notations and revisions.

1.05 **SCHEDULES**

A. **Critical Path Methods**: Prepare network analysis diagrams and supporting mathematical analyses using the *Critical Path Method* under *Concepts and Methods* as outlined in the AGC's **The Use of CPM in Construction, A Manual for General Contractors and the Construction Industry**.

B. **Order of Work**: Illustrate order and interdependence of activities and sequence of Work; how start of a given activity depends on completion of preceding activities, and how completion of the activity may restrain start of subsequent activities.

C. **Complete Sequence of Construction**: Illustrate complete sequence of construction by activity, identifying work of separate stages. Provide dates for submittals and return of submittals; dates for procurement and delivery of products; and dates for installation and provision for testing. Provide legend for symbols and abbreviations used.

D. **Mathematical Analysis**: Tabulate each activity of detailed network diagrams, using calendar dates, and identify for each activity:
1. Preceding and following event numbers
2. Activity description
3. Estimated duration of activity, in maximum thirty (30) day intervals
4. Earliest start date
5. Earliest finish date
6. Actual start date
7. Actual finish date
8. Latest start date
9. Latest finish date
10. Total and free float
11. Monetary value of activity (keyed to *Schedule of Values*)
12 Percentage of activity completed
13. Responsibility

E. **Analysis Program**: Capable of compiling monetary value of completed and partially completed activities, of accepting revised completion dates, and recomputation of all dates and floats.

F. **Required Sorts**: List activities in sorts or groups:
1. By preceding work item or event number from lowest to highest

2. By amount of float, then in order of early start
3. By responsibility in order of earliest possible start date
4. In order of latest allowable start dates
5. In order of latest allowable finish dates
6. Contractor's periodic payment request sorted by *Schedule of Values* listings, Specifications section
7. Listing of basic input data which generates the report
8. Listing of activities on the critical path
9. Monthly cash flow

G. ***Schedule of Values***: Coordinate contents with *Schedule of Values* in Section 01300.

1.06 **SUBMITTALS FOR REVIEW**

A. **Preliminary Network Diagram**: Within fifteen (15) days after the date established in the *Notice to Proceed* submit proposed preliminary network diagram defining planned operations for the first sixty (60) days of Work, with a general outline for the remaining Work.

B. **Review**: Participate in review of preliminary and complete network diagrams jointly with the Professional.

C. **Proposed Complete Network Diagram**: Within twenty (20) days after joint review of proposed preliminary network diagram, submit draft of proposed complete network diagram for review. Include written certification that mechanical and electrical Subcontractors have reviewed and accepted proposed schedule.

D. **Complete Network Diagram**: Within ten (10) days after joint review, submit complete network analysis consisting of network diagrams and mathematical analysis.

E. **Updated Network Schedules**: Submit updated network schedules with each Application for Payment.

F. **Copies**: Submit the number of opaque reproductions the Contractor requires, plus two (2) copies which will be retained by the Professional and the Owner.

1.07 **REVIEW AND EVALUATION**

A. **Review**: Participate in joint review and evaluation of network diagrams and analysis with the Professional at each submittal.

B. **Evaluate**: Evaluate Project status to determine Work behind schedule and Work ahead of schedule.

C. **Revisions**: After review and approval of the Professional, revise as necessary as a result of the review and resubmit within ten (10) days.

1.08 **UPDATING SCHEDULES**

A. **Schedules**: Maintain schedules to record actual start and finish dates of completed activities.

B. **Progress**: Indicate progress of each activity to date of revision, with projected completion date of each activity. Update diagrams to graphically depict current status of Work.

C. **Modifications**: Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

D. **Changes**: Indicate changes required to maintain Date of Substantial or Total Completion. These changes will be made only with the approval of the Professional.

E. **Extensions**: Contract completion time will be adjusted only for causes specified in the Contract. Requests for an extension of the contract completion date by the Contractor shall be supported with a justification, CPM data and supporting evidence as the Owner may deem necessary for determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the Contract. Submission of proof based on revised activity logic duration and costs is obligatory to any approvals. The schedule must clearly display that the Contractor has used, in full, all the float time available for the work involved in the request. The Owner's determination as to the total number of days of contract extension shall be based upon the current computer-produced calendar-dated schedule for the time period in question and all other relevant information. Actual delays in activities which, according to the computer-produced calendar-dated schedule, do not affect the extended and predicted contract completion dates shown by the critical path in the network, will not be the basis for a change to the contract completion date. The Owner will, within a reasonable time after receipt of such justification and supporting evidence, review the facts and advise the Contractor in writing of the Owner's decision. The Contractor shall submit each request for a change in the contract completion date to the Owner. The Contractor shall include as a part of each change order proposal, a sketch showing all CPM revisions, duration changes, and cost changes, for the work in question and its relationship to other activities on the approved arrow diagram.

F. **Substantiate**: Submit sorts required to support recommended changes.

G. **Report**: Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect.

1.09 **DISTRIBUTION**

A. **Distribution of Copies**: Following joint review, distribute copies of updated schedules to Contractor's Project site, to Subcontractors, Suppliers, Professional and Owner.

B. **Reporting Problems**: Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
SECTION 01340

1.01 **DESCRIPTION**

A. **Scope**: Submit to the Professional shop drawings, product data and samples required by Specification sections. Submit an additional copy of shop drawings, product data and samples related to items/systems identified to be commissioned to the Commissioning Authority Professional to be reviewed concurrently with the Professional. (if Cx on project).

B. **Shop Drawings**: Original drawings prepared by Contractor, Subcontractor, Supplier, or Distributor which illustrate some portion of the Work; showing fabrication, layout, setting, or erection details.
1. Prepared by a qualified detailer.
2. Identify details by reference to sheet and detail numbers shown on Contract drawings.
3. Minimum sheet size: 8 1/2" x 11"
4. Reproductions for submittals: Opaque diazo prints.

C. **Product Data**:
1. **Manufacturer's Standard Schematic Drawings**: Modify drawings to delete information which is not applicable to the Project. Supplement standard information to provide additional information applicable to the Project.
2. **Manufacturer's Catalog Sheets, Brochures, Diagrams, Schedules, Performance Charts, Illustrations and Other Standard Descriptive Data**: Clearly mark each copy to identify pertinent materials, products, or models. Show dimensions and clearances required. Show performance characteristics and capacities, wiring diagrams and controls.

D. **Samples**: Physical examples to illustrate materials, equipment or workmanship and to establish standard by which completed work is judged.

1. **Office Samples**: Of sufficient size and quantity to clearly illustrate functional characteristics of products or material with integrally related parts and attachment devices and full range of color samples. After review, samples remain the property of the Professional until completion of the construction project.
2. **Field Samples and Mock-ups**: Erect on project site at location acceptable to Professional. Construct each sample, or mock-up, completely including work of all trades required in finished work.

E. **Contractor's Responsibilities**:

1. Review shop drawings, product data and samples prior to submission.
2. Verify field measurements, field construction criteria, catalog numbers and similar data.
3. Coordinate each submittal with requirements of work and of Contract Documents.
4. Contractor's responsibility for errors and omissions in submittals is not relieved by the Professional's review of submittals.
5. Contractor's responsibility for deviations in submittals from requirements of Contract Documents is not relieved by Professional's review of submittals unless Professional gives written acceptance of specific deviations.
6. Notify Professional in writing at the time of submission of deviations in submittals from requirements of Contract Documents.
7. Begin no work requiring submittals until the return of submittals bearing Professional's stamp and initials, or signature indicating review.
8. After Professional's review, distribute copies.

F. **Submission Requirements**:

1. Schedule submission with ample time before dates reviewed submittals will be needed.
2. Submit number of copies of shop drawings and product data which Contractor requires for distribution, plus one (1) copy to be retained by the Professional.
3. Submit number of samples specified in each Specification section.
4. Accompany submittals with transmittal letter, in duplicate, containing date, Project title and number; Contractor's name and address; the number of each shop drawings, product data and samples submitted; notification of deviations from Contract Documents; and, other pertinent data.
5. Submittals shall include:
    a. Date and revision dates.
    b. Project title and number.
    c. The names of the Professional, Contractor, Supplier, Manufacturer and separate detailer, when pertinent.
    d. Identification of product, or material.
    e. Relation to adjacent structure, or materials.
    f. Field dimensions clearly identified as such.
    g. Specification section number.
    h. Applicable standards such as ASTM number, or federal specifications.
    i. A blank space (2" x 3") for the Professional's stamp.
    j. Identification of deviations from Contract Documents.
    k. Contractor's stamp, initialed or signed, certifying the review of submittal, verification of field measurements and compliance with Contract Documents.

G. **Resubmission Requirements**:

1. **Shop Drawings**: Revise initial drawings, as required, and resubmit as specified for initial submittal. Indicate on the drawings any changes which have been made other than those required by the Professional.
2. **Product Data and Samples**: Submit new data and samples, as required, for initial submittal.

H. **Distribution of Submittals After Review**:

1. Distribute copies of shop drawings and product data which carry Professional's stamp to Contractor's file, job site file, Subcontractor, Supplier and Fabricator.

2. Distribute samples as directed.

I. **Professional's Duties**:

1. Review submittals with reasonable promptness.
2. Review for design concept of Project and information given in Contract Documents.
3. Review of separate item does not constitute review of an assembly in which item functions.
4. Affix stamp and initials, or signature, certifying the review of submittal.
5. Return submittals to Contractor for distribution.

TESTING LABORATORY SERVICES
SECTION 01410

1.01 **DESCRIPTION**

A. **Scope**: The Contractor will employ and pay for the services of an independent laboratory to perform specified services. Employment of a testing laboratory shall in no way relieve the Contractor of his obligation to perform work in accordance with the Contract.

B. **Inspection, Sampling and Testing**: Refer to each individual specification section for specific inspection, sampling and testing requirements.

C. **Qualification of Laboratory**:

1. Meet the *Recommended Requirements for Independent Laboratory Qualification* published by the American Council of Independent Laboratories.
2. Meet the basic requirements of ASTM E 329-70, *Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction*.
3. Responsible Engineer: Perform all testing under the direct supervision of a registered Professional engineer employed full time by the testing laboratory.
4. Submittals: Submit a copy of the inspection report of the facilities made by materials reference laboratory of National Bureau of Standards of any deficiencies reported by the inspection.
5. Approval: The Professional must approve the testing laboratory.

D. **Laboratory's Duties**:

1. Upon notice, cooperate with the Professional and the Contractor to promptly provide qualified personnel. Perform specified inspections, sampling and testing of materials and methods of construction to ascertain compliance with requirements of Contract Documents. Promptly notify the Professional and the Contractor of irregularities or deficiencies of work observed during performance of services.
2. Reports of inspections and tests will include:
   a. Date issued
   b. Project title and number
   c. Testing laboratory's name and address
   d. Name and signature of inspector
   e. Date of inspection, or sampling
   f. Record of temperature and weather
   g. Date of test
   h. Identification of product and Specification section
   i. Location of Project
   j. Type of inspection, or test
   k. Observations regarding compliance with Contract Documents

3. Prompt distribution of copies of the inspection reports and tests to:
    a. Owner
    b. Professional
    c. General Contractor
    d. Consulting Engineer, when pertinent
    e. Subcontractor, when pertinent

E. **Contractor's Responsibilities**:

1. Cooperate with laboratory personnel to provide access to work and to manufacturer's operation. Provide the laboratory with the required quantities of preliminary samples representative of materials to be tested and required quantities. When required, furnish copies of mill test reports. Furnish laboratory casual labor to obtain and handle samples at the site and to facilitate inspections and tests. Provide facilities for laboratory's exclusive use for storage and curing of test samples. Notify laboratory sufficiently in advance of operations to allow for assignment of personnel and scheduling of tests.
2. Arrange and pay for additional samples and tests required for Contractor's convenience. When initial tests indicate work does not comply with Contract Documents, the Contractor may employ and pay for the services of a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing.

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS
SECTION 01500

1.01 **DESCRIPTION**

A. **Scope**: Work required under this section consists of all temporary construction facilities, services and related items to complete the work indicated on the drawings and described in the Project Manual.

B. **Standards**:

1. Conform to or exceed all temporary construction requirements stated in the current edition of the **Standard Building Code** [Chapter entitled *Safeguards During Construction*].
2. Refer to Article 10.1.1 in Section 00700 entitled *General Conditions*.

C. **Materials**: All materials required by the Work of this section shall be as specified in the respective sections.

1.02 **FACILITIES AND CONTROLS**

A. **Access**: The Prime General Contractor shall provide an adequate access and/or roads to the site of the structure, if required for the prosecution of work; and, should also provide and maintain at least one (1) temporary, or permanent, access to each working elevation to be permanently occupied.

B. **Hoisting Facilities**: The Prime General Contractor shall be responsible for providing suitable capacity and hoisting facilities for all people and materials. The use of the hoisting facilities shall be by mutual agreement of the Prime General Contractor and the individual Contractor.

C. **Field Office and Sheds**: At all times, the Prime General Contractor shall provide and maintain a weatherproof office with telephone, which may also be used by Subcontractors, the Owner and the Professional. Office location will be approved by the Owner. Each general and individual Contractor shall provide suitable watertight/dampproof sheds to house their construction materials.

D. **Sanitation Facilities**: The Prime General Contractor is responsible for furnishing adequate temporary toilet facilities on the job site.

E. **Drinking Water**: The Prime General Contractor shall provide at all times sanitary drinking water facilities for all workmen on the job including ice, when required, and paper cups, etc..

F. **Fire Protection**: The Prime General Contractor shall provide general temporary fire protection. Subcontractors will be responsible for their own.

G. **Storage**: The Prime General Contractor shall coordinate the allocation of storage areas to the various Subcontractors.

H. **Temporary Heat**: The Prime General Contractor shall provide heat, fuel and services, as necessary, to protect all work from dampness and cold until final acceptance. If in the late stages of the construction, mechanical and electrical installations will permit, the mechanical and electrical facilities may be used to provide heat and ventilation. However, the Owner is saved harmless of any costs of operation or responsibility as to acceptance of mechanical and/or electrical installations.

I. **Utilities**: The Prime General Contractor shall make arrangements for and furnish all water, electricity (lighting and power) and other utilities necessary for construction purposes. A written agreement must be reached on how all utilities (water and electricity) will be furnished and the rates the Contractor will be charged. A copy of the final agreement signed by the Contractor and the Institution or Agency must be forwarded to the Owner. If the written agreement is not filed with the Owner, the Contractor and the Institution or Agency waives all rights as to the rates charged. The Owner will then determine all utility rates and assess the charges before final payment is rendered.

J. **Project Sign**: (see also 600.31) (see 700.19; Exhibit B in Div 1 01900) (new State Seal per Legislature July 1, 2014)

1. The Prime General Contractor will erect on adequate supports and maintain one (1) neatly constructed and painted 3/4" thick plywood sign of size, color, layout, and location as indicated in the Contract Documents. (example attached as Exhibit "B" at the end of Division 1 Section 01900)
2. No other signs will be displayed on the job site without permission of the Professional. The displaying of sign advertisements is strictly prohibited.

SUBSTITUTIONS AND PRODUCT OPTIONS

SECTION 01630

(01630 Revised August 2016;
see Inst to Bidders 2.05)

1.01 DESCRIPTION

A. Scope: To set forth the procedure and conditions for substitutions and to give the product options available to the Contractor.

1.02 PRODUCTS LIST

A. Within thirty (30) days after the Contract has been signed, the Contractor will submit to the Professional five (5) copies of a complete list of all products proposed for installation.
B. Tabulate the list by Specification sections.
C. For products specified under reference standards, include with listing of each product:
   1. Name and address of Manufacturer.
   2. Trade name.
   3. Model, or catalog designation.
   4. Manufacturer's data.
   5. Performance and test data.
   6. Reference standards.

1.03 CONTRACTOR'S OPTIONS

A. For products specified only by reference standards or technical performance requirements, select any product meeting product standards by any Manufacturer.

B. For products specified by naming a minimum of three (3) products or Manufacturers, select any product and Manufacturer named. Equivalent products will always be accepted if equal in all consequential respects.

C. For product specified by naming one (1) or more products and/or Manufacturers, but indicating the option of selecting equivalent products by stating "or equal" after specified product and/or Manufacturer, select any product meeting specified reference standards or technical performance requirements as represented by the named products and/or Manufacturers.

D. For products specified by naming only one (1) product and/or Manufacturer as a "basis of design", an equivalent product will always be accepted if it is equal in all consequential respects.

E. For products specified by naming only one (1) product and Manufacturer and stating no substitutions will be accepted, there is no option and no substitutions will be allowed. This option must have written approval by the Owner before bidding.

1.04 SUBSTITUTIONS

A. A product or construction method that varies from a product or construction method specified in one or more consequential characteristics, reference standards, or technical performance requirements shall be considered a substitution.

B. Professional will not consider requests for substitutions during bidding.

C. Within thirty (30) days after the Contact has been signed, the Professional will consider formal requests from the Contractor for substitution of products in place of those specified. Submit five (5) copies of the request for substitutions. Include in the request:

1. Narrative summarizing characteristics, reference standards, or technical performance requirements that product varies from and how the proposed product or construction method will meet or exceed project requirements
2. For products:
    a. Product identification including Manufacturer's name and address.
    b. Manufacturer's literature: Product description, performance and test data and reference standards.
    c. Samples.
    d. Name and address of similar projects on which product was used and date of installation.
3. For construction methods:
    a. Detailed description of proposed method.
    b. Drawings illustrating methods.
4. Agreement to pay for any additional professional costs if acceptance of substitution will require substantial revision of Contract Documents.
5. Data relating to any delays to the construction schedule if any will result from proposed substitution.
6. Accurate cost data on proposed substitution if any project cost increases are anticipated or any cost savings are being offered for proposed substitution.

D. In making request for substitution, Contractor represents:

1. Proposed product, or method, has been investigated and determined that it is equal or superior in all respects to that specified.
2. The same or better guarantee and/or warranty will be provided for substitutions for product or method specified.
3. Installation of accepted substitutions will be coordinated into the Work, making such changes required of work to be complete in all respects at no additional cost to the Owner.
4. All claims for additional costs related to substitution, including any delays to the construction schedule, which consequently become apparent will be waived.
5. Unless specifically identified in substitution submittal and such delay is specifically agreed to by Change Order to the Contract, substitution will not cause any delay to the construction schedule.
6. Proposed product, or method, will not result in any additional costs to the Owner.

E. Substitutions will not be considered if:

1. Indicated, or implied, on shop drawings or product data submittals without formal request submitted in accordance with this Section.

2. Acceptance will require substantial revision of Contract Documents unless compensation for such additional professional costs are paid by Contractor at no additional cost to the Owner.
3. In the Professional's judgment, the product, or material, is not equal.

STARTING OF SYSTEMS
SECTION 01650

1.01 **GENERAL**

A. **Scope**: This Section describes the procedures for start up of all building equipment and systems including necessary demonstration and instructions.

1.02 **STARTING SYSTEMS**

A. Coordinate Schedule for start-up of various equipment and systems.

B. Notify Professional and Owner seven (7) days prior to start-up of each system.

C. Verify each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other conditions which may cause damage.

D. Verify that tests, meter readings and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of responsible Contractors' personnel in accordance with manufacturers' instructions.

G. When specified in individual specification Sections, require Manufacturer to provide authorized representative to be present at site to inspect, check and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

1.03 **DEMONSTRATION AND INSTRUCTIONS**

A. Demonstrate operation and maintenance of Products to Owner's personnel prior to date of Substantial Completion.

B. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at designated location.

D. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

CONTRACT CLOSEOUT
SECTION 01700

1.01 **DESCRIPTION**

A. **Scope**: The work required in this Section consists of the final inspections and the submission of all closeout documents and related items to complete the Work indicated on the Drawings and described in the Project Manual.

1.02 **FINAL INSPECTIONS**

A. **Professional's Inspection**: The Contractor shall make written request for a final inspection to the Professional; notice to be given ten (10) days prior to the inspection. A list of any deficiencies, compiled by the Professional, will be corrected by the Contractor. If, in the Professional's judgement, the Project is not ready for a final inspection, the Professional may schedule another inspection

B. **Owner's Inspection**: After the Professional has ascertained the Project to be ready, an Owner's inspection will be scheduled within ten (10) days thereafter. The Contractor will have ten (10) days after the Owner's acceptance to make any corrections of punch list items and to submit closeout documents.

C. **Correction of Work Before Final Payment**: The Contractor shall promptly remove from the Owner's premises all materials condemned for failure to conform to the Contract, whether incorporated in the Work or not, and the Contractor shall, at his own expense, replace such condemned materials with those conforming to the requirements of the Contract. Failure to remedy such defects after ten (10) days written notice will allow the Owner to make good such defects and such costs shall be deducted from the balance due the Contractor, or charged to the Contractor in the event no payment is due.

1.03 **CLOSEOUT DOCUMENTS**

Unless otherwise notified, the Contractor shall submit to the Owner through the Professional, three (3) copies of the following before final payment is made:

A. **Request for Final Payment**: AIA Document G702, current edition, completed in full or a computer generated form having similar data.

B. **Consent of Surety Company to Final Payment**: AIA Document G707, current edition, completed in full by the Bonding company.

C. **Power of Attorney**: Closeout documents should be accompanied by an appropriate Power of Attorney.

D. **Release of Liens and Certification that All Bills Have Been Paid**: AIA Document G706A, current edition, completed in full or a sworn statement and affidavit from the Contractor to the Owner stating that all bills for this job have been paid and that the Owner is released from any and all claims and/or damages.

E. **Contractor's Affidavit of Payment of Debts and Claims**: AIA Document G706, current edition, completed in full.

F. **Guarantee of Work**: Sworn statement that all work is guaranteed against defects in materials and workmanship for one (1) year from date of Owner's acceptance, except where specified for longer periods.

1. Word the Guarantee as follows, or in a similar manner:

We hereby guarantee all work performed by us on the above captioned Project to be free from defective materials and workmanship for a period of one (1) year or such longer period of time as may be called for in the Contract Documents for such portions of the Work.

2. All guarantees and warranties shall be obtained in the Owner's name.
3. Within the Guaranty period, if repairs or changes are requested in connection with guaranteed work which, in the opinion of the Owner, are rendered necessary as a result of the use of materials, equipment or workmanship which are inferior, defective or not in accordance with the terms of the Contract, the Contractor shall promptly, upon receipt of notice from and without expense to the Owner, place in satisfactory condition building, site, equipment or contents thereof. The Contractor shall make good any work, materials, equipment or contents of said buildings or site which may be disturbed by fulfilling any such Guaranty.
4. If, after notice, the Contractor fails to proceed promptly to comply with the terms of the Guaranty, the Owner may have the defects corrected and the Contractor and his Sureties shall be liable for all expense incurred.
5. All special guarantees applicable to definite parts of the work stipulated in the Project Manual or other documents forming part of the Contract shall be subject to the terms of this paragraph during the first year of the life of such special guaranty.

G. **Project Record Document**: Furnish all other record documents as set forth in Section 01720 entitled *Project Record Documents*.

H. **Additional Documents Specified Within the Project Manual**: Provide all additional certificates, warranties, guarantees, bonds or documents as called for in the individual sections of the Project Manual. The Contractor is responsible for examining the Project Manual for these requirements.

CLEANING
SECTION 01710

1.01 **DESCRIPTION**

A. **Scope**: Maintain premises and public properties from accumulations of waste, debris and rubbish caused by operations. At completion of work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials and clean all sight-exposed surfaces; leave Project clean and ready for occupancy.

1.02 **PRODUCTS**

A. **Materials**: Use only cleaning materials recommended by Manufacturer of surface to be cleaned. Use cleaning materials only on surfaces recommended by the cleaning materials Manufacturer.

1.03 **EXECUTION**

A. **During Construction**: Execute cleaning to insure that building, grounds and public properties are maintained free from accumulations of waste materials and rubbish. Wet down dry materials and rubbish to lay dust and prevent blowing dust. At reasonable intervals during progress of work, clean site and public properties and dispose of waste materials, debris and rubbish. Remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off Owner's property. Vacuum clean interior building areas when ready to receive finish painting and continue vacuum cleaning on an as-needed basis until building is ready for substantial completion or occupancy. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights. Schedule cleaning operations so that dust or other contaminants resulting from cleaning process will not fall on wet or newly painted surfaces.

B. **Final Cleaning**: Employ experienced workmen, or professional cleaners, for final cleaning. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces and concealed spaces. Remove grease, dust, dirt, stains, labels, fingerprints and other foreign materials from sight-exposed finishes. Repair, patch and touch up marred surfaces to specified finish to match adjacent surfaces. Broom clean paved surfaces; rake clean other surfaces of grounds. Replace air conditioning filters, if units were operated during construction. Clean ducts, blowers and coils if air conditioning units were operated without filters during construction. Maintain cleaning until Project, or respective portions thereof, is occupied by Owner.

PROJECT RECORD DOCUMENTS
SECTION 01720

1.01 **DESCRIPTION**

A. **Scope**: To set forth the procedure and requirements for keeping project record documents.

B. **Maintenance Documents**: (modified Dec 2013 SoS)
1. Throughout the Contract, maintain one (1) copy of all of the following: Contract Drawings, Project Manual, Addenda, Change Order(s), reviewed shop drawings, reviewed submittals, hardware schedules, field, and laboratory test records, equipment brochures, parts lists, operating instructions and other modifications to the Contract.
2. Store documents on site apart from documents used for construction.

3. Maintain documents in clean, dry, legible condition. Do not use record documents for construction purposes.
4. Make documents available, at all times, for inspection by the Professional, Commissioning Authority Professional, and the Owner.
5. Keep documents in 8 ½" x 11" loose leaf binders. Clearly label each binder on the spine. Sub-divide with permanently marked tabs of card stock. Provide a main tab for each specification section. Provide sub-tabs for each major piece of equipment or component.
6. Format for information behind each tabbed piece of equipment/component shall be:
    a. Contractor/Installer Information: Include address, phone number and contact name. Include emergency service contact information as applicable.
    b. Manufacturer Information: Include address, phone number and contact name.
    c. Shop Drawings and Product Data
    d. Operation and Maintenance Instructions
    e. Control Drawings

C. **Recording**:
1. **General**: Mark all modifications in red pencil. Keep record documents current. Do not permanently conceal any work until required information has been recorded.
2. **Contract Drawings**: Legibly mark to record actual construction.
    a. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
    b. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
    c. Field changes in dimension and detail.
    d. Changes made by change order(s) or field order(s).

3. **Project Manual and Addenda**: Legibly mark up each section to record Manufacturer, trade name, catalog number and Supplier of each product and item of equipment actually installed.
4. **Shop Drawings**: Maintain as record documents. Legibly mark drawings to record changes made after review.

D. **Submittal**: At completion of Project, deliver two (2) copies of each record document to the Professional, who will transmit both sets to the Institution or Agency. Additionally, provide to Owner updated As-Built Contract Documents in electronic format utilizing electronic format copy of Contract Documents furnished by Professional or by scanning of marked-up contract Documents. (see also 600.57 and 700.40 regarding electronic As-Built Documents) (modified Dec 2013 SoS)

DIVISION ONE SUPPLEMENT
SECTION 01900

PART 1 - SUMMARY OF WORK SUPPLEMENT

1.01 **WORK SEQUENCE**

A. Owner will occupy the building during construction, coordinate with Owner's Representative in scheduling work to vacate the areas as the Contractor requires.

B. Construct work in stages as follows:
1. N/A
2. _____
3. _____

1.02 **PARTIAL OWNER OCCUPANCY**

A. Schedule early completion of designated areas for Owner's usage prior to substantial completion of entire Project.
1. N/A
2. _____
3. _____

B. Owner will occupy areas for purpose of N/A

C. Contractor will provide:
1. Access for Owner's personnel
2. Operation of heating, ventilating, air conditioning and electrical systems
3. _____

D. Prior to occupancy, execute a *Certificate of Substantial Completion* for designated areas.

E. Upon occupancy, Owner shall provide:
1. _____
2. _____

PART 2 - ALLOWANCE SUPPLEMENT

2.01 **SCHEDULE OF ALLOWANCES**

A. Include in the Bid, for inclusion in the Contract Sum, the amount of $ 5,000.00 for purchase of MS DMR logo sign

(Refer to Section _____, _____)

B. Include in the Bid, for inclusion in the Contract Sum, the amount of $_____ for purchase of _____

(Refer to Section _____, _____)

3.01 **DESCRIPTION OF ALTERNATES**

A. Alternate Number One. Pier 4 - This alternate includes providing Pier 4 complete. The scope includes, but is not limited to, piles located at 2A, 2B, 3A, 4A, 5A, and 5B and the associated pier framing and decking at and between these piles.

B. Alternate Number Two. Boat Shelter - This alternate includes providing the treated wood shelter complete. The scope includes, but is not limited to, all vertical wood components above the top of piles, roof decking, lighting, and sign between column lines "D" and "E".

C. Alternate Number Three. N/A

D. Alternate Number Four. N/A

E. Alternate Number Five. N/A

Minority Tracking or Participation Form
February 2003

This document will serve as a tracking instrument for minority participation in publicly funded construction projects managed by the Owner. This document will aid the Owner in its commitment to encourage minority participation during the bidding process. Your conscientious effort and commitment to help establish good business relations with minority subcontractors, consultants, suppliers, partners and/or joint ventures is greatly appreciated.

Any responses will be deemed public information and may be incorporated into reporting information compiled by the Owner in the following manner: Contractors that listed minority participation, Contractors that did not list minority participation and Contractors that submitted an incomplete (partially filled-out or blank) form.

Division One

Section 01010 SUMMARY OF WORK

1.01 Work Covered by Contract Documents

F. Subcontractors List

F.1 The Prime General Contractor will submit to the Owner within seven (7) days from the Notice to Proceed, a completed *Minority Tracking Form* (as follows) **outlining the use of minority subcontractors that will be used on the project.**

Minority – A person who is a citizen or lawful permanent resident of the United States and who is the following: **African American, Hispanic American, Asian American, American Indian or Female**

Project Name and Number: _____

General Contractor: (Name) _____

Check the Following Appropriate Box

☐ **There are NO minority participants included in this bid proposal.**

☐ **There are minority participants included in this bid proposal.** The minority participants may be defined as: Subcontractor(s) / Consultant(s) / Supplier(s) / Partner(s) / Joint Ventures(s).

List minority participants and their discipline/responsibility per the above or per Construction Specification Institution (CSI) sixteen (16) divisions.

Name:_____

Division:_____

Amount $_____

Name:_____

Division:_____

Amount $_____

Name:_____

Division:_____

Amount $_____

Name:_____

Division:_____

Amount $_____

Name:_____

Division:_____

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Amount $_____

Name:_____

Division:_____

Amount $_____

Name:_____

Division:_____

Amount $_____

Name:_____

Division:_____

Amount $_____

End of Form

Division One

Section 01500 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

1.02 Facilities and Controls

J. Project Sign

1. The Contractor will erect on adequate supports and maintain one (1) neatly constructed and painted 3/4" thick plywood sign approximately four feet by eight feet (4' x 8'). The Professional will provide the colors, letters, layout and location of the sign. No other signs will be displayed on the job site without permission of the Professional. The displaying of sign advertisements is strictly prohibited

2. Sign to be white background with black lettering/seal. Text style to be Times New Roman. Color of rectangular field at bottom to be selected by Owner. Provide custom Using Agency logo at circular white field of up to three additional colors. No corporate logos for Architect or Contractor shall be permitted. Where additional rendered signage is specified elsewhere, it shall consist of (1) or (2) additional 4'x8' panels, contiguous to the right side of primary project sign.

BOB Procedure Manual:
700.19
PROJECT SIGN (new State Seal per Legislature July 1, 2014)

The contractor will erect on adequate supports and maintain one (1) neatly constructed and painted ¾" thick plywood sign approximately four feet by eight feet (4' x 8'). The Professional will provide the colors, letters, layout and location of the sign. No other signs will be displayed on the job site without permission of the Professional. The displaying of sign advertisements is strictly prohibited.

Sign to be white background with black lettering/seal. Text style to be Times New Roman. Color of rectangular field at bottom to be selected by Owner. Provide custom Using Agency logo at circular white field of up to three additional colors. No corporate logos for Architect or Contractor shall be permitted. Where additional rendered signage is specified elsewhere, it shall consist of (1) or (2) additional 4'x8' panels, contiguous to the right side of primary project sign.

THIS PROJECT IS FUNDED BY THE TAXPAYERS OF MISSISSIPPI

GOVERNOR PHIL BRYANT

PROJECT NAME

GS# 111-111
HB1111 or SB1111, LAWS OF 1111

MISSISSIPPI DEPARTMENT OF MARINE RESOURCES

ARCHITECT

ARCHITECT NAME

CONTRACTOR

CONTRACTOR NAME
MISSISSIPPI C.O.R. #11111

USING AGENCY NAME

HEAD OF USING AGENCY NAME
GOVERNING BOARD (WHERE APPLICABLE)

SECTION 02001
SITE CONDITIONS

1.0 SUBSURFACE INFORMATION

1.1 Subsurface investigations have not been made. The Contractor shall provide his own investigation as required to properly accomplish the work.

2.0 DIFFERING SUBSURFACE CONDITIONS

2.1 In the event latent physical conditions are found materially different from those ordinarily encountered and generally recognized as inherent in the character of work covered in these Contract Documents, the Contractor shall promptly, and before such conditions are disturbed, notify the Engineer in writing of such changed conditions.

2.2 The Engineer will investigate such conditions promptly and following this investigation, the Contractor shall proceed with the work, unless otherwise instructed by the Engineer. If the Engineer finds that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for performing the work, the Engineer will recommend to the Owner the amount of adjustment in cost and time he considers reasonable. The Owner will make the final decisions on all Change Orders to the Contract regarding any adjustment in cost or time for completions.

3.0 SITE INVESTIGATION AND REPRESENTATION

3.1 The Contractor acknowledges that he has satisfied himself as to the nature and location of the work; the general and local conditions, particularly those bearing upon availability of transportation, disposal, handling and storage of materials; availability of labor, water, electric power, and roads; uncertainties of weather, river stages, or similar physical conditions at the site; the conformation and conditions of the ground; the character of equipment and facilities needed preliminary to and during the prosecution of the work; and all other matters which can in any affect the work or the cost thereof under this Contract.

3.2 The Contractor further acknowledges that he has satisfied himself as to the character, quality, and quantity of surface and subsurface materials and groundwater to be encountered from inspecting the site. Any failure by the Contractor to acquaint himself with all the available information will not relieve him from responsibility for properly estimating the difficulty or cost of successfully performing the work. Neither the Owner, nor the Engineer assume responsibility for any conclusion or interpretation made by the Contractor on the basis of the information made available by the Owner, or the Engineer.

4.0 VERTICAL AND HORIZONTAL CONTROL

4.1 The Contractor shall provide any additional vertical and horizontal control points if necessary for construction. It will be the Contractor's sole responsibility to lay out the work. When new construction connects to existing facilities, the Contractor shall check and establish the exact location of the point of connection prior to construction. The Engineer will not be responsible for any elevations given other than those provided as indicated herein.

4.2 All control points, marks, and other information shall be carefully preserved by the Contractor, and in the event of their careless of unnecessary destruction or removal by him or any of his subcontractors, such stakes, marks, and other information will be replaced at the Contractor's expense by means of a deduction from the Contract monies due the Contractor.

4.3 The Contractor shall recheck all top and invert elevations of the storm sewer lines prior to construction. Copies of the field notes shall be turned over to the Engineer for review. The field information should be obtained utilizing elevations from the drawings. Rod readings for determination of grade are not acceptable.

4.4 Failure to perform this work will not relieve the Contractor from responsibility for checking and adjusting pipeline grades.

5.0 PROFILE ELEVATIONS

5.1 Existing ground profiles shown on the drawings were plotted from approved field surveys.

6.0 LAND MONUMENTS

6.1 The Contractor shall preserve all existing land monuments encountered. If monuments interfering with the proposed construction are encountered during the work, notify the Engineer immediately and allow 2 working days for arrangements to be made to reference them for later replacement. All monument replacement shall be at the expense of the Contractor and performed by a land surveyor licensed in the State of Mississippi.

7.0 EXISTING UTILITIES

7.1 Known utilities and structures adjacent to or encountered in the work are shown on the drawings. The locations shown are taken from existing records and it is expected that there may be some discrepancies and omissions in the locations and quantities of utilities and structures shown. Those shown are for the convenience of the Contractor only, and no responsibility is assumed by either the Owner, or the Engineer for their accuracy or completeness.

7.2 Prior to move-in and in conjunction with the work under Item 4 above, the Contractor shall verify the location of utilities, including depth and report this information to the Engineer. Conflicts, if any, will be resolved prior to move-in.

7.3 No attempt has been made to locate services whether water, sewer, or gas. Location and repairs to services damaged by the Contractor are considered incidental to construction and the cost should be included in the applicable unit price or lump sum bid items.

7.4 In the event utilities and/or structures are encountered that are not shown on the drawings, adjustments to the Contract shall be provided for in accordance with the GENERAL CONDITIONS, ALTERATIONS. The Contractor shall excavate areas where latent components may materialize some time ahead of construction in order to allow the Owner to institute appropriate changes and to mitigate any delays.

8.0 RESPONSIBILITY FOR UTILITY PROPERTIES AND SERVICE

8.1 Neither the Owner nor his officers or agents shall be responsible for the Contractor for damages as a result of the Contractor's failure to protect utilities encountered in the work.

8.2 The Contractor shall at all times provide unobstructed access to fire hydrants, underground conduit, manholes and water or gas valve boxes.

8.3 Where the Contractor's operations could cause damage or inconvenience to railway, telegraph, telephone, television, power, oil, gas, water, sewer, irrigation, or other systems adjacent or near the work, operations shall be suspended until the Contractor has made all arrangements necessary for the protection of these utilities and services and the Engineer has been notified of these arrangements.

8.4 Notify the Engineer and all utility offices that are affected by the construction operation at least 7 days in advance of commencing construction operations. The Contractor shall not expose any utility without first obtaining permission from the appropriate agency and notifying the Engineer of this permission. Once permission has been granted, locate and, if necessary, expose and provide temporary support and/or relocation in advance of operations.

8.5 Protect all utility poles from damage. If interfering utility poles, guy wires or anchors are encountered, the Contractor shall notify the Engineer and the appropriate utility company as soon as possible and at least 48 hours in advance of construction operations to permit the necessary arrangements for protection or relocation of the interfering poles.

8.6 The Contractor shall be solely and directly responsible to the Owner and operators of such utility properties for any damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of any character brought because of any injuries or damage that may result from the construction operations under his Contract.

8.7 In the event of interruption to domestic water, sewer, storm drain, or other utility services as a result of accidental breakage due to construction operations, promptly notify the proper authority. Cooperate with said authority in restoration of service as promptly possible and bear all costs of repair. In no event shall interruption of any water or utility service be allowed unless prior approval is granted by the Owner of the utility.

8.8 The Contractor shall replace, at his own expense, any and all other existing utilities or structures removed or damaged during construction, unless otherwise provided for in these Contract Documents or ordered by the Engineer.

9.0 RELOCATIONS REQUIRED BY CONSTRUCTION

9.1 Where existing utilities, structures, or other physical obstructions block or impede construction under this Contract, they shall be permanently relocated. Such relocations shall be considered as required by construction. All other relocations shall be treated in accordance with UTILITY INTERFERENCES INCIDENTAL TO CONSTRUCTION below.

9.2 The Contractor shall give immediate notice to the Engineer and the Owner of the utility when a physical conflict is determined to exist. The actual relocation will be accomplished by the Owner of the utility, structure or other physical obstruction unless otherwise specified in these Contract Documents. Any delays resulting from the required relocations of the utilities are the responsibility of the Contractor.

10.0 UTILITY INTERFERENCES INCIDENTAL TO CONSTRUCTION

10.1 Where existing utility lines or structures are so located as to interfere with the Contractor's method of performing the work, but do not reasonably block or impede construction, under the Contract, any modification, alteration, or relocation of interfering utility, either permanent or temporary, shall be accomplished at the expense of the Contractor.

10.2 The Contractor shall give immediate notice to the Engineer and the Owner of the utility when an interference is determined to exist and shall obtain approval to relocate such utility or to discontinue service from the Engineer and the Owner of the utility. The Owner of the utility shall have the right to do all work required to discontinue, relocate, and replace interfering utilities and charge the Contractor for all costs thereof. When approved by the Engineer and the Owner of the utility, all work required to discontinue, relocate and replace interfering utilities may be done by, or arranged for, by the Contractor. All such discontinuance, relocation, and replacement shall be accomplished in accordance with all requirements of the Owner of the utility.

10.3 When notified by the Contractor that an interference or conflict has been determined to exist, the Engineer will determine whether such interference shall be considered as required by construction or as incidental to construction.

11.0 INTERFERING STRUCTURES

11.1 Take necessary precautions to prevent damage to existing structures where on the surface, aboveground, or underground. An attempt has been made to show major structures on the drawings. While the information has been compiled from the best available sources, its completeness and accuracy cannot be guaranteed, and it is presented as a guide to avoid known possible difficulties.

11.2 Protect existing structures from damage, whether or not they lie within the right-of-way or the limits of the easements obtained by the Owner. Where existing structures are damaged during the work, they shall be restored at the Contractor's expense to at least their original condition and to the satisfaction of the Engineer.

11.3 The Contractor may, with the approval of the Engineer and without additional compensation, remove and replace in a condition as good as or better than original, any small interfering structures such as fences, mail boxes and signposts that interfere with the Contractor's operations.

12.0 FIELD RELOCATION

12.1 During the progress of the work, minor relocations of the work may be necessary. Such relocations shall be made only with the agreement of the Engineer. If existing structures are encountered that will prevent construction as shown, notify the Engineer before continuing with the work in order that the Engineer may make such field revisions as necessary to avoid conflict with the existing structures. If the Contractor proceeds with the work despite this interference, he shall be responsible for any damage that may occur.

13.0 EASEMENTS

13.1 Where part of the work is located on private property, easements are shown. The Contractor shall determine the adequacy of easements and shall obtain additional easements, if required.

13.2 Upon completion of work in any Owner provided easement area, the surface shall be restored as required and to the satisfaction of the Engineer. Restoration shall begin within 14 days following completion of construction in the easements. The restoration shall include, at minimum: final grading and grassing; limbing; fence repairs and replacement; sidewalk; curb; and drive repairs; etc. Failure to comply with this provision shall be considered reason to withhold a portion or all monies due the Contractor on Request for Payment.

13.3 The Contractor shall confine construction operations to within the easement limits or make his own special agreement with the property owners for any additional area required and provide two copies of written verification to the Engineer.

13.4 Before final payment will be authorized, the Contractor shall furnish the Owner with written releases from property owners where special agreements have been made by the Contractor, or when his operations, for any reason, have not been kept within the limits of easements obtained by the Owner.

13.5 In the event the Contractor is unable to secure the written releases required in the above paragraph, he shall inform the Engineer of the reasons for his failure to do so. The Engineer will examine the site and will direct the Contractor to complete any work that may be necessary to satisfy the terms of the easement or special agreement. Should the Contractor refuse to do the work, the Owner reserves the right to have it done by separate contract and deduct the cost of same from monies due the Contractor, or the Owner may require the Contractor to furnish a bond in a sum satisfactory to the Owner to cover any legal claims for damages. When the Owner is satisfied that the work has been completed in accordance with the terms of the easement or special agreement, he may waive the requirement of obtaining the statement if the Contractor's failure to obtain such statement is due to the grantor's refusal to sign and this refusal is not based upon any legitimate claims that the Contractor has failed to fulfill the terms of the easement or special agreement, or if the Contractor has overdue hardship in contacting the grantor.

14.0 PAYMENT

14.1 The work specified in this section shall be considered incidental and the cost shall be included as part of the appropriate lump sum or unit prices stated in the Bid.

SECTION 02002
PROTECTION OF THE ENVIRONMENT

1.0 GENERAL

The Contractor, in executing the work, shall maintain all work areas on and off the site free from environmental pollution that would be in violation of any federal, state, or local regulations.

2.0 PROTECTION OF SEWERS

Take adequate measures to prevent the impairment of the operation of the existing sewer system. Prevent construction material, pavement, concrete, earth, or other debris from entering a sewer or sewer structure.

All sewage flow interfering with construction and requiring diversion shall be diverted to sewers leading to a wastewater treatment plant. Prior to commencing excavation and construction, the Contractor shall submit for the Owner's review detailed plans (including routing and connections) showing how he intends to handle and dispose of sanitary sewer wastes. By reviewing the plan, the Owner neither accepts any responsibility for the adequacy thereof nor for any damages to public or private property resulting therefrom. Such responsibilities remain with the Contractor.

3.0 PROTECTION OF WATERWAYS

The Contractor shall comply with all laws prohibiting the pollution of any lake, stream, river, or wetland by the dumping of, or the delivery of any runoff water containing any refuse, rubbish, dredge material, or debris therein.

The Contractor shall comply with the procedures outlined in the U.S. Environment Protection Agency manuals entitled, "Guidelines for Erosion and Sedimentation Control Planning and Implementation", and "Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity" and shall incorporate adequate measures to minimize delivery of sediment from the construction site to adjacent or downstream trees, lands, or water bodies.

4.0 CLEANING DURING CONSTRUCTION

At all times, maintain areas covered by the Contract and public properties free from accumulations of waste, debris, and rubbish caused by construction operations.

Excavated materials shall be removed from the site in a manner that will cause the least damage to adjacent lawns, grassed areas, trees, gardens, shrubbery, or fences regardless of whether these are on private property or on public rights-of-way.

Cleaning and disposal operations shall comply with local ordinances and anti-pollution laws. Do not burn or bury rubbish, debris, or waste materials on the project site or dispose of volatile wastes such as mineral spirits, oil, chemicals, or paint thinner in storm or sanitary drains. Disposal of waste, debris, and rubbish into streams or waterways is prohibited.

Appropriate containers for collection and disposal of waste materials, debris, and rubbish shall be provided by the Contractor.

5.0 NOISE AND DUST CONTROL

The Contractor shall so conduct all his operations that they will cause the least annoyance to the residents in the vicinity of the work, and shall comply with all applicable laws. Vehicles carrying rock, concrete, or other material shall be routed over such streets as will cause the least annoyance to the public and shall not be operated on public streets between the hours of 8 p.m. and 7 a.m. or on Sundays or legal holidays unless the Contractor obtains written permission from appropriate agencies within the municipality(ies) in which the work is to be conducted.

All unpaved streets, roads, detours, haul roads, or roads used in the construction area shall be given a dust preventive treatment or periodically watered to prevent dust. Applicable environmental regulations for dust prevention shall be strictly enforced.

6.0 PAYMENT

The work specified in this Section shall be considered incidental and the cost shall be included as part of the appropriate lump sum or unit prices stated in the Bid.

SECTION 02003
PROTECTION OF PROPERTY

1.0 ACCIDENT REPORTS

If serious injury or damage occurs, the accident shall be reported immediately by telephone or messenger to the Engineer and to appropriate local authorities. In addition, the Contractor must promptly report in writing to the Engineer all accidents in connection with the work, giving full details, names and statements of witnesses.
If a claim is made by anyone against the Contractor or any subcontractor resulting from an accident, the Contractor shall promptly report the facts in writing to the Engineer, giving full details of the claim, including investigating and restitution.

2.0 COMPLAINTS

All complaints received by the Contractor shall be reported to the Engineer no later than the working day following receipt thereof. Such reports shall include the name, address, date, time received, date and type of action complained above, and a brief description of the alleged damages or other circumstances upon which the complaint is predicated. Each complaint shall be assigned a separate number, and all complaints shall be numbered consecutively in order of receipt. In the event more than one complaint is received from the same complainant, each later complaint shall show all previous complaint numbers registered by the same complainant. In addition, a summary report shall be made to the Engineer each month which shall indicate the date, time, and name of the person investigating the complaint and the amount of damages claimed (or estimated thereof), including the amount of settlement, if any. When settlement of a claim is made, the Engineer shall be furnished with a copy of the release of claim by the claimant. The Owner shall be notified immediately, throughout the statutory period of liability, of any formal claims or demands made by attorneys on behalf of claimants; of the serving of any notice, summons, subpoena, or other legal documents incidental to litigation; and for any out-of-court settlement or court verdicts resulting from litigation.

3.0 NOTICE OF WORK

At least seven (7) days prior to move in, the Contractor shall notify all public and private utilities of his mobilization of parts in the following manner

1. Jackson County: a letter directed to the County Administrator.

2. Written notice provided to the local Sheriff Office, Fire Department, Postal Services, and Utilities serving the area.

3. General Public: Notice published in the Mississippi Press and Sun Herald.

The notifications shall include the commencement dates, a general description of the work required, person to contact with questions concerning the project. Copies of the notifications will be sent to the Engineer for review prior to publication.

4.0 ACCESS FOR EMERGENCY, PUBLIC TRANSPORTATION, AND POSTAL VEHICLES

Notify the fire department, police department, and applicable public and school transportation companies at least 14 days before closing any street or portion thereof. No closing shall be made without appropriate concurrence of aforementioned departments. Notify said departments when the streets are again passable for emergency vehicles. Maintain vehicle access to consecutive arterial crossings or dead end streets, in excess of 300 linear feet, unless special written permission has been obtained from the fire and police departments.

The Contractor shall leave his night emergency telephone number or numbers with the fire and police departments, so that contact may be made easily at all times in case of barricade or flare trouble or other emergencies.

Maintain postal service facilities in accordance with the requirements of the U.S. Postal Service. Move mailboxes to temporary locations designated by the Postal Service and, at the completion of the work in each area, replace them in their original location and in a condition satisfactory to the U.S. Postal Service.

5.0 PROTECTION OF PROPERTY

The Contractor shall employ such means and methods as necessary of adequately protect all property against damage. In the event of damage to property, the Contractor shall, at his own expense, immediately restore the property to a condition at least equal to its original condition and to the satisfaction of the Engineer.

6.0 PRESERVATION AND RESTORATION

SITE RESTORATION AND CLEANUP

At all times during the work, keep the premises clean and orderly, and upon completion of the work, repair all damage caused by equipment and leave the project free of rubbish or excess materials of any kind.

Stockpile excavated materials in a manner that will cause the least damage to adjacent lawns, grassed areas, gardens, shrubbery, or fences, regardless of whether their are on private property, or on state, county, or city rights-of-way. Remove all excavated materials from grassed and planted areas, and leave these surfaces in a condition equivalent to their original condition. Replace topsoiled areas where pipeline installations are outside of roadways. The Contractor shall rake and grade these areas to conform to their original contour and seed flat areas and sod areas with a slope greater than 2 to 1.

All existing drainage ditches and culverts shall be reopened and graded and natural drainage restored. Restore culverts broken or damaged to their original condition and location.

Upon completion of pipe laying backfilling operation, hand-rake and drag all former grassed and planted areas, leaving all disturbed areas free from rocks, gravel, clay, or any other foreign material and ready, in all respects, for seeding. The finished surface shall conform to the original surface, and shall be free draining and free from holes, ruts, rough spots, or other surface features detrimental to a seeded area.

The Contractor shall be responsible for erosion control for the entire project site throughout the construction term and shall take preventive measures for keeping erosion from occurring.

RESEEDING AND FERTILIZING

Originally seeded areas shall be fertilized and reseeded with first quality seed or planted with new sod as approved by the Owner. All ground preparation, reseeding, and sodding shall be done in accordance with the best accepted practices for lawn planting. The Contractor shall be responsible for obtaining a satisfactory grass turf acceptable to the Owner, or as otherwise shown on the drawings.

7.0 TREE REMOVAL

No trees, except those specifically shown on the drawings to be removed, shall be removed without the express approval of the Engineer. Removed trees will be disposed of off the work site by the Contractor.

Where construction passes under the drip line of hardwood trees and 12" plus diameter pine, the Contractor shall protect the trees from damage during construction.

In general, the Contractor shall hand dig as required and shall not cut any root 4" and larger. Recompact soil after construction by hand, if necessary to protect the root system.

8.0 PRESERVATION OF DRAINAGE DITCHES

After backfilling of excavations, restore all drainage ditches destroyed, damaged, or otherwise modified during construction to a condition equivalent to the condition of the ditch before construction. Ditches so reconstructed shall be built in their original locations and cross-section or as otherwise shown on the drawings.

9.0 FINISHING OF SITE, BORROW AND STORAGE AREAS

Upon completion of the project, all areas used by the Contractor shall be properly cleared of all temporary structures, rubbish, and waste materials and properly graded to drain and blend in with the adjoining property. Areas used for the deposit of waste materials shall be finished to property drain and blend with the surrounding terrain.

10.0 STREET CLEANUP DURING CONSTRUCTION

Tracking or dropping of dirt or other materials from the site onto any public or private street shall be minimized. The Contractor shall clean all spilled dirt, gravel, or other foreign material caused by the construction operations from all streets and roads at the conclusion of each day's operation.

11.0 PAYMENT

The work specified in this section shall be considered incidental and the cost shall be included as part of the appropriate lump sum or unit prices stated in the Bid.

SECTION 02004
SUBMITTALS DURING CONSTRUCTION

1.0 GENERAL

1.1 This section outlines in general the items that the Contractor must prepare or assemble for submitting during the progress of the work. There is no attempt herein to state all of the procedures and requirements for each submittal. The Contractor's attention is directed to the individual specification sections in these Contract Documents which may contain in detail additional and special submittal requirements. The Engineer reserves the right to direct and modify the procedures and requirements for submittals as necessary to accomplish the specified purpose of each submittal. Should the Contractor be in doubt as to the procedure, purpose, or extent of any submittal, he should direct his inquiry to the Engineer.

1.2 Submittals to the Engineer shall be addressed to:

Compton Engineering, Inc.
P. O. Box 686
1706 Convent Avenue
Pascagoula, MS 39567

1.3 For submittals required with this Bid, see Sections INSTRUCTIONS TO BIDDERS and SUPPLEMENTARY CONDITIONS.

2.0 ADMINISTRATIVE SUBMITTALS

2.1 The Contractor shall provide all of the submittals required by the Bidding Requirements, the GENERAL CONDITIONS, the SUPPLEMENTARY CONDITIONS, Division 1, GENERAL REQUIREMENTS, and as may be specifically required elsewhere in these Contract Documents.

2.2 The Contractor shall make required submittals promptly. Failure to comply with this requirement may result in the withholding of progress payments and make the Contractor liable for other prescribed action and sanctions.

2.3 The Contractor shall submit to the Engineer a copy of all correspondence relative to the Contract, transmitting notifications, reports and certifications. Costs for reproductions shall be considered incidental and included in the Contractor's Bid.

3.0 TECHNICAL SUBMITTALS

3.1 General

3.1.1 Requirements in this section are in addition to any specific requirements for submittals specified in other divisions and sections of these Contract Documents.

3.1.2 Data submitted shall have sufficient detail for determination of compliance with the Contract Documents.

3.1.3 Review of substitutions, schedules and lists of materials submitted or requested by the Contractor shall not add to the Contract amount, and any additional costs that may result therefrom shall be solely the obligation of the Contractor.

3.1.4 The Owner shall not be responsible for providing engineering or other services to protect the Contractor from additional costs accruing from such approvals.

3.1.5 The Owner is not precluded, by virtue of review, acceptance, or approval, from obtaining a credit for construction savings resulting from allowed concessions in the work or materials therefor.

3.1.6 No equipment or material for which listings, drawings, or descriptive material are required shall be fabricated, purchased, or installed until the Engineer has on hand copies of such approved lists and the appropriately stamped final shop drawings.

3.1.7 Submittals will be acted upon by the Engineer as promptly as possible, and in all cases within 20 days of receipt and returned to the Contractor. Delays caused by the need for resubmittals shall not constitute reason for an extension of Contract time.

3.2 Samples and Specimens

3.2.1 Where required in the specifications, and as determined necessary by the Engineer, test specimens or samples of materials, appliances, and fittings to be used or offered for use in connection with the work shall be submitted to the Engineer, at the Contractor's expense, with information as to their sources, with all cartage charges prepaid, and in such quantities and sizes as may be required for proper examination and tests to establish the quality or equality thereof, as applicable.

3.2.2 All samples and test specimens shall be submitted in ample time to enable the Engineer to make any tests or examinations necessary without delay to the work. The Contractor will be held responsible for any loss of time due to his neglect or failure to deliver the required samples and test specimens to the Engineer, as specified.

3.2.3 The Contractor shall submit additional samples and test specimens as required by the Engineer to assure equality with the original approved sample and/or determination of specification compliance.

3.2.4 The Contractor shall cooperate with the laboratory personnel and provide access to the work to be tested. The Contractor shall notify the laboratory sufficiently in advance of
operations to allow scheduling of tests. The Contractor shall furnish labor and facilities to obtain and handle samples at the site and to store and cure test samples as required.

3.2.5 Any testing laboratory utilized by the Contractor shall be an independent laboratory acceptable to the Owner and the Engineer and complying with the latest edition of the "Recommended Requirements for Independent Laboratory Qualification", published by the American Council of Independent Laboratories. The samples furnished and the cost of the laboratory services shall be at the expense of the Contractor.

3.2.6 Testing laboratories, whether provided by the Owner or the Contractor, shall promptly notify the Engineer and the Contractor of irregularities or deficiencies of work which are observed during performance of services. Laboratories shall submit two copies of all reports directly to the Engineer and two copies to the Contractor. The samples furnished and the cost for the laboratory services shall be at the expense of the Contractor.

3.2.7 Laboratory tests and examinations not required by the Contract Documents will be made at no cost to the Contractor, except that, if a sample of any material or equipment proposed for use by the Contractor fails to meet the specifications, the cost of testing subsequent samples shall be borne by the Contractor.

3.2.8 Sample items (fixtures, hardware, etc.) may be incorporated into the work upon acceptance of the items and when no longer needed by the Engineer for reference.

3.3 Shop Drawing and Submittal

3.3.1 The Contractor shall submit to the Engineer for his review, nine copies, including one reproducible copy of submittals larger than 11"x17" of shop drawings and catalog cuts for fabricated items and be accurate, distinct, and complete, and shall contain all required information, including satisfactory identification of items, units, and assemblies in relation to the applicable parts of these Contract Documents.

3.3.2 Unless otherwise approved by the Engineer, shop drawings shall be submitted only by the Contractor, who shall indicate by a signed stamp on the shop drawings, or other acceptable means, that he (the Contractor) has checked and approved the shop drawings, and that the work shown is in accordance with the Contract Documents and has been checked for dimensions and relationship with other work. The practice of submitting incomplete or unchecked shop drawings for the Engineer to correct or finish will not be acceptable, and shop drawings which, in the opinion of the Engineer, indicate that they have not been checked by the Contractor will be returned to the Contractor for resubmission in the proper form.

3.3.3 When shop drawings have been reviewed, two sets of submittals will be returned to the Contractor appropriately stamped. If major changes or corrections are necessary, the shop drawings may be rejected and one set will be returned to the Contractor with such changes or corrections indicated, and the Contractor shall correct and resubmit the shop drawings in the same manner and quantity as specified for the original submittal, unless otherwise directed by the Engineer. If changes are made by the Contractor (in addition to those requested by the Engineer) on the resubmitted shop drawings, such changes shall be clearly explained by the Contractor in a transmittal letter accompanying the resubmitted shop drawings.

3.3.4 The review of shop drawings and catalog cuts by the Engineer will not relieve the Contractor from responsibility for correctness of dimensions, fabrication details, and space requirements, or for deviations from the drawings or specifications, unless the Contractor has called attention to such deviations in writing by a letter accompanying the shop drawings and the Engineer approves the change or deviation in writing at the time of submission; nor shall review by the Engineer relieve the Contractor from the responsibility for errors in the shop drawings. When the Contractor does call such deviations to the attention of the Engineer, the Contractor shall state in his letter whether or not such deviations cause any deduction or extra cost adjustment.

3.3.5 The Contractor agrees that shop drawing submittals processed by the Engineer do not become Contract Documents and are not Change Orders; that the purpose of the shop drawing review is to establish a reporting procedure and is intended for the Contractor's convenience in organizing his work and to permit the Engineer to monitor the Contractor's progress.

3.4 Shop Drawing Requirements

3.4.1 Shop drawings referred to herein shall include shop drawings and other submittals for both shop and field fabricated items. The Contractor shall submit, as applicable, the following for all prefabricated or manufactured equipment, materials and systems:

3.5 General

3.5.1 Shop drawings or equipment drawings, including dimensions, size and location of connections to other work, and weight of equipment.

3.5.2 Catalog information and cuts.

3.5.3 Installation or placing drawings for reinforcing steel or miscellaneous metals.

3.5.4 Supporting calculations for equipment and associated supports, or hangers required or specified to be designed by equipment manufacturers or suppliers.

3.5.5 Suggested spare parts list with current price information.

3.5.6 List of special tools required for checking, testing, parts replacement, and maintenance. (Special tools are those which have been specially designed or adapted for use on parts of the equipment, and which are customarily and routinely carried by maintenance mechanics.)

3.5.7 List of special tools furnished with the equipment.

3.5.8 List of materials and supplies required for the equipment prior to and during startup.

3.5.9 List of materials and supplies furnished with the equipment.

3.5.10 Samples of finish colors for selection.

3.5.11 Special handling instructions.

3.5.12 Requirements for storage and protection prior to installation.

3.5.13 Requirements for routine maintenance.

3.5.14 List of all requested exceptions to the Contract Documents.

3.5.15 The submittals shall include satisfactory identification of items, units, and assemblies in relation to the specification section number.

3.5.16 Should the Contractor propose any item on his shop drawings, or incorporate an item into the work, and that item should subsequently prove to be defective or otherwise unsatisfactory, the Contractor shall, at his expense, replace the item with another item that will perform satisfactorily.

3.6 Record Drawings

3.6.1 The Contractor shall maintain two sets of full size prints on the jobsite, one set designated "Job Progress Drawings" and the second set designated "Record Drawings". The Contractor shall contemporaneously maintain both sets in a condition which reflects the current status of the construction work. Both sets shall be available to the Engineer for inspection and copying during the progress of the work. All markings shall be neatly performed with red pencil.

3.6.2 The Record Drawings will be marked up as required to show all deviations from the original contract drawings including changes resulting from minor field adjustments, field orders, and Contract modifications. Changes should be drawn after the construction work is completed and all new locations, dimensions, and elevations shall be shown. Where larger scale presentation is required, the Contractor shall prepare additional drawings and attach them to the appropriate prints.

3.6.3 Each month, or as otherwise agreed, the Contractor shall submit to the Engineer, a current listing and description of each deviation incorporated into the work since the preceding submittal.

3.6.4 Failure to submit the record drawing information shall be cause for withholding any partial payment due the Contractor.

3.6.5 The Job Progress Drawings shall be marked up to show all work complete in weekly intervals, and the week the work is performed shall be shown.

3.6.6 At the completion of the work but before Substantial Completion, both the Job Progress Drawings and Record Drawings sets of prints shall be submitted to the Engineer.

3.7 Operation and Maintenance (O&M) Manuals

3.7.1 The Engineer will submit to the Contractor a list of equipment items requiring O&M Manual submittal.

3.7.2 The Contractor shall furnish one original and eight copies of a complete manual containing installation, operation, maintenance, and lubrication requirements for each component of mechanical and electrical equipment or system plus one reproducible copy of all submittals larger than 11"x17". The production quality shall be equivalent to offset printing. If offset printed (or equivalent) materials are not available, photocopying from original documents using a properly adjusted plain paper copier will be accepted. However, photocopies of materials containing photographs will not be accepted. It is understood that the Owner has the right to produce additional copies for his own use. All equipment manufacturers and/or suppliers shall be made award of these requirements and all associated costs shall be included in the costs for furnishing the equipment or system.

3.7.3 Two copies of a preliminary O&M Manual shall be submitted to the Engineer for review within 30 days following receipt of the initial shop drawing submittal containing the Engineer's review comments. The final copies of the O&M Manual shall be submitted to the Engineer at the time the equipment is delivered to the jobsite. No partial payments (or additional partial payments, where payments were made for undelivered specially manufactured equipment) will be made to the Contractor for equipment delivered or stored until acceptable final O&M Manuals for that equipment are received. Failure to comply with this section shall allow the Owner to withhold all partial payments to the Contractor in excess of 75 percent of the contract amount until the O&M Manuals due under this section has been reviewed and accepted. In addition, for the purpose of the

definition of "Substantial Completion" contained in the General Conditions, Substantial Completion on the whole or any portion of the work does not exist until the required O&M Manuals have been accepted by the Engineer.

3.7.4 Each O&M Manual shall include, but not be limited to, the following:

3.7.5 Diagrams and illustrations

3.7.6 Detailed description of the function of each principal component of the system

3.7.7 Performance and nameplate data

3.7.8 Installation instructions

3.7.9 Procedure for starting

3.7.10 Proper adjustment

3.7.11 Test procedures

3.7.12 Operating procedures

3.7.13 Shutdown instructions

3.7.14 Emergency operating instructions and troubleshooting guide

3.7.15 Safety precautions

3.7.16 Bill of material/parts list

3.7.17 Maintenance and overhaul instructions shall include detailed assembly drawings with part numbers, parts list, instructions for ordering spare parts, and complete preventive maintenance instructions required to assure satisfactory performance and longevity of the equipment.

3.7.18 Lubrication instructions shall list points to be greased or oiled; shall recommend type, grade and temperature range of lubricants; and shall recommend frequency of lubrication.

3.7.19 The O&M Manual submittal shall be preceded by an Equipment Data Form, completely filled out (see following section), bound with a binder clip and placed in an expansion type manila file pocket. Each file pocket shall be clearly labeled with the equipment description and tag number. The file pockets shall be submitted to the Engineer in similarly labeled expanding wallets with ties.

3.7.20 Whenever possible, material shall be 8-1/2 inches by 11 inches or 11 inches by 17 inches Z-folded to 8-1/2 inches by 11-inches. If necessary, materials larger than 11 inches by 17 inches may be provided. They shall be folded to approximately 8-1/2 inches by 11 inches so that the title block is clearly visible without unfolding.

3.7.21 All material shall be tailored to the specific function that the equipment serves in the facility. If material covers more than one product type or includes equipment information not relevant to the project, the applicable information for the equipment supplied shall be clearly indicated by highlighting the information using a yellow felt tip marked manufactured for that purpose.

3.7.22 Highlighting that obliterates the information when photocopied is not acceptable. The relevant information shall also be indicated by an arrow located in the margin. If catalog cuts are included in the submittal, the catalog name and number, and the company name, address and telephone number shall be provided on the catalog cut or typewritten on a separate sheet of paper.

3.8 Equipment Data Forms

3.8.1 As part of the O&M Manual submittal, the Contractor shall provide an Equipment Data Form completely filled out for each equipment item. Sample equipment data forms will be found at the end of this section. The equipment data shall be typewritten on printed forms available from the Engineer and submitted with the O&M Manual for review by the Engineer. The manufacturer's standard form, or photocopies of the sample form, will not be acceptable as a substitute for the printed forms.

3.8.2 The term "Maintenance Operation" as used in the equipment data forms shall be understood to mean any routine operation required to assure the satisfactory performance and longevity of the equipment. Examples of typical Maintenance Operations are lubrication and routine adjustments. The maintenance summary portion may take as many pages as required. However, the order and format shown must be adhered to. Only 8-1/2 inch by 11 inch paper will be accepted. The maintenance operations and their frequencies must be typed on the forms.

3.8.3 In completing the recommended spare parts list, the data provided in the "part number" and "description" columns shall be consistent with the terminology used in the equipment manufacturer's Bill of Material/Parts List provided with the O&M Manuals. Spare parts provided by this Contract must be identified by placing two asterisks after the part number.

3.9 Certificates of Compliance

3.9.1 A Certificate of Compliance shall be furnished for materials specified to a recognized standard or code prior to the use of any materials specified for the work. The Engineer may permit the use of certain materials or assemblies prior to sampling and testing if accompanied by a Certificate of Compliance. The Certificate shall be signed by the manufacturer of the material or the manufacturer of assembled materials and state that the materials comply in all respects with the requirements of the specifications. A Certificate of Compliance shall be furnished with each lot of material delivered to the work and the lot so certified shall be clearly identified in the Certificate.

3.9.2 All material used on the basis of a Certificate of Compliance may be sampled and tested at any time. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the Contractor of responsibility for incorporating material in the work that conforms to the requirements of the Contract Documents and any such material not conforming to the requirements will be subject to rejection whether in place or not.

3.9.3 The Engineer reserves the right to refuse permission for use of material on the basis of a Certificate of Compliance.

4.0 PAYMENT

4.1 No separate payment shall be made for work under this section. Payment for work in this section shall be included in the bid price to which it is subsidiary.

SAMPLE EQUIPMENT DATA FORM

PROJECT NAME _____

CONTRACT NO. _____

CONTRACTOR _____

EQUIPMENT NO. _____

DESCRIPTION _____

LOCATION _____

MANUFACTURER _____

PURCHASED FROM _____ PURCHASE DATE _____

VENDOR ORDER NO. _____ PURCHASE PRICE _____

LOCAL SUPPLIER _____ PHONE _____

ADDRESS _____

MODEL NO. _____ SHIPPING WT/UNIT _____

NO. OF UNITS _____ SERIAL NOS. _____

MAINTENANCE REQUIREMENTS/
MANUFACTURERS SPECIFICATIONS

EQUIPMENT NO. _____

DESCRIPTION _____

MAINTENANCE OPERATION	FREQUENCY
List briefly each maintenance operation required and refer to specific information in manufacturer's manual, if applicable. Refer by symbol to "Lubricant List" for Lubrication Operation	List required frequency of each maintenance operation
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

LUBRICANT LIST

REFERENCE SYMBOL	LUBRICANT TYPE (MILITARY STANDARD)	RECOMMENDED LUBRICANT AND MANUFACTURER
List symbols in "maintenance operation"	List general lubricant type name,	List specific lubricant viscosity, and manufacturer
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

RECOMMENDED SPARE PARTS LIST

EQUIPMENT NO. _____

DESCRIPTION _____

PART NO.	DESCRIPTION	UNIT	QUANTITY	UNIT COST

ADDITIONAL DATA AND REMARKS:

_____
_____
_____
_____
_____
_____
_____

SECTION 02005
SCHEDULE AND SEQUENCE OF OPERATIONS

1.0 CONSTRUCTION SCHEDULE GENERAL PROVISIONS

1.1 Continue operation of the Owner's existing facilities is of critical importance.

1.1.1 Connections to existing services or utilities, or other work that requires the temporary shutdown of any existing operations of utilities shall be planned in detail with appropriate scheduling of the work and coordinated with the Owner or Engineer. The approved schedule for shutdown or restart shall be indicated on the Contractor's progress schedule, and advance notice shall be given in order that the Owner or Engineer may witness the shutdown, tie-in, and start-up.

1.1.2 All materials and equipment (including emergency equipment) necessary to expedite and tie-in shall be on hand prior to the shutdown of existing services or utilities.

1.2 Operation of Existing System by Contractor is Prohibited: At no time undertake to close off any lines or open valves or take any other action which would affect the operation of the existing system, except as specifically required by the drawings and specifications and after approval is granted by the Owner. Request approval 2 working days in advance of the time that interruption of the existing system is required.

2.0 PROCESS OF THE WORK

2.1 General

2.1.1 The work shall be performed at such times and in or on such parts of the project and with such forces, materials and equipment to prevent any delay to the completion of the project within the time limits stated in the Contract and in conformance with the Overall Construction Schedule specified herein.

2.1.2 The Contractor may, with written permission of the Owner and acquisition of all necessary permits and at his expense, work, outside regular hours of 7 a.m. and 8 p.m. He shall submit a written request to the Engineer and allow 7 days for satisfactory arrangements to be made for inspecting the work in progress. The Contractor shall comply with all applicable requirements of the Owner.

2.2 Pipeline Construction

2.2.1 The work shall proceed in a systematic manner so that a minimum of inconvenience will result to the public in the course of construction. The trenching equipment shall not be farther than 20 feet ahead of each pipelaying crew or such lessor distance as necessary to provide maximum safety. The safety conditions of open excavations shall be the Contractor’s responsibility. The Contractor shall properly backfill and compact all open trenches by the end of each work day, unless otherwise directed by the Engineer.

2.2.2 Clean-up construction debris, excess excavation, excess materials, and completely restore fences, mailboxes, ditches, culverts, and similar items immediately following the final backfilling.

3.0 PRECONSTRUCTION CONFERENCE

3.1 Before beginning the work and after the Contract has been awarded, the Engineer will conduct a Preconstruction Conference to discuss construction schedules and procedures, Contractor's use of the site, Contractor's use of existing facilities, Owner's regulations, and other matters deemed relevant to the effective performance of the work.

The conference will be attended by:

Contractor's Office Representative
Contractor's General Superintendent
Any subcontractor's or supplier's representative whom the Contractor may desire to invite, or the Engineer may request

Representatives from the following agencies will also be invited to attend:

The Owner
Engineer
Mississippi Department of Marine Resources

4.0 OVERALL CONSTRUCTION SCHEDULE

4.1 General

4.1.1 The Contractor shall prepare and submit to the Engineer within 10 days after the Notice to Proceed and before starting construction, his Overall Construction Schedule (Overall Schedule). The Overall Schedule shall be comprised of preparatory and construction to operations covering all work to be done in connection with the Contract.

4.1.2 The original of the Overall Schedule shall be drawn on 22 inch by 34 inch reproducible media. The Overall Schedule shall be in the form of a time-scaled bar chart showing bid items and other activities identified herein. Each activity shall be labeled with a complete description and the estimated duration in days. The Contractor shall sign and provide the Engineer for his review and/or rejection as appropriate, three copies of the initial and each revision of the Overall Schedule.

4.1.3 Whenever under any Contract Documents, the Engineer is given the right of review or rejection of Contractor's schedules or changes thereto, such right is for the benefit of or service to the Contractor. Comments made by the Engineer on the schedule, or lack of such comments, or rejection or non-rejection of the Contractor's schedule does not relieve the Contractor from compliance with requirements of the Contract Documents, nor do they create any responsibility or duty for scheduling owed from the Owner, or the Engineer to the Contractor. This review, whether accompanied by comments, rejection, or neither, is only for general conformance with the schedule concept of the project and general compliance with the information given in the Contract Documents.

4.1.4 Failure to submit the Overall Schedule or subsequent updates of the schedule shall be considered cause for withholding any partial payments due or that may be become due under the Contract in accordance with the General Conditions.

4.2 ACTIVITIES

An activity is defined as a time and/or resource consuming element of work. The activities selected for inclusion in the Overall Schedule shall be discrete. When necessary, discrete activities shall be subdivided into smaller, discrete activities so that the dependency relationships may be shown. The level of detail shall be sufficiently fine to enable the Engineer to determine that the project has been adequately planned and to facilitate the determination of real progress as the work is prosecuted. Activity durations exclusion of those for "Submittal Preparation by the Contractor", "Review by the Engineer" and "Material Fabrication and Delivery" shall not be less than one or more than 21 days, unless otherwise approved by the Engineer. Allowance for inclement weather shall be factored into each activity where appropriate. The days and number of shifts necessary to accomplish each work activity shall be shown with each work activity.

The Overall Schedule shall indicate the description, duration and sequence of work activities. It shall include, but not be limited to, the following items as appropriate to this Contract:

1. Mobilization and move in

2. Shop drawing preparation by the Contractor and review by the Engineer. See Section SUBMITTALS DURING CONSTRUCTION.

3. Material and equipment
   a. Order
   b. Delivery
   c. Installation

4. Site Grading

5. Utility Installation

6. Concrete Foundation and Slab Construction

7. Building Construction and Interior Finishes

8. Plumbing

9. Electrical

10. Topsoil, Finish Grading and Grassing

11. Substantial completion and final completion dates

12. Final cleanup and demobilization

The Contractor shall prepare Progress Quantity Chart. The chart shall match the Overall Schedule in time. The chart shall show the average feet per day for each major condition expected and the cumulative feet of progress to date throughout the construction. Average rates and cumulative curves shall be shown on each chart for initial projected progress, actual progress and revised projected progress.

4.3 CONTINGENCY

Any contingency within the schedule, i.e., a difference in time between the project's early completion and required contract completion date and float in the Overall Schedule, will belong to the project and not to any of the parties of the Contract.

4.4 FLOAT

The Contractor shall not be permitted to sequester shared float through such strategies as extending duration estimates to consume available float time or extensive crew/resource sequencing, etc.

4.5 PROCESS REVIEW MEETING

4.5.1 Once each month on a date established by the Engineer, a meeting will be held at which time the schedule will be reviewed. The meeting shall be attended by the Contractor's project manager and superintendent and those major subcontractors as determined by the Engineer to be necessary at the time.

4.5.2 Prior to the meeting, the Contractor shall obtain information to update the Overall Schedule to reflect progress to date. The updated schedule shall be available at the meeting for review. To update the Overall Schedule, the Contractor shall:

Enter actual start and completion dates, days, number of shifts used for those activities started and/or completed during the previous reporting period.

For activities in progress, indicate the percentage complete to date. Review and revise as necessary the remaining duration of the work from the update to the estimated completion date.

For activities not yet started, review and revise as necessary the durations and estimated start and completion dates.

Add authorized Change Orders.

Update status information shall be annotated on the Overall Schedule in a manner that the Overall Schedule shall graphically depict the current status of the work.

4.5.3 The monthly submittal to the Engineer shall be accompanied by a Narrative Report. The Narrative Report shall be brief and include the information described in the Narrative Report Outline bound at the end of this section. If at any time during the project, the Contractor fails to complete any activity by its latest completion date, he will be required, within 7 days, to submit to the Engineer a written statement as to how and when he plans to reorganize his work force to return to the current Overall Schedule.

Whenever it become apparent from the current monthly progress evaluation and updated schedule data that the Contract completion date will not be met, the Contractor shall take some or all of the following actions:

1. Increase construction manpower in such quantities and crafts as shall substantially eliminate the backlog of work.

2. Increase the number of working hours per shift, shifts per work day, work days per week, or the amount of construction equipment or any combination of the foregoing sufficient to substantially eliminate the backlog of work.

3. Reschedule work items to achieve concurrency of accomplishment.

The addition of equipment or construction forces, increasing the working hours or any other method, manner or procedure to return to the current Overall Schedule shall not be considered justification for a Change Order or treated as an acceleration order.

5.0 CASH FLOW

With the initial Overall Schedule submittal and each monthly update, the Contractor shall also submit a cash flow summary. The cash flow summary shall be based on the submitted Overall Schedule and equal in total the Contractors bid plus approved Change Orders. Excepted payment requests for each month shall be included, as well as the cumulative payment requests to date for each month of the project. The net month payment request and cumulative payment requests to date shall also be shown after deducting retainage. The Contractor, at the preconstruction conference, shall explain in detail the procedure to be used to develop the cash flow summary. This procedure is subject to the review of the Engineer. Failure to submit an acceptable cash flow summary shall be considered cause for withholding any partial payments due or that may become due under the Contract.

6.0 PAYMENT

The work specified in this section shall be considered incidental and the cost shall be included as part of the appropriate lump sum or unit prices stated in the Bid.

NARRATIVE REPORT OUTLINE

1. Contractor's transmittal letter

2. Schedule narrative referring to each activity on the Overall Schedule including:

    a. Activities completed this reporting period
    b. Activities in progress this reporting period
    c. Activities scheduled next reporting period

3. Description of any problem areas

4. Current and anticipated delays

    a. Cause of the delay
    b. Corrective action and schedule adjustments to correct the delay
    c. Impact of the delay on other activities, milestones and completion dates

5. Change in construction sequence

6. Pending items and status thereof

    a. Permits
    b. Change Orders
    c. Time Extensions
    d. Other

7. Contract completion date status

    a. Ahead of schedule and number of days
    b. Behind schedule and number of days

8. Other project or scheduling concerns

9. Including reviewed and updated Overall Schedule

10. Progress Quality Chart (if required)

11. Revised cash flow information

12. Other

SECTION 02006
TEMPORARY CONSTRUCTION FACILITIES & CONTROLS

1.0 GENERAL

1.1 Section Includes

1. Temporary Utilities: Electricity, lighting, ventilation, water, and sanitary facilities.

2. Temporary Controls: Enclosures and fencing, and protection of the Work.

3. Construction Facilities: Parking, progress cleaning, and temporary buildings.

1.2 Temporary Electricity

1. Cost: By Contractor; provide and pay for power service required from utility source. Owner will allow temporary electricity service from Building No. 5005 – Storage Building.

1.3 Temporary Ventilation

1. Ventilate enclosed area to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.4 Temporary Water Service

1. Owner will pay cost of water used. Exercise measures to conserve water.

2. Extend branch piping with outlets located so water is available by hoses with threaded connections.

1.5 Temporary Sanitary Facilities

1. Provide and maintain required facilities and enclosures. Existing facility use is not permitted. Provide at time of project mobilization.

1.6 Barriers

1. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.

2. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.7 Exterior Enclosures

1. Provide temporary weather tight closure of exterior openings to accommodate protection for Products, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.8 Protection of Installed Work

1. Protect installed Work and provide special protection where specified in individual specification sections.

2. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.

3. Protect finished surfaces from dirt, wear, damage, or movement of heavy objects.

1.9 Security

1. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

2. Coordinate with Owner's security program.

1.10 Progress Cleaning and Waste Removal

1. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

2. Collect and remove waste materials, debris, and rubbish from site periodically and dispose off-site.

2.0 PRODUCTS

Not Used

3.0 EXECUTION

Not Used

4.0 PAYMENT

The Work specified in this section shall be considered incidental, and the cost shall be included as part of the appropriate lump sum of unit prices stated in the Bid.

SECTION 02007
MATERIAL AND EQUIPMENT SHIPMENT, HANDLING, PROTECTION & STORAGE

1.0 GENERAL

1.1 SECTION INCLUDES

1. Products.
2. Transportation and handling.
3. Storage and protection.

1.2 PRODUCTS

1. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

1.3 TRANSPORTATION AND HANDLING

1. Transport and handle Products in accordance with manufacturer's instructions.
2. Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.
3. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.4 STORAGE AND PROTECTION

1. Store and protect Products in accordance with manufacturers' instructions.
2. Store with seals and labels intact and legible.
3. Store sensitive Products in weather tight, climate controlled, enclosures in an environment favorable to Product.
4. For exterior storage of fabricated Products, place on sloped supports above ground.
5. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.
6. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.
7. Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

2.0 PRODUCTS

Not Used.

3.0 EXECUTION

Not Used.

4.0 PAYMENT

The work specified in this section shall be considered incidental and the cost shall be included as part of the appropriate lump sum or unit prices stated in the Bid.

SECTION 02010
MOBILIZATION/DEMOBILIZATION

1.0 SCOPE

Mobilization/Demobilization consists of moving in, including preparatory work and operations and moving out, including all dismantling and clean-up work and operations performed by the Contractor.

Mobilization includes movement of all labor, equipment, supplies and incidentals to the project site; establishment of facilities necessary for work on the project; and other work and operations which must be performed or costs not directly attributable to other pay items, exclusive of bidding costs, which must be incurred by the Contractor before beginning and during the early stages of production work on the project site.

Demobilization includes movement of all labor, equipment, supplies and incidentals from the project site; dismantling and removal of temporary facilities; clean-up of the project site and all work areas; and other work and operations which must be performed or costs not directly attributable to other pay items which must be incurred by the Contractor after completion of certain items of work and all other work on the Contract has been completed.

2.0 MEASUREMENT

The percentage of the lump sum amount for this Item will be measured in accordance with the mobilization/demobilization schedule submitted by the Contractor and approved by the Engineer within the following limitations:

% of Total Contract Earned*	% of Maximum Lump Sum This Item Allowed
10%	40%
25%	60%
80%	90%

When all work under this Contract is completed by the Contractor and accepted by the Engineer, one hundred percent (100%) of the Lump Sum Amount will be allowed.

*Total Contract earned will be equal to certified estimates approved by the Engineer exclusive of the Mobilization-Demobilization Lump Sum and Materials Stored Amounts.

3.0 PAYMENT

Mobilization will be paid for at the Contract Lump Sum Price in accordance with the provisions included under Measurement. This price shall be full compensation for all mobilization and demobilization in accordance with the Contract Documents.

SECTION 02011
CONSTRUCTION SURVEY

1.0 DESCRIPTION

This work consists of furnishing, placing, and maintaining construction stakes necessary for the proper prosecution of the work under contract and the preparation of cross sections and volume calculations for added site fill, base material grades and establishment of finished grades.

2.0 CONSTRUCTION REQUIREMENTS

The Owner will establish, one time only, reference points and benchmarks and shall assume responsibility for the accuracy thereof. These shall constitute the field control by which the Contractor shall establish and maintain all necessary controls for the proper layout and performance of the work. The Contractor will be required to make all calculations involved and to furnish and place all layout stakes.

The Contractor shall provide field forces and equipment, and shall determine and provide all additional grade controls and staking operations necessary to secure a correct layout and construction of the work. All minor variations in layout and grade required to meet field conditions shall be worked out with the Engineer and will not be considered a justification for adjusting the contract price.

The Contractor will be responsible for establishing all lines, grades, elevations, and dimensions called for on the plans. All grades, layout data, and volumes computed by the Contractor shall be in an electronic format for AutoCAD 2000 or newer. All field information shall be furnished to the Engineer before field work is started. The contractor shall supply to the engineer a survey of the subgrade under any concrete or asphalt surface as well as any building pads for review and approval prior to pouring or placing of any paving or building foundation. A final As Built survey sealed by a Professional Surveyor shall be furnished to the Engineer on or before completion of the work for the Owner's permanent file. The As Built survey shall be submitted in CAD, PDF and paper formats. The Contractor shall also furnish personnel to assist the Engineer in taking notes to determine proper tolerances. Any inspection or checking of the Contractor's layout by the Engineer and the acceptance of all or any part of it will not relieve the Contractor of the responsibility to secure the proper dimensions, grades, and elevations of the several parts of the work.

The Contractor shall exercise care in the preservation of stakes and benchmarks and shall reset them when any are damaged, lost, displaced, or removed. The Contractor shall use competent personnel and suitable equipment for the layout work required and shall provide that it be performed under the supervision of, or directed by, a Registered Professional Engineer or Registered Professional Land Surveyor who is duly registered and entitled to practice as a Professional Engineer or Professional Land Surveyor in the State of Mississippi. The Contractor shall not engage the services of any person in the employ of the Owner for the performance of any of the work covered by this Section.

All cross sections required for determining monthly and final pay quantities will be submitted to the Engineer plotted with final calculations shown on the final cross sections, etc. and printed summary.

Any inspection, checking, and acceptance thereof by the Engineer of work for which the Contractor is responsible will not relieve the Contractor of responsibility to secure the correct dimensions, grades and elevations of the work.

3.0 METHOD OF MEASUREMENT

Construction stakes will be measured as a lump sum quantity.

4.0 CONSTRUCTION STAKES

Measurement for payment will be in accordance with the following schedule:

(a) When one percent of the original contract amount is earned from all direct pay items, 10 percent of the amount bid for Construction Stakes will be paid.

(b) When five percent of the original contract amount is earned from all direct pay items, 25 percent of the amount bid for Construction Stakes will be paid.

(c) When 20 percent of the original contract amount is earned from all direct pay items, 50 percent of the amount bid for Construction Stakes will be paid.

(d) After the Contractor has earned 50 percent of the original value of all direct pay items, the amount paid will be based on the contract percent complete.

5.0 BASIS OF PAYMENT

Construction stakes, measured as prescribed above will be paid for at the contract lump sum price, which shall be full compensation for completing the work.

SECTION 02012

GEOTECHNICAL DATA

See the following report. (11 pages)

GEOTECHNICAL ENGINEERING TESTING, INC.

~ Geotechnical Evaluations ~ Construction Materials Testing ~ Geosciences ~ Infrastructure Management Services ~

SOILS EXPLORATIONS AND GEOTECHNICAL ENGINEERING STUDIES FOR PROPOSED DEPARTMENT OF MARINE RESOURCES BOAT LIFTS AT OCEAN SPRINGS INNER HARBOR IN OCEAN SPRINGS, MISSISSIPPI

Professional Services Since 1974

904 Butler Drive, Mobile, AL 36693

251.666.7197 FAX: 251.666.7380

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GEOTECHNICAL ENGINEERING-TESTING, INC.

PROFESSIONAL ENGINEERS

GEOTECHNICAL EVALUATIONS - GEOSCIENCES-CONSTRUCTION MATERIALS

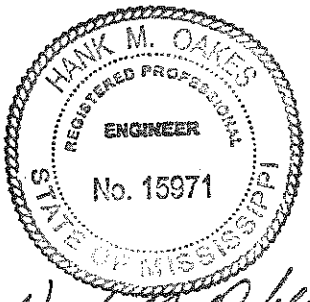
904 Butler Drive
Mobile, Alabama 36693
(251) 666-7197
Fax (251) 666-7380

CLIENT'S NO: _____ PROJECT NO: 16-174

REPORT NO: 1 DATE: July 29, 2016

REPORT OF:

SOILS EXPLORATIONS AND GEOTECHNICAL ENGINEERING STUDIES FOR PROPOSED DEPARTMENT OF MARINE RESOURCES BOAT LIFTS AT OCEAN SPRINGS INNER HARBOR IN OCEAN SPRINGS, MISSISSIPPI



7/29/16

REPORT TO:

COMPTON ENGINEERING, INC.
1706 CONVENT AVENUE
PASCAGOULA, MISSISSIPPI 39567
ATTN.: MR. ANDY DOUGLASS, P.E.

I. INTRODUCTION

Geotechnical Engineering-Testing, Inc. has completed the authorized soils explorations and geotechnical engineering studies for the proposed Department of Marine Resources (DMR) Boat Lifts at Ocean Springs Inner Harbor in Ocean Springs, Mississippi. The soils explorations have included one exploratory soil boring, visual descriptions of the soils encountered, and laboratory tests on selected soil samples. The engineering study has included the planning, coordination, and supervision of the soils explorations program, evaluations of the results of the soils explorations, development of recommendations for pile foundations, and the preparation of this report. Our professional services for this project have been performed, findings obtained, and recommendations prepared in accordance with generally accepted engineering principles and practices. This warranty is in lieu of all other warranties, either expressed or implied.

Deep (pile) foundations will be used to support the boat lifts. We have developed recommendations for allowable capacities of various sizes of timber and precast concrete piles installed into the very dense sand stratum indicated at about elevation -33 ft. These and other recommendations and details of our findings are presented in the following sections of this report.

II. GENERAL SITE AND SUBSURFACE CONDITIONS

The proposed boat lifts will be at the location of existing boat slips at the Inner Harbor marina. The existing slips will be removed to accommodate one larger DMR vessel along with other smaller vessels.

The soil boring was performed with a barge mounted drill rig at a location where the water was about 5 ft deep. The soil boring encountered very soft clays from the mudline to a depth of about 18 ft (below the water level) and then firm silty sands to a depth of about 24 ft. Medium consistency clay was encountered from about 24 ft to 31 ft. A stratum of very dense and dense sand was encountered from about 31 ft to 49 ft and was underlain by stiff clays from about 49 ft to the boring termination depth of about 57 ft. Details of the soils encountered are presented by the Log of Boring on page 8 of this report.

The soil boring is representative of subsurface conditions at its location and for its vertical reach. However, local variations characteristic of the subsurface materials of the region may be

encountered. The boring log and related information are based on the driller's logs and visual examination of recovered soil samples. The delineation between soil types shown on the log is approximate and the description represents the interpretation of subsurface conditions at the designated boring location on the particular date drilled.

III. GEOTECHNICAL ENGINEERING STUDIES AND RECOMMENDATIONS

Using soil parameters indicated by the results of the soils explorations and based on our experience, the computer program DRIVEN 1.2, which uses analysis methods recommended by the Federal Highway Administration, was used to estimate the static capacities of several sizes of round timber piles and two sizes of square precast concrete piles. Other pile types and/or sizes can be evaluated if desired. Our analyses assumed that piles will be driven into the stratum of very dense and dense sand encountered by the soil boring at about elevation -33 ft. Our recommended allowable pile capacities are presented in the table below.

Pile Size & Type	Allowable Axial Capacity
12" Butt X 8" Tip Timber	15 Tons
13" Butt X 9" Tip Timber	19 Tons
14" Butt X 10" Tip Timber	23 Tons
15" Butt X 11" Tip Timber	28 Tons
14" Square Concrete	50 Tons
16" Square Concrete	65 Tons

Since it is anticipated that a pile load test will not be performed for this project, the above recommended allowable pile capacities are based on application of a factor of safety of about 3.0 to the estimated ultimate pile capacities.

To achieve the allowable capacities presented in the table above, piles should be driven into the very dense sand stratum indicated at about elevation -33 ft. Plans should not call for piles to be installed to a specific tip elevation; rather, piles should be driven to a driving resistance (blows per foot) that will provide clear evidence that the pile tips are embedded in the very dense sand. The driving resistance that will provide this clear evidence will depend on the pile type and size and on the pile hammer. Prior to pile installation, wave equation analyses should be performed using the specific properties of the selected pile and hammer to determine the required driving resistance.

The soils above the pile bearing stratum are soft to medium consistency. There should be no need for jetting of piles and we recommend that jetting not be allowed.

IV. SOILS EXPLORATIONS

One soil boring was performed for this project. It was located approximately as shown on a drawing received from Compton Engineering. That drawing is included on page 6 of this report for reference.

A barge mounted SIMCO 2400 drill rig was used to perform the boring. The borehole was advanced using the rotary wash method. Standard penetration tests were generally performed and split spoon soil samples collected at 5 ft intervals from the mudline to the boring termination depth. Boring and sampling operations were conducted in general accordance with standard procedures. Depths where samples were collected and the results of the standard penetration tests are shown on the Log of Boring.

Split spoon soil samples collected during the boring operations were visually described, logged, placed in moisture tight plastic bags, and transported to the laboratory. At the laboratory, the project engineer visually examined the samples to confirm or adjust field classifications.

Selected samples were subjected to laboratory tests to aid the engineering evaluations. These tests included moisture content, Atterberg limits, percent finer than a number 200 sieve, and hand penetrometer (to estimate shear strength of cohesive soils). The tests were performed in general accordance with standard laboratory soil testing procedures. Test results are shown on the Log of Boring opposite the respective samples tested.

V. CONCLUSION

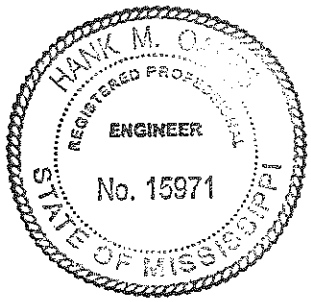
This report completes the soils explorations and geotechnical engineering studies authorized for the proposed DMR Boat Lifts at Ocean Springs Inner Harbor in Ocean Springs, Mississippi. Geotechnical Engineering-Testing, Inc. appreciates this opportunity to be of service. We recommend that our firm be retained to review project plans and specifications relative to our recommendations to help provide assurance that we have properly conveyed our findings and recommendations to the project designers.

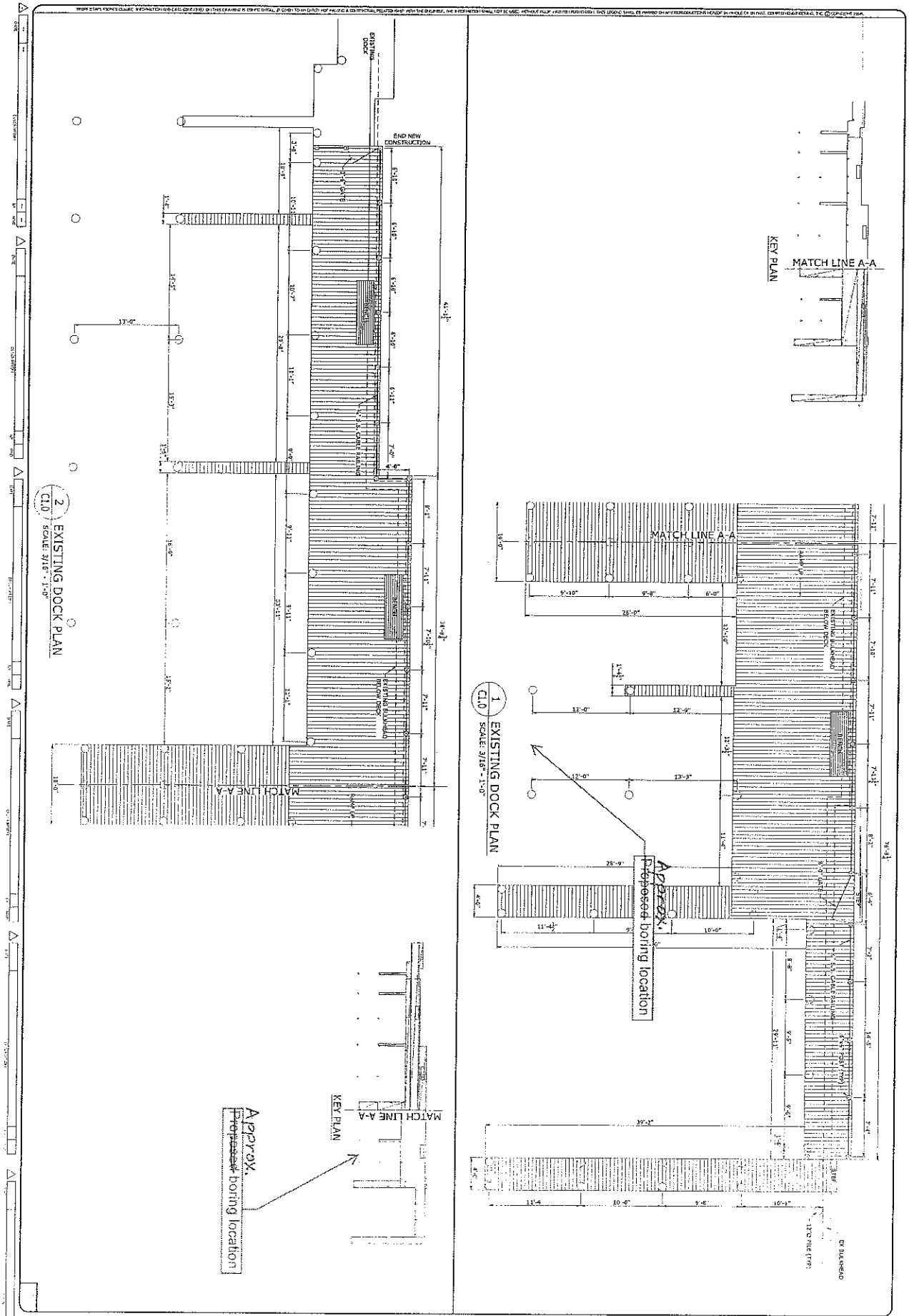
Should there be questions regarding the findings and recommendations presented by this report or if additional information is needed, please let us know.

GEOTECHNICAL ENGINEERING-TESTING, INC.

Hank M. Oakes

Hank M. Oakes, P.E.
Senior Project Engineer
Mississippi License No. 15971
Date: 7/29/16





C1.0

SCALE: AS NOTED
JOB NO.: 216-015
DATE: APRIL 2016
DSGN.: J. DUGGAN
DWG. BY: T. PARKER
CHK.:
APVD.:

MISSISSIPPI DEPARTMENT OF MARINE RESOURCES (DRM)
OCEAN SPRINGS, MISSISSIPPI

DMR BOAT LIFTS @ O.S. HARBOR
EXISTING DOCK PLAN

COMPTON ENGINEERING, INC.
Engineering, Surveying, and Environmental Services
1706 Convent Avenue
Pascagoula, Mississippi 39567
Phone: (228) 762-3970 Fax: (228) 769-9079
E-mail: compton@comptonengineering.com

PROJECT NAME:

G.E.T. PROJ. NUMBER:

PROJECT LOCATION:

DRILL RIG:

DRILL METHOD:

DRILL CREW:

DATE DRILLED:

BORING DEPTH:

BORING ELEV.:

DATUM:

WATER DEPTH:

REMARKS:

GEOTECHNICAL ENGINEERING TESTING, INC

BORING NUMBER: LEGEND

BORING LOCATION:

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_C	W.C. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	SHEAR STRENGTH tsf	UNIFIED CLASS
		SAND		Nf - Standard penetration test value determined in field-ASTM D 1586 (WOH indicates penetration of sampler under weight of 140 lb hammer)	Nc - Standard penetration test value of sand corrected for overburden by Peck-Hansen-Thornburn, 1974	w.c. % - Percent water content based on dry soil weight	L.L. - Liquid Limit	P.I. - Plasticity Index	Unit Wt., pcf - Dry unit weight of soil, pounds per cubic foot	% Minus #200 - Percent by weight of soils finer than #200 sieve	c - Cohesion, tons per square foot ϕ - Angle of internal friction, degrees s - Vane shear strength, tons per square foot c* - Values measured with a pocket penetrometer	Classification according to the Unified Classification System
		CLAY										
		SILT										
		ORGANICS										
		GRAVEL										
		LIMESTONE										
		SPLIT-SPOON SAMPLE (STANDARD PENETRATION TEST)										
		UNDISTURBED TUBE SAMPLE										
		SAMPLE NOT RECOVERED										
		VANE SHEAR TEST										

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

G:\GINT\WLEGEND.DWG
LOG OF BORING LEGEND.GPJ GETT_AL.GDT 1/24/01

PROJECT NAME: DMR BOAT LIFTS

G.E.T. PROJ. NUMBER: 16-174

PROJECT LOCATION: OCEAN SPRINGS INNER HARBOR, OCEAN SPRINGS, MS

DRILL RIG: SIMCO 2400

DRILL METHOD: MUD ROTARY

DRILL CREW: CHALLENGE

DATE DRILLED: 07/11/16

BORING DEPTH: 56.7 FT.

BORING ELEV.: +0.4 FT.

DATUM:

WATER DEPTH:

REMARKS:

GEOTECHNICAL ENGINEERING TESTING, INC.

BORING NUMBER: W-3

BORING LOCATION: SEE BORING LOCATION PLAN

DEPTH IN FEET	LOG	DESCRIPTION	SAMPLE NO.	S.P.T. N_f	S.P.T. N_c	W.C. %	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	DRY UNIT WT. pcf	% MINUS #200	SHEAR STRENGTH tsf	UNIFIED CLASS
0		Water										
5			1	WOR		203				75.8		
10		Very soft dark gray silty clay	2	WOR								
15		Very soft dark gray clay	3	1		141				84.7		
20		Firm light gray silty sand	4	12								
25		Medium consistency dark gray clay	5	4		52	79	60		93.3	c*=0.35	CH
30			6	54								
35			7	50+		22				4.3		
40		Very dense & dense light gray fine to medium sand	8	38								
45			9	50+		17				6.3		
50		Stiff greenish gray clay	10	8		37	61	33		90.2	c*=0.75	CH
55		Stiff greenish gray silty clay	11	11								
60		B.T. @ 56.7 FT										

NOTE: The stratification lines shown represent the approximate boundary between soil types and the transition may be gradual. The groundwater level stated is for conditions at the time of boring and the level may fluctuate large amounts for other conditions or seasons.

Reviewed By:

MOD DEEP BORING LOG W/O NC VALUES 16-174 DMR BOAT LIFTS.GPJ GETI_AL.GDT 07/26/16

Geotechnical Engineering-Testing, Inc.

PROFESSIONAL ENGINEERS

Geotechnical Evaluations - Geosciences - Construction Materials - Pavement Management

September 23, 2016

Mr. James Buras
Compton Engineering
1706 Convent Avenue
Pascagoula, MS 39567

Via Email: jburas@comptonengineering.com

Re: Department of Marine Resources Boat Lifts at Ocean Springs Inner Harbor in Ocean Springs, Mississippi (G.E.T. Project No. 16-174)

Dear James:

In response to your emailed request of September 22, 2016, we have performed static pile capacity analyses for 12-inch square concrete piles at the referenced project site. The analyses were performed using the computer program DRIVEN 1.2 which uses analysis methodologies recommended by the Federal Highway Administration. Soil properties were based on the results of our soils explorations performed at the site in July of this year.

For a 12-inch square concrete pile installed to a tip elevation of about -33 ft (into the stratum of dense to very dense sands indicated by our soil boring), we recommend an allowable axial pile capacity of 37 tons. This recommendation includes application of a factor of safety of about 3.0 to the estimated ultimate pile capacity.

We refer you to our July 29, 2016 geotechnical engineering report for the project for recommendations regarding installation of the piles.

Geotechnical Engineering-Testing, Inc. appreciates this opportunity to be of service. Please let us know if questions arise or if additional information is needed.

Sincerely,

GEOTECHNICAL ENGINEERING-TESTING, INC.

Hank M. Oakes

Hank M. Oakes, P.E.
Senior Project Engineer
Mississippi License No. 15971
Date 9/23/16

SECTION 02015
SITE PREPARATION

1.0 SCOPE

1.1 The work in this section shall consist of all mobilization and preparation required by the Contractor to move in equipment, personnel and successfully complete the required work in a timely, orderly and safe fashion.

1.2 General:

1.2.1 Under no circumstances will Site Preparation begin prior to the Owner's written Notice to Proceed.

1.2.2 The limits of the Owner's property and easements are shown on the drawings. Any additional space required shall be secured by the Contractor.

2.0 MATERIALS, EQUIPMENT AND TEMPORARY FACILITIES

2.1 All materials and equipment delivered to the site will be stored in such a manner as to avoid unnecessary interference with ingress or egress to public and private properties.

2.2 The Contractor shall be responsible for providing all temporary facilities required for his use during construction, including temporary security fencing, parking, temporary utilities, etc.

3.0 WORKMANSHIP

3.1 Clearing of the site as required will be performed by others.

3.2 Layout of facilities shall be performed by the Contractor from the information shown on the drawings.

3.3 Obstructions:

3.3.1 Some obstructions may not be shown. Bidders are advised to carefully inspect the existing facilities before preparing their Bids. The removal and replacement of minor obstructions such as electrical conduits, water, waste piping, and similar items shall be anticipated and accomplished, even though not shown or specifically mentioned.

3.3.2 Major obstructions encountered that are not shown on the drawings, or could not have been foreseen by visual inspection of the site prior to bidding, should immediately be brought to the attention of the Engineer. The Engineer will make a determination for proceeding with the work. If the Engineer finds that the obstruction adversely affects the Contractor's costs or schedule for completion, a proper adjustment to the Contract will be made in accordance with the General Conditions.

4.0 PAYMENT

4.1 No separate payment shall be made for work under this section. Payment for work in this section shall be included in the lump sum or unit price bid to which it is subsidiary.

SECTION 02050
DEMOLITION

1.0 SCOPE

1.1 Work Included: This section covers the work necessary to remove all culverts, pipes, inlets, junction boxes, pavement, concrete, etc. and retire existing water lines, sewer lines, and manholes as shown on the drawings or required by construction.

1.2 General: Review with the Engineer the locations, limits, and measures and methods for accomplishing the work prior to commencing work under this section.

2.0 WORKMANSHIP

2.1 Pipe Removal: The pipes and miscellaneous items designated for removal or required to be removed for construction shall be removed and hauled from the site in such a manner as to minimize the impact of the construction and surrounding property owners.

2.1.1 Pipe Retirement: Pipe designated to be "Retired in Place" shall have all openings capped and shall be filled with flowable fill in such a manner as to leave no voids.

2.2 Concrete and Miscellaneous Work: When applicable, all concrete or junction boxes, inlets, or miscellaneous structures designated for removal shall be broken into 3'x3' maximum size and removed from the site. This shall also include walks, pavement, etc. which are either designated for removal or removal is required for installation of the work.

2.2.1 Manhole Retirement: Manholes designated to be "Retired in Place" shall be removed to a minimum of 3 feet below finished grade and backfilled as shown on the detail.

2.3 Asphalt Removal: When required, asphalt shall be removed subsequent to sawcutting and shall be hauled off site at the Contractor's expense.

2.4 Sawcutting: Prior to demolition, all asphalt, concrete, and cement shall be sawcut at the right of way line or as necessary to form a straight and continuous edge for future repair.

2.5 Removal and Salvage: Items designated to be "Removed and Salvaged" shall be disconnected and removed so as not to cause any harm to the item. Salvaged items should be delivered to the Owner at the Owner's designated site.

2.6 Wood Decking, Caps, etc.: Remove all decks, caps, stringers, rails, etc., which are required for completion of the project or designated for removal.

2.7 Piles: Piles designated for removal shall be pulled and completely removed and disposed of. Should a pile break during extraction, the remaining portion shall be pulled and removed.

2.8 Disposal: All materials shall be hauled off of the site and deposited in disposal sites which are licensed to handle such debris. All vehicles hauling the construction material shall abide by county, city, and state requirements for hauling construction debris.

3.0 PAYMENT

3.1 Payment for work in this section shall be included in the unit price / lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials and incidentals complete.

SECTION 02200
EARTHWORK

1.0 GENERAL

1.1 Summary:

A. Scope of Specification

This specification prescribes the requirements for the excavation and the fill and embankment construction required to achieve the site finished grades and profiles indicated on the drawings or otherwise required by the contract documents. Also prescribed are the requirements for the removal, replacement, and disposal of unsuitable materials; the disposal of surplus materials; and the furnishing, placement, and compaction of borrow material.

B. Related Specifications

The following specifications prescribe items of related Work:

- 01000: General Requirements
- 02110: Clearing, Grubbing, & Stripping

Coordinate Work prescribed by this specification with Work prescribed by the above listed specifications.

C. Terminology

The following terms are defined as stated, unless otherwise indicated:

1. Soil Classification Symbols: Symbols based on the Unified Soil Classification System as determined per ASTM D2487 or ASTM D2488 (such as GW, SW, and CH).

2. Suitable Fill Material: See Section 02290 for suitable fill material.

3. Unsuitable Material: Soil having insufficient strength or stability to carry the loads that will be superimposed on the completed fill or embankment without excessive settlement or loss of stability; material containing refuse, frozen lumps, large rocks, debris, or other materials that could cause the fill or embankment not to compact; and organic soils (Pt, OH, OL).

4. Cohesive Materials: Soils classified per ASTM D2487 or ASTM D2488 REV A as GC, SC, ML, CL, MH, CH, or materials classified as GM or SM when their fine fraction (material passing a No. 40 sieve) has a plasticity index of 4 or greater.

5. Cohesionless Materials: Soils classified per ASTM C2487 or ASTM D2488 REV A as GW, GP, SW, SP, and materials classified as GM or SM when their fine function (material passing a No. 40 sieve) is nonplastic or has a plasticity index less than 4.

6. Modified Proctor Density: The maximum dry density achieved per ASTM D1557 when testing a sample of material representative of that to be compacted in the field.

7. Optimum Moisture Content: The moisture content at which the Modified Proctor Density is achieved.

8. Testing Agency: The Contractor shall retain an independent testing agency approved by the Engineer to perform the inspections and tests required to determine and verify compliance of the work with the requirements of this specification.

9. Rock: Solid, homogenous, interlocking crystalline material with firmly cemented, laminated, or foliated masses, or conglomerate deposits that cannot be removed without the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or other concrete masses (except sidewalks and other pavements and slabs) larger than 1/2 cubic yard in volume.

10. Proof-Rolling: Applying test loads over the surface of a designated area to locate and permit the timely correction of deficiencies in subsurface soils that are likely to adversely affect the performance of an overlying pavement or structure.

1.2 References:

The publications listed below form part of this specification. Each publication shall be the latest revision and addendum in effect on the date this specification is issued for construction unless noted otherwise. Except as modified by the requirements specified herein or the details of the drawings, Work included in this specification shall conform to the applicable provisions of these publications.

A. Applicable Publications

1. ASTM (American Society for Testing and Materials)

a. ASTM D1557: Test Methods for Moisture-Density Relations of Soil and Soil-Aggregate Mixtures using 10-pound Rammer and 18-inch Drop.

b. ASTM D2487: Standard Test Method for Classification of Soils for Engineering Purposes.

c. ASTM D2488: Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).

d. ASTM C33: Concrete Aggregate

e. ASTM C150: Portland Cement

2. OSHA (Occupational Safety and Health Administration)

a. OSHA Construction Industry Standards, Title 29, Code of Federal Regulations, Part 1926, Safety and Health Regulations for Construction.

1.3 Submittals:

A. Water Control Plan

Control water, both surface and ground, to insure the excavation remaining during construction.

1.4 Quality Assurance:

A. General

An inspection and testing agency will be retained by the Contractor to perform field and laboratory testing and soil evaluations to verify compliance of the work with the requirements of this specification and to ensure the achievement of the intents and purposes of the work. The performance or lack of performance of such tests and inspections shall not be construed as granting relief from the requirements of these specifications or the other contract documents.

2.0 PRODUCTS

2.1 Materials:

A. Select Subbase

For roadway select subbase material requirements, see details on drawings.

B. Borrow

Borrow material shall meet the requirements specified herein for suitable fill materials. See section 02290.

D. Portland Cement

Portland Cement shall be according to ASTM C150, Type I or II.

E. Sand

Sand shall be fine aggregate per ASTM C33. See Section 02290.

2.2 Mixtures:

A. Lean Concrete

A mixture containing 1 part (by volume) Portland cement, 2 parts sand, and water. The amount of water shall be the minimum necessary to produce a mixture with a consistency suitable for proper placement.

3.0 EXECUTION

3.1 Examination:

A. Existing Facilities to Remain

Take protective measures to prevent existing facilities within the work area that are not designated for removal from being damaged by the work.

B. Survey Monuments

Locate and protect from damage survey monuments within the work area. Properly relocate or witness any monument that must be disturbed by the work. After completion of the work, restore monument witnesses.

3.2 Preparation:

A. Preceding Work

1. Before start of earthwork covered by this specification, complete required preceding work such as:
   - 02110: Clearing, Grubbing, & Stripping

B. Erosion and Siltation Control, Prevention, and Abatement

Provide erosion and sediment control devices as required. The Contractor shall be responsible for installing control devices to avoid impact to drainage basins.

C. Slope Stabilization

1. Stabilize the sides of excavations and any other steeply sloped bank as necessary to prevent slope failure or any other earth movement that might injure personnel, or damage existing buildings, structures, or other facilities in the vicinity of the work. The stabilization method

employed shall comply with all pertinent requirements of the OSHA Construction Industry Standards and all other applicable federal, state, and local codes and regulations.

2. Remove sheeting, bracing, and shoring systems employed for slope stabilization as the progress of the work eliminates their need, unless they are permitted or required to remain by other provisions of these specifications or the other contract documents. Carefully remove such systems in a manner that will prevent subsidence or other soil movement that might damage any existing or newly constructed structure or other facility.

D. Existing or Complete Utilities

Use care in moving machinery and equipment over existing or newly installed pipes and utilities during construction so as not to cause damage to completed work. Do not use power-driven equipment to excavate closer than 2 feet from any existing utility or structure. For work immediately adjacent to, or for excavation exposing an existing utility or other structure, use manual or light equipment excavation methods until the obstruction is cleared. Support uncovered pipes and other existing work affected by the excavation until they are properly supported by backfill.

E. Structures and Surfaces

Protect newly backfilled areas and adjacent structures, slopes, or grades from damage. Repair and re-establish damaged grades and slopes. Protect existing streams, ditches, and other stormwater facilities from silt accumulation and erosion.

3.3 Construction Layout:

Unless otherwise stipulated elsewhere in the contract documents, the work covered by this specification shall include the performance of calculations, and the setting of marks and stakes necessary to ensure that the work conforms to the required lines, grades, and dimensions. Relate such layout to the coordinate grid system, elevation datum, and related survey control monuments and bench marks identified on the drawings or elsewhere in the contract documents.

3.4 Excavation:

A. General

1. Remove soil and other materials deemed unsuitable and as necessary to achieve the finished grades, subgrades, and grading profiles or other limits of excavation indicated. Utilize suitable materials resulting from excavation work in the construction of fills and embankments, and for the replacement of removed unsuitable materials.

2. Stockpile excavated suitable materials that are surplus to the quantity needed for construction of required fills and embankments, or for replacement of unsuitables, in the manner indicated on the drawings or elsewhere in the contract documents. Dispose of surplus materials offsite if no provisions for stock piling are cited or if the quality of surplus material exceeds the quantity to be stock piled.

3. After the excavation to the required finish grade is completed, recompact materials that are to remain but have been loosened or otherwise disturbed by the excavation operations, to a firm, stable condition, and to a density equal to or greater than the surrounding undisturbed material.

3.5 Ditches, Swales, and Channels:

Construct new and modified ditches, swales, and channels to conform to the lines, grades, and cross sections indicated on the plans or otherwise required by the contract documents. Trim and dress roots, stumps, and other foreign materials exposed by the work to conform to the required surface. Do not over excavate. Backfill to grade any excessive excavation using either suitable material thoroughly compacted to the density required for fills and embankments or place stone or cobble to form an erosion resistant ditch lining.

3.6 Fills and Embankments:

A. General

1. Construct fills and embankments by placing and compacting suitable materials in successive, uniform, horizontal lifts of not greater than 8 inches loose thickness. Compact each lift to the specified density before placing materials for the overlying lift.

2. Where the required finished grade has a slope steeper than 1 vertical to 8 horizontal, overbuild the slope by no less than 2 feet (measured horizontally) and trim back to finished grade after compaction.

B. Embankment Foundation

1. Where the existing ground surface on which the fill or embankment is to be constructed has a slope steeper than 1 vertical to 8 horizontal, bench the surface so that each lift can be placed and compacted horizontally. Benching shall be of sufficient width to permit the safe and effective operation of placing and compacting equipment. Begin each horizontal cut at the intersection of the original ground surface and the vertical sides of the previous cut. Recompact material cut out for benching in conjunction with the compaction of the new fill material.

2. Where the fill or embankment is to be placed on an inundated area or on low swampy ground that will not support the weight of the hauling equipment, construct the first lift by dumping successive loads of suitable materials in a uniformly distributed layer, of a thickness not greater than that necessary to support the hauling equipment while placing materials for the subsequent lift. Compact the top of this special first lift to a firm and stable condition; however, it need not be compacted to the specified density, provided it is overlaid by at least 2 lifts that are placed and compacted as required.

C. Compaction

1. Compact materials placed in fills and embankments in 8” lifts to no less than 8 percent of modified proctor density, except that the top 12 inches of subgrade beneath structurally loaded areas (such as slabs, pavements, and foundations) shall be compacted to no less than 98 percent of modified proctor density. Density tests shall be taken on each 8” lift at a frequency of no less than one test per 300 linear foot of trench.

2. Adjust the moisture content as necessary to achieve a condition suitable for compaction. For cohesive materials, the moisture content at the time of compaction shall be within plus or minus 2 percent of optimum.

3.7 Surface Drainage:

Conduct excavation, fill, and backfill operations in such a manner and sequence that proper drainage is maintained at all times in and around the work area. Promptly remove surface waters that become impounded. Remove and replace with suitable materials, or stabilize (by drying, or by approved mechanical or chemical amendment methods) materials that become loosened due to exposure to the elements.

3.8 Soft or Yielding Subgrades:

If an area of soft or yielding subgrade is detected during the performance of Work prescribed by this specification, report this condition immediately to the Engineer for determination of appropriate corrective action.

3.9 Proof-Rolling:

A. Proof-roll the subgrade in all areas to receive fill or embankment. Extend proof rolling a minimum of 5'0" horizontally outside the area to receive pavements or structures. Test the areas to be proof-rolled

with a minimum of four coverages of a four wheeled rubber tired proof-roller or dump truck with a minimum loaded weight of 25 tons, unless failure occurs during the first coverage. Proof-roll the last two passes perpendicular to the first two. An area will be considered covered when the out to out dimension of the wheels of the roller has passed over it twice. An additional coverage may be required by the Engineer to ensure that a suspicious area is stable. Operate the roller in a systematic manner so that the number of coverages over all areas designated can be readily determined.

Operate the equipment at a speed not to exceed five miles an hour or be less than 2-1/2 miles per hour. Proof-roll only in the presence of the Engineer. Do not proof-roll in alluvial areas having a near surface ground water level. Do not proof-roll where water is ponded on the surface or when rainfall has occurred within the previous 24 hours.

After areas found to be unstable have been improved by excavation and backfilling, proof roll again to ensure the effectiveness of the corrective measures.

B. Excavation of Unsuitable Material: Excavate those areas where, in the opinion of the Engineer, proofrolling indicates unstable subgrade or excessive rutting. Excavate to the necessary elevation or depth to correct the unstable condition.

C. Backfilling of Excavated Areas: Backfill excavated areas with approved suitable material unless otherwise directed by the Engineer. Place backfill as soon as possible after excavation but in no case can the excavation be left open overnight. Do no place backfill on areas covered by water. Remove water from all excavated areas by approved methods. Place and Compact backfill materials in accordance with the requirements for fills and embankments as specified in Section 3.6 above.

D. Survey: Measurement of quantities by the cubic yard is in-place measure. Contractor shall have a Registered Surveyor determine quantities for payment at appropriate intervals of technique as approved by the Engineer.

3.10 Finish Grading:

Trim and finish-grade the surface of areas involved in work covered by this specification to within plus or minus 0.10 feet of the required grade. The resulting surface shall be reasonably smooth and free of ruts, ridges, depressions, and other significant irregularities. Finish ditches so that no ponding occurs. Leave areas designated to be grassed in a condition suitable for subsequent topsoiling, and seeding or sodding operations.

4.0 PAYMENT

4.1 Payment for work in this section shall be included in the unit price/lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials, and incidentals complete.

SECTION 02224
EXCAVATION, BACKFILL & COMPACTION FOR UNDERGROUND PIPING

1.0 GENERAL

1.1 Summary

A. Scope of Specification

This specification prescribes the excavation, bedding, backfilling, and compaction required for installing underground piping, culverts, and associated appurtenances.

B. Related Specifications

The publications listed below form part of this specification. Each publication shall be the latest revision and addendum in effect at the time of the project's execution unless noted otherwise. Except as modified by the requirements specified herein or the details of the drawings, all Work included in this specification shall conform to the applicable provisions of these publications.

- 01000: General Requirements
- ~~02115: Topsoil Removal and Stockpiling~~
- 02200: Earthwork
- 02290: Imported Materials for Foundation, Bedding, and Backfill

C. Terminology

The following terms are defined as stated unless otherwise indicated:

1. Suitable Backfill Material: Soil classified per ASTM D2487 or ASTM D2488 as one of the following:

- gravel (GW, GP, GM, GC)
- sand (SW, SP, SM, SC)
- inorganic lean clay (CL)
- inorganic silt (ML)
- a gravel-silt, gravel-clay, sand-silt, sand-clay mixture containing 5 to 12 percent fines (e.g., GW-CL, SP-ML)

Suitable backfill material shall be free from frozen lumps, refuse, rocks larger than 3 inches in any dimension, or other material that might cause damage to the pipe, prevent proper compaction, or cause the completed backfill to have insufficient bearing capacity for the expected superimposed loads.

2. Unsuitable Material: Soil or other material having insufficient strength or stability to carry the loads that will be superimposed on the completed backfill without excessive consolidation or loss of stability; material containing refuse, frozen lumps, large rocks, debris, or other materials that could damage the pipe or cause the backfill not to compact; and organic soils (Pt, OH, OL).

3. Select Backfill Material: Must meet the requirements of Section 02290.

4. Cohesive Material: Soils classified per ASTM D2487 or ASTM D2488 as GC, SC, ML, CL, or materials classified as GM or SM when their fine fraction (material passing No. 40 sieve) has a plasticity index of 4 or greater.

5. Rock: Solid homogenous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, that cannot be removed without the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement exceeding 1/2 cubic yard in volume.

6. Unyielding Subgrade: Rock or soil containing large stones (over 3 inches in any dimension) that if allowed to remain at the trench bottom, would likely cause uneven or point loading on the pipe.

7. Unstable Subgrade: Material in the trench bottom that lacks sufficient firmness to maintain the alignment of the pipe, or to prevent joints in the pipe from separating during backfilling. This may be material that is otherwise suitable but has been disturbed or is saturated with water.

8. Modified Proctor Density: The maximum dry density achieved per ASTM D1557 when testing a sample of material representative of that to be compacted in the field.

9. Optimum Moisture Content: Modified Proctor Density is achieved.

10. Relative Density: The degree of compactness of a free draining granular soil with respect to the loosest and densest conditions of the soil as determined by ASTM D4253 and ASTM D4254.

11. Soil Classification Symbols: Where used in this specification, symbols for soil classification (e.g., GW, SW, CH) shall be understood to be the soil classification group symbol based on the Unified Soil Classification System as determined per ASTM D2487 or ASTM D2488.

12. Topsoil: Natural, friable, fertile, fine, loamy soil containing no less than 1.5 percent organic materials when tested per AASHTO T194, and generally representative of agriculturally productive soils in the vicinity, that is free from appreciable quantities of hard clods, stiff clay, gravel, brush, large roots, and other deleterious materials.

13. Pipe Embedment Zone: The area of the trench in the immediate vicinity of the installed pipe, including special foundations when required (see pipe bedding details on the drawings), where special materials and construction techniques are required by this specification to ensure proper installation of the pipeline.

14. Load-bearing Subgrade: The soil lying beneath and up to 5 feet outside of the edge of pavements and structures (either existing or to be constructed), and the soil lying within such other limits of load-bearing subgrade as may be indicated on the drawings or elsewhere in the contract documents.

1.2 References

A. Applicable Publications

The publications listed below form part of this specification. Each publication shall be the latest revision and addendum in effect at the time of the project's execution unless noted otherwise. Except as modified by the requirements specified herein or the details of the drawings, all Work included in this specification shall conform to the applicable provisions of these publications.

1. ASTM (American Society for Testing and Materials)

   a. ASTM C33: Standard Specification for Concrete Aggregate

   b. ASTM D1557: Test Methods for Moisture-Density Relations of Soil and Soil-Aggregate Mixtures using 10-pound Rammer and 18-inch Drop.

   c. ASTM D2487: Standard Test Method for Classification of Soils for Engineering Purposes.

   d. ASTM D2488: Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).

   e. ASTM D4253: Standard Test Methods for maximum Index Density of Soils using a Vibratory Table.

   f. ASTM D4254: Standard Test Methods for Minimum Index Density of Soils and Calculation of Relative Density.

2. OSHA (Occupational Safety and Health Administration)

a. OSHA Constructions Industry Standards, Title 29, Code of Federal Regulations, Part 1926, Safety and Health Regulations for Construction.

1.3 Submittals

A. Trenching Safety Plan

When required by the contract documents, a trenching safety plan shall be submitted for review and approval no less than 10 days before the scheduled start date for trenching. The plan shall indicate the systems, methods, and techniques to be used to ensure that all trench sidewalls will be properly guarded for the protection of personnel and existing facilities and structures in the vicinity of the work.

B. Water Control Plan

No piping shall be installed with water in the trench. The Contractor shall control all surface and ground water during installation.

1.4 Quality Assurance

A. Testing: An independent testing agency shall be retained by the Contractor to perform field and laboratory testing and soil evaluations to verify compliance of the work with the requirements of this specification and to ensure the achievement of the intents and purposes of the work. The performance or lack of performance of such tests and inspections shall not be construed as granting relief from the requirements of these specifications or the other contract documents.

B. Testing Frequency: See Section – 02200 – 3.6.C.1.

2.0 PRODUCTS

2.1 Materials

A. Granular Bedding Material

Well-graded sand (SW or SW-SM), gravel (GW or GW-GM), or manufactured aggregate containing no particles larger than 1/2 inch, and free from roots, debris, or any other substance that would harm the pipe or might impair the performance of the material as bedding for the pipe.

B. Plastic Marking Tape

Plastic marking tape shall be acid and alkali-resistant polyethylene film, 6-inches wide with minimum thickness of 0.004 of an inch. Tape shall have a minimum strength of 1750 psi lengthwise and 1500 psi crosswise. The tape shall be manufactured with integral wires, foil backing or other means to enable detection by a metal detector when the tape is buried up to 3 feet deep. The tape shall be of a type specifically manufactured for marking and locating underground utilities. The metallic core of the tape shall be encased in a protective jacket or provided with other means to protect it from corrosion. Tape color shall be as specified in Table 1 and shall bear a continuous printed inscription describing the specific utility.

Table 1. Tape Color	
Red	Electric
Yellow	Gas, Oil, and Dangerous Materials
Orange	Telephone, Telegraph, Television, Police, and Fire Communications
Blue	Water Systems
Green	Sewer Systems

C. Tracer Wire

14 gauge along plastic coated wire taped directly to the pipe prior to installing backfill. Terminate wire at all valves, meters, cleanouts, etc.

3.0 EXECUTION

3.1 Preparation

A. Preliminary Site Examination

Prior to excavating, thoroughly investigate the line of the proposed trench to ascertain the existence and location of any underground structures or other items that might interfere with the pipe installation. Notify Engineer of any obstructions that will prevent installation of the pipe or appurtenance as indicated on the drawings.

B. Fills and Embankments

Where the pipeline is to be installed in an area of fill or embankment, verify that such work has been completed to an elevation at least 3 feet above the top of the pipeline to be installed.

C. Construction Layout

Unless otherwise stipulated elsewhere in the contract documents, the work covered by this specification shall include the performance of all calculations, and the setting of all marks and stakes necessary to ensure that the work conforms to the required lines, grades, and dimensions. Relate all such layout to the coordinate grid system, elevation datum, and related survey control monuments and bench marks identified on the drawings or elsewhere in the contract documents.

D. Stripping and Stockpiling Topsoil

Strip topsoil in areas to be excavated and stockpile separately from other excavated materials. Protect topsoil stockpiles from contamination during progress of the work until their materials have been used in finish operations.

E. Pavement Removal

Where trenches must be excavated in areas of existing paving, remove the pavement using neat, straight, and square or parallel saw cuts no less than 1 foot outside of the line of intersection between the excavation sidewall and the pavement subgrade surface. In the case of Portland cement concrete pavement, the line of removal may be the nearest existing pavement joint outside of the 1 foot limit. Cut steel reinforcement exposed by the pavement removal and carefully bend it out of the way of the trenching work. Leave a sufficient amount of the reinforcement projecting within the removed area to allow for the lap splice with the new replacement reinforcement required for restoration of the pavement.

F. Erosion and Siltation Control, Prevention, and Abatement

Before starting earthwork operations in any particular area of the project site, install measures for the control, prevention, and abatement of erosion and siltation for that area as required by any applicable federal, state, or local codes or regulations.

G. Trenching Safety

Before the start of trenching, plan for and assemble materials and equipment required to stabilize trench walls as necessary to ensure the safety of personnel working in the trench, and to protect from damage existing facilities and structures in the vicinity of the work. The systems, methods, and techniques used shall meet or exceed all applicable requirements of the OSHA Construction Industry Standards, and all other local, state, and federal codes and regulations.

3.2 Protection

A. Slope Stabilization

1. Stabilize the sides of excavations as necessary to prevent slope failure or any other earth movement which might injure personnel or damage existing buildings, structures, or other facilities in the vicinity of the work. The stabilization method employed shall comply with all pertinent requirements of the OSHA Construction Industry Standards, and all other applicable federal, state, and local codes and regulations.

2. Remove sheeting, bracing, and shoring systems employed for slope stabilization as the progress of the work eliminates their need, unless they are permitted or required to remain by other provisions of these specifications or the other contract documents. Carefully remove such systems to prevent subsidence or other soil movement that might damage any existing or newly constructed structure or other facility.

B. Existing or Complete Utilities

When crossing existing pipelines or other structures, alignment and grade shall be adjusted as necessary, with the approval of the Engineer, to provide clearance as required by federal, state, or local regulations or as deemed necessary by the Engineer to prevent future damage or contamination of either structure. Carefully move machinery and equipment over existing or newly installed pipes and utilities during construction so as not to damage completed work. Do not use power-driven equipment to excavate closer than 2 feet from any existing utility or structure. For work immediately adjacent to, or for excavation exposing an existing utility or other structure, use manual or light equipment excavating techniques. Start manual or light equipment excavation before reaching the obstruction and continue until the obstruction is uncovered, or until clearance for the new pipe or utility is ensured. Support uncovered pipes and other existing work affected by the excavation until they are properly supported by backfill. Report immediately to the Engineer any damage to existing utility lines or other subsurface facilities.

C. Structures and Surfaces

Protect newly backfilled areas and adjacent structures, slopes, or grades from damage. Repair and re-establish damaged grades and slopes. Protect existing streams, ditches, and other stormwater facilities from silt accumulation and erosion.

3.3 Control of Water

A. General

Prevent or control water flow into excavations, or water accumulation in excavations, to ensure that the bottoms and sides of all excavations remain in a firm and stable condition throughout construction operations.

B. Surface Waters

Plan and conduct excavation operations so as to minimize the disruption of stormwater drainage in the vicinity of the work. Provide diversion ditches, dikes, and other suitable measures to control and direct runoff around

and away from the excavation. Protect the sides of excavations from erosion and sloughing caused by stormwater runoff. Promptly remove stormwater accumulations in excavations. The systems and equipment for control of surface water shall be of sufficient capacity to accommodate the runoff rate that can be expected from the 2 year (50 percent annual chance) rainfall event, with no significant disruption of the construction schedule, or damage to existing features or facilities in the vicinity of the work.

C. Groundwater

When the bottom of the trench must be carried to an elevation below the groundwater piezometric surface, or to such proximity to the piezometric surface that the excavation bottom will become soft due to its being saturated by groundwater, take measures to lower the piezometric surface sufficiently to maintain the stability of the excavation bottom. Design the groundwater control system using accepted professional methods of design and engineering consistent with the best modern practice. The system shall include trenches and sumps with pumps, well points, and such other equipment, appurtenances, and related earthwork necessary to achieve the groundwater control needs of the work. Carefully design and operate the system to avoid damage to existing structures and other facilities in the vicinity of the work.

D. Disposal of Removed Water

Convey water removed by the water control systems to an existing stormwater drainage facility with sufficient capacity to accommodate the flow rates involved without damage. Secure permits or other approval required from authorities having jurisdiction for such stormwater discharge.

E. System Removal

After completing construction operations needing water control, remove materials, equipment, and other facilities used for that purpose, and clean up and restore affected areas as required.

3.4 Excavation

A. General

Carefully excavate trenches to the minimum depths and widths necessary for installing the pipeline and associated appurtenances in accordance with the requirements of this specification, and the lines and grades indicated on the plans or elsewhere in the contract documents. Over-excavation of trench width or depth not directed by the Engineer shall be at the Contractor’s expense. In the pipe embedment zone, the trench sidewalls shall be as nearly vertical as practical. From the top of the pipe embedment zone to the surface, the trench sidewalls shall be either sloped sufficiently to prevent sloughing or cave-in, or shall be properly supported. Stockpile excavated materials in an orderly manner a sufficient distance from the trench sidewalls to avoid endangering the stability of the bank. All excavation of every description and of whatever substances encountered shall be performed to the depths indicated or as otherwise specified. During excavation, material suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid over-loading and to prevent slides or cave-ins. All excavated materials not required or suitable for backfill shall be removed and disposed of off-site at the Contractor's expense. Grading shall be done as necessary to prevent surface water from flowing into trenches or other excavations, and any water accumulating therein shall be removed by pumping or by other approved methods. Sheeting and shoring shall be done as necessary for the protection of the work and for the safety of personnel. Excavation shall comprise all materials encountered, including rock and filled-in material of whatever nature is involved. Do not install any work until excavations are free of water, mud, and loose earth. Do not install any work on frozen ground.

B. Unstable Subgrade

When soft, yielding, or otherwise unstable soil conditions are encountered at the required trench bottom elevation, over excavate the trench to a depth of no less than 12 inches below the required pipe bottom elevation, and backfill with granular bedding material as directed by the Engineer. If conditions are so severe that over excavating and backfilling will not achieve a stable condition, notify the engineer immediately so that appropriate corrective measures may be identified.

C. Unyielding Subgrade

Whenever rock, stone, masonry, or other hard, unyielding material is encountered at or above the required trench bottom elevation, remove it to provide a clearance of no less than 6 inches below and on each side of pipes and associated fittings, valves, and other appurtenances. Backfill the over-excavated area with granular bedding material.

D. Previous Excavations

In the event that the trench passes over a sewer or through any other previous excavation, carefully compact the bottom of the trench to a density equal to or greater than that of the native soil adjacent to the previous excavation. Perform this compaction carefully to avoid damaging the previously installed facility.

E. Excavation for Appurtenances

1. Excavations for precast manholes, catch basins, drainage inlets, and other similar structures shall be of sufficient size to permit proper placement of the structures in their intended positions, and to permit proper placement and compaction of backfill around the structures after their placement. For cast-in-place appurtenances, excavations shall be of sufficient size to permit placement and removal of necessary formwork.

2. When concrete is to be placed against the bottom or sides of an excavation, take care not to disturb the native soils that the concrete bears against. Excavate to final line and grade just before the concrete or masonry is to be placed. Remove loose or unstable materials. Clean rock of loose material and other debris, and cut to a firm and stable surface that is either level, stepped, or serrated; remove loose or deteriorated rock and thin strata.

3.5 Bedding

After the excavation reaches the required trench bottom elevation and any unacceptable subgrade conditions are corrected as specified, prepare the bottom of the trench for placement of the pipe by spreading in the trench a layer of loose granular bedding material as directed by the Engineer to attain a level just above the required grade of the outside bottom of the pipe. Carefully shape the surface of this layer of loose material to ensure that uniform and continuous support is provided to the bottom quadrant of each pipe section along its entire length. In the prepared trench bottom, excavate small depressions (bell holes) of the minimum size necessary to allow removing the pipe handling slings, to allow assembly of pipe joints, and to avoid the development of bearing loads on the pipe bells or flanges. Bedding thickness and width shall be in accordance with the appropriate pipe bedding details shown on the drawings. Bedding in excess of the width and depth specified without direction from the Engineer shall be at the Contractor's expense.

3.6 Pipe Laying and Assembly

Place the pipe, pipe assemblies, and fittings on the prepared trench bottom, embedding the bottom of the pipe into the loosely placed bedding materials true to the required line and grade. Ensure that the barrel of each pipe section is uniformly supported along its entire length, and that no point loads are developed on bells, flanges, or elsewhere. Assemble joints in accordance with the applicable piping system requirements.

3.7 Haunching

After placing the pipe and assembling joints in accordance with the applicable system installation specifications, carefully fill bell holes with bedding material and place compact bedding material under the sides of the pipe to the pipe spring line. Take care during placement and compaction of this material to ensure sound support is developed for the sides of the pipe while avoiding either vertical or lateral displacement of the pipe from its intended position. Place haunching area material and compact to the required density in uniform lifts of not over 6 inches loose thickness using manual or mechanical tamping techniques.

3.8 Coordination With System Testing

Coordinate initial and final backfilling with the applicable piping system installation specification testing requirements to ensure that required visual examinations are accomplished before the pipeline is obscured by backfill.

3.9 Initial Backfill

1. Place and compact select backfill from the spring line of the pipe to the top of the pipe embedment zone in uniform horizontal lifts of not over 6 inches loose thickness. Bring up the level of backfill uniformly on opposite sides of the pipe along the full length of each pipe section. Take care not to damage the pipe or any protective coating it may have.

2. When installing high density polyethylene (HDPE) pipe, polyvinyl chloride (PVC) pipe, corrugated metal pipe (CMP), or any other flexible type pipe, give special attention to proper compaction of the materials in the pipe haunch area and sides to ensure that adequate side support of the pipe is developed while avoiding any vertical or lateral displacement of the pipe. For flexible type pipe, the material directly above the pipe in the pipe embedment zone shall be only lightly compacted to avoid distorting the pipe. Compacted density requirements do not apply to materials in this area directly over flexible type pipe.

3. Install tracer wire on all non-ferrous pipe prior to backfill. Tape wire with duct tape on approximate 6' center.

3.10 Final Backfill

Place and compact suitable backfill material in 8 inch maximum loose thickness lifts to restore the required finished surface grade. During final backfill for plastic or other non-ferrous pipelines, install plastic marking tape above the pipeline at a depth of 1 to 2 feet below the required finished grade.

3.11 Compaction

A. Equipment

Compact bedding and backfill materials using vibratory or impact type compaction equipment suitable for use in confined areas, and operated at the frequency and amplitude recommended by the equipment manufacturer for the type of material and lift thickness involved in the work.

B. Moisture Content

1. At the time of compaction, the moisture content of the material shall be such that the specified compacted density will be obtained and the completed backfill will be in a firm and stable condition. Adjust the moisture content as necessary to achieve a condition suitable for compactions.

2. For cohesive materials, the moisture content at the time of compaction shall be within plus or minus 3 percent of optimum.

C. Compacted Density

1. Pipe Embedment Zone

Compact bedding and backfill material placed in the pipe embedment zone compacted to a density of no less than 92 percent of Modified Proctor Density or, if a free-draining granular material, to a density of no less than 70 percent relative density.

2. Final Backfill

a. Except in areas of load bearing subgrade, compact final backfill composed of suitable materials from the original trenching excavation to a density equal to or greater than that of the existing undisturbed material immediately adjacent to the trench. Where the excavated material is unsuitable for use as backfill and, therefore, imported materials are used, compact the backfill to no less than 90 percent of Modified Proctor Density.

b. In areas of load bearing subgrade, compact final backfill materials to a density of no less than 92 percent of Modified Proctor Density, with the top 12 inches compacted to no less than 95 percent of Modified Proctor Density.

3.12 Restoration and Clean Up

A. General

After completing backfill placement and compaction, restore or replace shrubbery, turf, fences, and other features, surfaces, and structures disturbed during the work, except as otherwise indicated. Return restored features and facilities to a condition equal or superior to that which existed before the work began.

B. Pavement Restoration

Restore removed pavement to a condition equal or superior to that existing prior to its removal. Replace removed reinforcing steel with new material of a size, quality, and grade equal or superior to that which was removed. Install replacement steel with lap splices of no less than 36 bar diameters or 12 inches for wire fabric.

C. Clean Up

Remove off the jobsite and properly dispose of surplus piping materials, soils, temporary structures, and other debris resulting from the work. Leave the site in a neat and clean condition, ready to receive topsoil, seeding, or whatever final surface treatment is indicated.

4.0 PAYMENT

Payment for work in this section shall be included in the lump sum or unit price bid to which it is subsidiary.

SECTION 02290
IMPORTED MATERIALS FOR FOUNDATION, BEDDING & BACKFILL

1.0 SCOPE

1.1 Work Included: This section includes furnishing and installation of foundation, bedding and backfill material required for pipelines, and other pipeline appurtenances and road base where the existing native material has been determined unsuitable for use.

1.2 General:

1.2.1 If, in the opinion of the Engineer, the existing native material is unsuitable for use, the Contractor shall promptly replace the material with materials contained in this section.

1.2.2 Where granular fill is called for, but excavations are determined to be unsuitable, the Contractor shall utilize commercial sand conforming with Section 2 below unless directed otherwise.

1.2.3 Placement of this material shall conform to the requirements shown on the drawings.

2.0 MATERIALS

2.1 Commercial Sand (Com. Sand):

2.1.1 Sand shall be clean granular material and may contain natural or artificial mixtures free of organic matter and shall be graded as follows:

Sieve Designation	Percent by Weight Passing Square Mesh Sieve
No. 10	100
No. 40	80 - 100
No. 60	30 - 100
No. 100	10 - 25
No. 200	2 - 8

2.2 Sand Clay:

2.2.1 Sand clay shall consist of natural or artificial mixtures of clay or soil binder and gravel, sand or other aggregates. The material shall be free from organic matter and shall be graded as follows:

Sieve Designation	Percent by Weight Passing Square Mesh Sieve
1 Inch	100
No. 10	65 - 100

2.3 Soil Mortar:

2.3.1 Soil mortar shall be that portion passing the No. 10 sieve, shall be a liquid limit of less than 25 and a plastic index of less than 10, and shall be graded as follows:

Sieve Designation	Percent by Weight Passing Square Mesh Sieve
No. 10	100
No. 20	55 - 90
No. 40	35 - 70
No. 200	8 - 25

2.4 Limestone or Rock:

2.4.1 Foundation Stabilization: Limestone or rock 1" maximum size and shall be well graded. The foreign matter content of the processed material, as determined by washing, shall not exceed three (3) percent of the dry weight of the material.

2.4.2 Materials for aggregate pavement base shall be size 610 crushed stone base in accordance with Section 703.03 of the "Mississippi Standard Specification for Road and Bridge Construction", current edition and shall be graded as follows:

Sieve Designation	Percent by Weight Passing Square Mesh Sieve
1.50 inch	100
1.00 inch	90 - 100
0.75 inch	70 - 100
0.50 inch	62 - 90
0.375 inch	50 - 80
No. 4	35 - 65
No. 40	12 - 32
No. 200	5 - 12

2.4.3 #67 Crushed Stone: Limestone or rock shall be size 67 crushed stone base in accordance with Section 703.03 of the "Mississippi Standard Specification for Road and Bridge Construction", current edition and shall be graded as follows:

Sieve Designation	Percent by Weight
1.00 inch	100
0.75 inch	80 – 100
0.50 inch	-
0.375 inch	20 - 55
No. 4	0 - 10
No. 8	0 - 5

3.0 WORKMANSHIP

3.1 Removal of Unsuitable Material: All material determined unsuitable shall be removed from the construction site. Disposal shall be in accordance with Section 02200 of these specifications.

3.2 Certification: Prior to delivery of materials to the site, the Contractor shall submit certificates of compliance of such materials with these specifications.

3.3 Unsuitable Material: Any material containing cinders, ashes, refuse, vegetable or organic material, boulders, rocks or stones, frozen soils or other material that is determined to be unsuitable. Moisture shall not be a material that determines unsuitability.

4.0 PAYMENT

Payment for work in this section shall be included in the unit price/lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials, and incidentals complete.

SECTION 02361
TEST PILES

1.0 SCOPE

1.1 Work Included: This section covers the work necessary to furnish and drive test piles of the size, and type, at locations shown on plans.

1.2 General: See CONDITIONS OF THE CONTRACT and Division 1, GENERAL REQUIREMENTS, which contains information and requirements that apply to the work specified herein and are mandatory for this project.

1.3 Submittals: Submittals during construction shall be made in accordance with Division 1, General Requirements. In addition, the following specific information shall be provided:

A. Certification that preservative treatment meets the requirements of these specifications.

B. Shop drawings and descriptive literature at driving equipment.

2.0 MATERIALS

2.1 Test Piles: Prestressed concrete piles shall conform to approved prestress concrete pile design. Test pile shall be 12 inches in square unless otherwise indicated on the drawings.

2.2 Lengths: Test pile lengths unless otherwise indicated on the drawings, shall be the Contractor's responsibility. Any increase in lengths, as may be necessary to provide for fresh kneading and additional length as may be necessary to suit the Contractor's method of operation will be provided without additional cost to the Owner.

2.3 Extensions or Build-Ups: Test piles shall be extended, build-up, or spliced if deemed necessary to the depths shown on the plans. Similarly, test piles may be required to be driven below cut-off and extended as necessary to achieve plan penetrations and/or bearings.

3.0 WORKMANSHIP

3.1 Refer to Section 02454 – Prestressed Concrete Piles.

3.2 Load tests shall be conducted as specified in ASTM D1143 and ASTM D3689 for Static Axial Compressive load and Static Axial Tensile Load, respectively.

4.0 MEASUREMENT AND PAYMENT

4.1 Test Piles Measurement:

4.1.1 Test piles will be measured per each complete-in-place. Piles paid for as test piles will not be included in the measurement of pay footage for permanent piles.

4.1.2 Test piles which require extensions of building up will not be measured for additional payment. Splices required for the extensions of test piles will not be measured for payment.

4.1.3 No measurement for payment will be made for cut-offs of a test pile, except that any part of the excess approved in writing by the Engineer for incorporation into the completed permanent structure below cut-off elevation will be measured for payment as outlined in Section 02454.

4.2 Test Pile Payment: Payment for accepted test pile will be made at the unit price bid or lump sum as specified in the bid.

SECTION 02370
EROSION AND SEDIMENTATION CONTROL

1.0 GENERAL REQUIREMENTS

The works includes all measures necessary to effectively control erosion on the construction site and prevent sediment-laden run-off from leaving the construction site.

2.0 CONTRACTOR'S RESPONSIBILITY

The Owner has submitted a Stormwater Pollution Prevention Plan, including a large construction Notice of Intent, to the Mississippi Department of Environmental Quality, which is included in these specifications. The Contractor agrees to all of the conditions of the permit and the Contractor shall be responsible for prevention of damage to properties outside the construction limits from siltation due to construction of the project. The contractor will assume all responsibilities to the affected property owners for correction of damages, which may occur. The Contractor further agrees to assume all responsibilities for all fines or damages assessed against the Owner by any regulatory agency or individual due to lack of proper erosion and sediment control during construction. The Owner reserves the right to withhold a portion of the Contractor's payment requests sufficient to pay the assessments.

3.0 MINIMUM AREAS TO BE DISTURBED

A. Only those areas necessary for timely and proper completion of the project shall be stripped of native vegetation.

B. No land disturbing activity shall be permitted in proximity of a natural watercourse without a buffer zone along the margin of the watercourse of sufficient width to confine a visible siltation within the 25 percent of the buffer zone nearer the land disturbing activity.

C. The angle for graded slopes and fills shall be no greater than the angle, which can by retained by vegetative cover or other adequate erosion control devices or structures. Slopes left exposed will, within 30 working days of completion of any phase of grading, be planted or otherwise provided with ground cover, devices, or structures sufficient of restrain erosion.

D. Whenever land disturbing activity is undertaken on a tract comprising more than one acre, if more than one contiguous acre is uncovered, a ground cover sufficient to restrain erosion must be planted or otherwise provided within 30 working days on that portion of the tract upon which further active construction is not being undertaken.

4.0 METHODS TO BE USED – EROSION CONTROL SCHEDULE REQUIRED

Any accepted erosion sedimentation control measures may be used, at the Contractor's option, including and in addition to specific measures prescribed in the project plans and elsewhere in these specifications. Methods, which may be used, include, but are not limited to, vegetation, silt fences, or silt basins. The Contractor shall program and submit to the Engineer prior to beginning construction and erosion control schedule outlining measures to be taken for positive control of erosion and sedimentation during construction.

5.0 PLACEMENT OF SEDIMENT CONTROL SCHEDULE REQUIRED

All devices (silt fences, silt basins, etc.) for sediment control shall be constructed prior to beginning clearing and grubbing on the site.

6.0 MAINTENANCE OF SEDIMENT CONTROL DEVICES

All devices for sediment control shall be maintained in proper working order for the duration of the project.

7.0 SCHEDULING OF WORK

Clearing and grubbing shall be scheduled and performed in such a manner that subsequent grading operation and erosion control practices can follow immediately thereafter. Excavation, borrow, and embankment operations will be conducted such that cuts and fills will be completed to final grades in a continuous operation. All construction areas not otherwise protected shall be planted with permanent vegetative cover in accordance with Section 02936 (Seeding) of the Specification within 30 working days after completion of active construction.

8.0 TEMPORARY SUSPENSION OF WORK

If any earthwork is to be suspended for any reason whatsoever for longer than 30 calendar days, the areas involved shall be seeded with temporary vegetative cover or otherwise protected against excessive erosion during the suspension period. Suspension of work in any area of operation does not relieve the Contractor of the responsibility for the control of erosion in that area.

9.0 REMOVAL OF SEDIMENT CONTROL DEVICES

Near the completion of the project or upon instruction by the Engineer, the Contractor shall dismantle and remove silt fences and fill silt basins used for sediment control during construction and dress up and seed the areas to give a pleasing appearance.

10.0 ADDITIONAL MEASURES

If the Engineer determines that significant sedimentation is occurring as a result of activity on the construction site despite the application and maintenance of prescribed protective measures, the Engineer may require the Contractor to take additional protective measures.

11.0 DUST CONTROL

A. The Contractor shall control dust throughout the life of the project within the project area and at all other areas affected by the construction of the project, including, but not specifically limited to, unpaved secondary roads, haul roads, access roads, disposal sites, borrow and material sources, and production sites. Dust control shall not be considered effective where the amount of dust creates a potential or actual unsafe condition, public nuisance, or condition endangering the value, utility, or appearance of any property.

B. The Contractor will not be directly compensated for any dust control measures necessary, as this work will be considered incidental to the work covered by the various contract items.

12.0 PAYMENT

4.1 Payment for work in this section shall be included in the unit price / lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials and incidentals complete.

SECTION 02371
TEMPORARY SILT FENCE

1.0 GENERAL

1.1 Description. This work consists of furnishing, constructing and maintaining a water permeable filter type fence for the purpose of removing suspended soil particles from the water passing through it in accordance with the requirements shown on the plans and these specifications. Fence measured and paid as temporary shall be removed. It is understood that measurement and payment for silt fence will be made only when ordered and a pay item is included in the proposal. The quantities are estimated for bidding purposes only, and may be varied dependent upon actual conditions which occur during construction of the project.

2.0 MATERIALS

2.1 Geotextile fabric, posts, staples and woven wire backing, when required, shall meet the requirements of Section 02247.

3.0 EXECUTION

3.1 Placement of Fence: The silt fences shall be constructed at the locations shown on the plans or as directed by the Engineer. All posts shall be installed so that no more than three feet of the post shall protrude above the ground. Extra post for bracing shall be installed as directed by the Engineer. The woven wire shall be securely fastened to the wood posts with staples. When metal posts are used, the wire shall be fastened to the post with wire or other approved means. The geotextile shall be attached to the wire fence by wire or other approved means. The bottom edge of the geotextile shall be buried six inches below ground surface to prevent undermining. When splicing of the geotextile is necessary, two posts shall be installed approximately 18 inches apart and each piece of geotextile shall be fastened to both posts. The geotextile will be rejected if it has defects, rips, holes, flaws, deterioration, or damage incurred during manufacture, transportation, storage or installation. Type II geotextile may be installed without the woven wire fence backing provided all of the following conditions are met:

(a) Post spacing is reduced to six feet or less.
(b) The geotextile has been approved by the Engineer and the manufacturer recommends its use without the woven wire backing.
(c) Fence posts shall be inclined toward the runoff source at an angle of not more than 20° from vertical.
(d) Geotextile shall be attached to the posts in such manner that purpose intended is satisfied and maintained.

3.2 Maintenance and Removal: The Contractor shall maintain the silt fence and the geotextile shall be removed and replaced when deteriorated to such extent that it reduces the effectiveness of the silt fence. Excessive accumulations against the fence shall be removed and disposed of as directed by the Engineer. Unless otherwise directed, all temporary silt fences shall be removed. Upon removal, the Contractor shall remove and dispose of any excess silt accumulations, dress the area to give a pleasing appearance and vegetate all bare areas in accordance with the contract requirements. The temporary fence materials will remain the property of the Contractor and may be used at other locations provided the materials are acceptable to the Engineer.

4.0 MEASUREMENT AND PAYMENT

4.1 Payment for work in this section shall be included in the unit price / lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials and incidentals complete.

SECTION 02454
PRESTRESSED CONCRETE PILES

1.0 GENERAL

1.1 Section Includes:

A. Prestressed precast concrete piles.

1.2 Related Sections

Section 03300 - Concrete: Requirements for concrete.

1.3 References

A. ASTM A416 - Uncoated Seven-Wire Stress-Relieved Strand for Prestressed Concrete.

B. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

C. PCI MNL-116 - Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.

1.4 Quality Assurance

A. Perform Work in accordance with PCI MNL-116.

2.0 PRODUCTS

2.1 Materials

A. Concrete: Minimum 5,000 psi, 28 day strength, Normal Portland cement; aggregates and sand as recommended by pile manufacturer.

B. Tensioning Steel Tendons: ASTM A416 Grade 270, of sufficient strength commensurate with member design.

C. Reinforcing Steel: ASTM A615 Grade M, deformed steel bars.

2.2 Fabrication

A. Pile Connectors: Fabricated of steel angles, fitted to outside dimensions of square pile ends.

B. Shop fabricate pile in maximum practical lengths to meet design requirements.

3.0 EXECUTION

3.1 Preparation

A. Obtain prior approval of hammer type to be used.

B. Use driving method which will not cause damage to nearby structures.

C. Notify adjacent and affected land owners and building occupants with 5 days notice before proceeding with the Work.

D. Protect structures near the Work from damage.

E. No production piles shall be driven until test reports of test piles, as requires by ASTM D1143 and ASTM D3689, are received and written approval is given by the engineer.

3.2 Installation

A. Protect pile head during driving, using cushion cap with full bearing on pile butt for even distribution of hammer blow.

B. Deliver hammer blows to central axis of pile.

C. Do not damage piles during driving operations.

D. If driving is interrupted before refusal, drive an additional 12 inches before resuming recording of performance data.

E. Re-drive piles which have lifted due to driving adjacent piles, or by soil uplift.

3.3 Tolerances

A. Maximum Variation From Vertical For Plumb Piles: 1 in 48.

B. Maximum Variation From Required Angle For Batter Piles: 1 in 24.

C. Maximum Variation From Pile Cut-off Elevation: 1 inches.

D. Maximum Out-of-Position: 1 inch.

3.4 Project Record Documents

A. Accurately record the following:

1. Sizes, lengths, and locations of piles.
2. Sequence of driving.
3. Number of blows per foot for entire length of piles and measured set for last 10 blows.
4. Final base and top elevations.
5. Driving force of each hammer blow.

3.6 Unacceptable Piles

A. Unacceptable Piles: Piles that fail tests, are placed out of position, are below cut-off elevations, or are damaged.

B. Provide additional piles or replace piles to conform to specified requirements.

3.7 Allowable Load on Piles

A. The load test of a single pile shall be triple the design load.

B. Capacity of single piles not in clusters shall be not less than:
Axial compression: 37 tons
Axial Tension: 4 tons
Lateral: 2 tons

C. Maximum allowable capacity of foundation piles shall be considered to be one-half of test load that causes a settlement determined by the formula listed below:

$s = 0.15 + d/120 + \Delta$
where d = diameter of piles (inches)
Δ = elastic deformation of the pile (inches) as determined by test pile for that area of foundation, when driven, using equivalent make and model of pile hammer and same operation of hammer, with regard to speed, height or fall, stroke, and pressure.

4.0 PAYMENT

4.1 Payment for work in this section shall be included in the unit price/lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials, and incidentals complete.

SECTION 02580
PAVEMENT MARKINGS

1.0 GENERAL

1.1 Summary

1.1.1 Scope of Specification

This specification prescribes the requirements for the marking of pavement as shown on the drawings.

1.1.2 Related Specification

Work in this specification shall be coordinated with Specification 01000: General Requirements.

1.2 References

The publications listed below form part of this specification. Each publication shall be the latest revision and addendum in effect on the date this specification is issued for construction unless noted otherwise. Except as modified by the requirements specified herein or the details of the drawings, Work included in this specification shall conform to the applicable provisions of these publications.

1.2.1 Applicable Codes

1.2.1.1 AASHTO (American Association of State Highway and Transportation)

1.2.1.1.1 AASHTO M-248: Ready-Mixed White and Yellow Traffic Paints

1.3 Quality Assurance

Use workmen trained and experienced in applying the products and operating the equipment required for properly performing Work.

2.0 PRODUCTS

2.1 Materials

Traffic paint shall be an alkyd resin type of ready-mixed paint suitable for use on bituminous or Portland cement concrete pavement conforming to the requirements of AASHTD M-248 Type S. The paint color shall be white. Striping for handicap shall be blue.

3.0 EXECUTION

3.1 Examination

Examine the work areas and correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 Surface Preparation

3.2.1 Prepare the surfaces to receive paint as recommended by the paint manufacturer and as described herein.

3.2.2 New pavement surfaces shall be allowed to cure for a period of no fewer than 30 days before application of marking materials. All surfaces to be marked shall be thoroughly cleaned before application of the paint. Dust, dirt, and other granular surface deposits shall be removed by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods as required.

3.3 Application

Apply the paint in strict accordance with the manufacturer's recommendations, using proper masking, stencils, and application equipment recommended for the purpose by the manufacturer of the paint. When dry, the paint shall be smooth, uniform, and free from roughness, grit, and other surface imperfections.

3.4 Inspection and Clean Up

3.4.1 After the paint has thoroughly dried, visually inspect the entire application and touch up as required to provide clean, straight lines and surfaces throughout.

3.4.2 Waste materials shall be removed at the end of each work day. Upon completion of the work, all containers and debris shall be removed from the site. Paint spots upon adjacent surfaces shall be carefully removed by approved procedures that will not damage the surfaces and the entire job left clean and acceptable.

3.5 Protection and Traffic Controls

Provide traffic cones, barricades, and other devices as needed to control traffic and protect the paint until it is sufficiently dry to withstand traffic. When public/private roadways are adjacent to roadways to be striped, suitable warnings signs shall be placed near the beginning and well ahead of the worksite for alerting traffic approaching from both directions. Painting equipment shall be marked with large warning signs indicating that slow-moving painting equipment is in operation.

4.0 PAYMENT

Payment for work in this section shall be included in the lump sum or unit price bid to which it is subsidiary.

SECTION 02770
CIVIL CAST-IN-PLACE CONCRETE

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. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Civil Structures.
2. Sidewalks.

B. Related Sections:

1. Section 02200: Earthwork
2. Section 02290: Imported Materials for Foundation, Bedding and Backfill

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Engineer.

E. Qualification Data: For testing agency.

F. Welding certificates.

G. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Fiber reinforcement.
6. Waterstops.

7. Curing compounds.
8. Floor and slab treatments.
9. Bonding agents.
10. Adhesives.
11. Vapor retarders.
12. Semirigid joint filler.
13. Joint-filler strips.
14. Repair materials.

H. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates.

I. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

J. Field quality-control reports.

K. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

G. Concrete Testing Service: The contractor shall engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

H. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete subcontractor.
e. Special concrete finish subcontractor.

2. Review concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi-rigid joint fillers, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.

C. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type II. Supplement with the following:

a. Fly Ash: ASTM C 618, Class F.

B. Normal-Weight Aggregates: ASTM C 33, Class 3S Class 3M coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable.

2.5 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.6 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Axim Italcementi Group, Inc.; CATEXOL CimFilm.
b. BASF Construction Chemicals - Building Systems; Confilm.
c. ChemMasters; SprayFilm.

d. Conspec by Dayton Superior; Aquafilm.
e. Dayton Superior Corporation; Sure Film (J-74).
f. Edoco by Dayton Superior; BurkeFilm.
g. Euclid Chemical Company (The), an RPM company; Eucobar.
h. Kaufman Products, Inc.; Vapor-Aid.
i. Lambert Corporation; LAMBCO Skin.
j. L&M Construction Chemicals, Inc.; E-CON.
k. Meadows, W. R., Inc.; EVAPRE.
l. Metalcrete Industries; Waterhold.
m. Nox-Crete Products Group; MONOFILM.
n. Sika Corporation; SikaFilm.
o. SpecChem, LLC; Spec Film.
p. Symons by Dayton Superior; Finishing Aid.
q. TK Products, Division of Sierra Corporation; TK-2120 TRI-FILM.
r. Unitex; PRO-FILM.
s. Vexcon Chemicals, Inc.; Certi-Vex Envio Set.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Construction Chemicals - Building Systems; Kure 1315.
b. ChemMasters; Polyseal WB.
c. Conspec by Dayton Superior; Sealcure 1315 WB.
d. Edoco by Dayton Superior; Cureseal 1315 WB.
e. Euclid Chemical Company (The), an RPM company; Super Diamond Clear VOX; LusterSeal WB 300.
f. Kaufman Products, Inc.; Sure Cure 25 Emulsion.
g. Lambert Corporation; UV Safe Seal.
h. L&M Construction Chemicals, Inc.; Lumiseal WB Plus.
i. Meadows, W. R., Inc.; Vocomp-30.
j. Metalcrete Industries; Metcure 30.
k. Right Pointe; Right Sheen WB30.
l. Symons by Dayton Superior; Cure & Seal 31 Percent E.
m. Vexcon Chemicals, Inc.; Vexcon Starseal 1315.

2.7 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.

C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Reglets: Fabricate reglets of not less than 0.022-inch-thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

F. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.8 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.9 CONCRETE MIXTURES

A. Civil Structures: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum aggregate size: 1 inch.
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
5. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.5 lb/cu. yd.

B. Sidewalks: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3,000 psi at 28 days.
2. Maximum aggregate size: ¾ inch.
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: Do not allow air content of trowel-finished toppings to exceed 3 percent.
5. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.5 lb/cu. yd.

2.10 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.
2. Class C, 1/2 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
3. Locate joints for beams in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 7 Section "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Ensure that discharge of ready mixed concrete is completed within 1.5 hours after batching. The 1.5 hours may be extended if the concrete is of such slump after 1.5 hours (or 300 revolutions) that it can be satisfactorily placed and consolidated without adding water.

E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

G. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

H. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish,.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING SLABS

A. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.

1. Apply scratch finish to surfaces to receive concrete floor toppings.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view.

2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.-long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

F. Slip-Resistive Finish: Before final floating, apply slip-resistive aluminum granule finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:

1. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive aluminum granules over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
2. After broadcasting and tamping, apply float finish.

3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aluminum granules.

3.9 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.10 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

    a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
    c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.11 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least six month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semi-rigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.12 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.

5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Engineer’s approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.13 FIELD QUALITY CONTROL

A. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

B. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one set of composite samples for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof. (Note: 1 set = 4 cylinders provided by Contractor.)
2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
7. Compression Test Specimens: ASTM C 31/C 31M.
    a. Cast and field cure two sets of standard cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C 39/C 39M;

    a. Test one cylinder of each set of laboratory-cured specimens at 7 days, 14 days, and one at 28 days. The four cylinders shall be reserved to be tested, if needed.
    b. Test one cylinder of each set of field-cured specimens at 7 days, 14 days, and one set of two specimens at 28 days. The four cylinders shall be reserved to be tested, if needed.
    c. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
11. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

PART 4 - EXECUTION

The work specified in this section shall be considered incidental and the cost shall be included as part of the appropriate lump sum or unit prices stated in the Bid.

SECTION 03210
REINFORCING STEEL

1.0 SCOPE

1.1 Work Included: This section covers the work necessary to furnish and install, complete, the reinforcing steel and welded wire fabric.

A. Bending Lists

B. Placing Drawings

C. Shop drawings showing weld splice, Cadweld splice, and/or mechanical threaded splices where required or where Contractor specifically requested consideration for use.

2.0 MATERIALS

2.1 Deformed Reinforcing Bars: Deformed billet-steel bars conforming to ASTM A 615 including Supplemental Requirements S1, or axle-steel deformed bars conforming to ASTM A 617, Grade 60, unless otherwise shown on drawings. Grade 40 bars shall be furnished for all stir-ups and column ties.

2.2 Splices and Mechanical Connections:

2.2.1 Splices other than lap splices shall not be used except where specifically indicated or permitted in writing by the Engineer.

2.2.2 Welded splices shall be accomplished by full penetration groove welds in accordance with paragraph WELDING REINFORCEMENT hereinafter, and shall develop at least 125 percent of the specified yield strength of the bar.

2.2.3 As an alternative, splices may be performed using a metal sleeve with cast filler metal, capable of developing in tension or compression 125 percent of the specified yield strength of the bar.

2.2.4 Mechanical threaded connections shall utilize a metal coupling sleeve with internal threads which engage threaded ends of the bars to be spliced, and shall develop in tension or compression 125 percent of the specified yield strength of the bar. Lenton Reinforcing Steel Couplers, as manufactured by Erico Products, Inc., Cleveland, OH; Richmond DB-SAE Dowel Bar Splicers, as manufactured by Richmond Screw Anchor Co., Inc. Fort Worth, TX; or equal. Furnish current International Conference of Building Officials (ICBO) Research Report or equivalent code agency report listing the findings to include acceptance, special inspection requirements, and restrictions. Contractor shall provide verification that each thread has been checked for thread quality by accepted manufacturer methods and meets all requirements.

2.3 Welded Wire Fabric: Conform to ASTM A 185 or A 497 and ACI 318, latest revisions.

2.4 Welded Wire Fabric for Single Layer Reinforced Slab on Grade Applications: Wide spaced standard structural welded wire fabric with the same steel areas as bars shown; minimum yield strength 75 psi that the panels conform in all respects to ASTM A 185 or A 497 and ACI 318, latest revisions, and provided details approved by the Engineer on reviewed shop drawings.

2.5 Accessories: Tie wire shall be 16-gauge, black, soft-annealed wire. Bar supports shall be of proper type for intended use. Bar supports in beams, columns, walls, and slabs exposed to view after stripping shall be small rectangular concrete blocks made up of the same color and same strength concrete being placed around them. Use concrete supports for reinforcing in concrete placed on grade. Conform to requirements of "Placing Reinforcing Bars" published by CRSI.

3.0 WORKMANSHIP

3.1 General:

3.1.1 Conform to "Placing Reinforcing Bars", Recommended Practices, Joint Effort of CRS-WCRSI, prepared under the direction of the CRSI Committee on Engineering Practice. All bars shall be bent cold.

3.1.2 Notify the Engineer when reinforcing is ready for inspection and allow sufficient time for this inspection prior to casting concrete.

3.2 Delivery and Storage: Deliver steel with suitable hauling and handling equipment. Tag steel for easy identification. Store to prevent contact with the ground. The unloading, storing, and handling bars on the job shall conform to CRSI publication "Placing Reinforcing Bars".

3.3 Placing Reinforcing Steel:

3.3.1 Cleaning: Clean metal reinforcement of any loose mill scale, oil, earth and other contaminants.

3.3.2 Straightening and Rebending: Do not straighten and rebend metal reinforcement. Where construction access through reinforcing is a problem, bundling or spacing of bars instead of bending shall be used. Submit details and obtain Engineer's review prior to placing.

3.3.3 Protection, Spacing and Positioning: Conform to the current edition of the ACI Standard Building Code Requirements for Reinforced Concrete (ACI 318), reviewed placing drawings and design drawings.

3.3.4 Location Tolerances: Conform to the current edition of "Placing Reinforcing Bars" published by Concrete Reinforcing Steel Institute and to the details and notes on the drawings.

3.3.5 Splicing: Conform to drawings and current edition of ACI Code 318. Splices in adjacent bars shall be staggered.

3.3.6 Tying Deformed Reinforcing Bars:

3.3.6.1 Conform to the current edition of "Placing Reinforcing Bars" published by Concrete Reinforcing Steel Institute and to the details and notes on the drawings. Mats made up of #3-#4-#5-#6 shall have every other intersection tied in such a manner to hold bars at required spacing.

3.3.7 Reinforcement Around Openings: Place an equivalent area of steel around the pipe or opening and extend on each side sufficiently to develop bond in each bar. See the details on drawings for bar extension length each side of opening. Where welded wire fabric is used, provide extra reinforcing using fabric of deformed bars.

3.3.8 Welding Reinforcements:

3.3.8.1 Welding shall not be permitted unless the Contractor submits detailed shop drawings, qualifications and radiographic nondestructive testing procedures for review by the Engineer. The Contractor shall obtain the results of this review prior to proceeding. The basis for the Contractor's submittal shall be the Structural Welding Code, Reinforcing Steel, AWS D1.4-79, published by the American Welding Society and the applicable portions of ACI 318, current edition. The Contractor shall test 10 percent of all welds using radiographic nondestructive testing procedures referenced in this code.

3.4 Field Bending: Field bending of reinforcing steel bars is not permitted when rebending will later be required to straighten bars. Rebending of bars at the same place where strain hardening has taken place due to the original bend will damage the bar. Consult with the Engineer prior to any pour if the Contractor foresees a need to work out a solution to prevent field bending.

3.5 Mechanical Splices and Connections: Install the mechanical splices as required by the manufacturer with threads tightened as required by the referenced ICBO Report. The Contractor shall carefully inspect each splice and verify that each component meets manufacturer's and ICBO requirements. Maintain minimum edge distance and concrete cover.

SECTION 03300
STRUCTURAL CONCRETE AND REINFORCING

1.0 GENERAL

1.1 Summary

This specification prescribes requirements for cast-in-place concrete construction.

1.1.1 Scope of Specification

1.1.1.1 Construction of plain and reinforced concrete work.

1.1.1.2 Sampling, testing, and inspecting concrete and concrete construction.

1.1.1.3 Placing anchor bolts and embedments for structural items.

1.1.1.4 Detailing, providing fabrication, and placing steel bar reinforcing, including reinforcing supports and accessories.

1.1.1.5 Sealing floors in janitor's closets, mechanical closets and others as specified on the finish schedule.

1.2 References

The publications listed below form part of this specification to the extent referenced in this specification. In the event there is a discrepancy between the references and this specification, then this specification shall govern.

1.2.1 ACI (American Concrete Institute)

1.2.1.1 ACI 211.1-91 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete

1.2.1.2 ACI 211.2-91 Standard Practice for Selecting Proportions for Structural Lightweight Concrete

1.2.1.3 ACI 301-89 Specification for Structural Concrete for Buildings

1.2.1.4 ACI 302.1R-89 Guide for Concrete Floor and Slab Construction

1.2.1.5 ACI 304R-89 Guide for Measuring, Mixing, Transporting, and Placing Concrete

1.2.1.6 ACI 304.2R-91 Placing Concrete by Pumping Methods

1.2.1.7 ACI 305R-91 Hot Weather Concreting

1.2.1.8 ACI 306R-88 Cold Weather Concreting

1.2.1.9 ACI 308-92 Standard Practice for Curing Concrete

1.2.1.10 ACI 315-92 Details and Detailing of Concrete Reinforcement

1.2.1.11 ACI 318-89/ACI 318R-89 Building Code Requirements for Reinforced Concrete

1.2.1.12 ACI 347R-94 Guide to Formwork for Concrete

1.2.1.13 ACI 504R-90 Guide to Sealing Joints in Concrete Structures

1.2.1.14 ACI SP-15-89 Specifications for Structural Concrete for for Buildings ACI 301-89 with Selected ACI and ASTM References

1.2.2 AISC (American Institute for Steel Construction)

1.2.2.1 Code of Standard Practice, Adopted 01Sep86

1.2.3 ASTM (American Society for Testing and Materials)

The standards of the American Society for Testing and Materials are listed under Section 1.4 of ACI 301 and are declared to be a part of these specifications, the same as if fully set forth herein. In addition, the following form a part of this specification to the extent referenced:

1.2.3.1 ASTM A82-94	Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
1.2.3.2 ASTM A184/ A184M-90	Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
1.2.3.3 ASTM A185-94	Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
1.2.3.4 ASTM A497 Rev A-94	Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
1.2.3.5 ASTM A615/ A615M Rev A-95	Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
1.2.3.6 ASTM A767/ A767M-90	Standard Specification for Zinc-Coated Galvanized) Steel Bars for Concrete Reinforcement
1.2.3.7 ASTM A775/ A775 Rev D-94	Standard Specification for Epoxy-Coated Reinforcing Steel Bars
1.2.3.8 ASTM C33-93	Standard Specification for Concrete Aggregates
1.2.3.9 ASTM C40-92	Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
1.2.3.10 ASTM C88-90	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
1.2.3.11 ASTM C94-94	Standard Specification for Ready-Mixed Concrete
1.2.3.12 ASTM C109/ C109M-95	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)
1.2.3.13 ASTM C117-95	Standard Test Method for Materials Finer Than 75-Micrometer (Number 200) Sieve in Mineral Aggregates by Washing
1.2.3.14 ASTM C123-94	Standard Test Method for Lightweight Pieces in Aggregate
1.2.3.15 ASTM C128-93	Standard Test Method for Specific Gravity and Absorption of Fine Aggregate

1.2.3.16 ASTM C136 Rev A-95	Standard Method for Sieve Analysis of Fine and Coarse Aggregates
1.2.3.17 ASTM C138-92	Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
1.2.3.18 ASTM C142-78	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
1.2.3.19 ASTM C150-95	Standard Specification for Portland Cement
1.2.3.20 ASTM C171-92	Standard Specification for Sheet Materials for Curing Concrete
1.2.3.21 ASTM C227-90	Standard Test Method for Potential Alkali Reactivity of Cement - Aggregate Combinations (Mortar-Bar Method)
1.2.3.22 ASTM C260-94	Standard Specification for Air-Entraining Admixtures for Concrete
1.2.3.23 ASTM C289-94	Standard Test Method for Potential Reactivity of Aggregates (Chemical Method)
1.2.3.24 ASTM C295-90	Standard Guide for Petrographic Examination of Aggregates for Concrete
1.2.3.25 ASTM C309-94	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
1.2.3.26 ASTM C330-89	Standard Specification for Lightweight Aggregates for Structural Concrete
1.2.3.27 ASTM C494-92	Standard Specification for Chemical Admixtures for Concrete
1.2.3.28 ASTM C595 Rev A-94/ASTM C595M-95	Standard Specification for Blended Hydraulic Cements
1.2.3.29 ASTM C618 Rev A-94	Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
1.2.3.30 ASTM C1017-92	Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
1.2.3.31 ASTM D512-89	Standard Test Methods for Chloride Ion in Water
1.2.3.32 ASTM D994-94	Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
1.2.3.33 ASTM D1056-91	Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
1.2.3.34 ASTM D1751-83	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
1.2.3.35 ASTM E329 Rev. A-95	Standard Practice for Use in the Evaluation of Testing and Inspection Agencies as Used in Construction

1.2.4 NRMCA (National Ready Mixed Concrete Association)

1.2.4.1 Checklist for Ready Mixed Concrete Production Facilities, Fifth Edition, March, 1992

1.2.5 OSHA (Occupational Safety and Health Act)

1.3 Pre-Concrete Conference

Concrete Supplier, Engineer, Concrete Contractor, Admixture Supplier, and Testing Laboratory shall meet before submittal of mix design to review specifications, discuss detailed requirements for preparing mix designs, and to establish proper construction procedures.

1.4 Submittals

1.4.1 The Contractor shall submit 1 copy of the following documentation for review and approval 14 days prior to placing any concrete, or as required by Project requirements:

- Mix Designs

  Mix designs shall be proportioned in accordance with Chapter 3 of ACI 301. Submit mix designs for each combination of ingredients on each class of concrete for review.

- Trial batch qualification test results, including standard deviation analysis.

- Ingredients test results or certifications.

- Compressive strength results.

- Material suppliers, sources, properties, and certifications.

- A copy of the current National Ready Mixed Concrete Association Certificate of Conformance for Concrete Production Facilities for Supplier's plants, if concrete is provided by a ready mixed concrete supplier.

1.4.2 Prior to the production of concrete, the Contractor shall submit to the Engineer for record only, 1 copy of Manufacturer's specifications with application and installation instructions for proprietary materials and items including bonding agents, form release agents, water stops, joint systems, chemical floor hardeners, dry shake finish materials, liquid curing compounds, and prepackaged repair materials. Also, include a statement showing product selections comply with VOC (Volatile Organic Compounds) and environmental regulations of the locality.

1.4.3 Prior to the production of concrete, the contractor shall submit a complete description of proposed curing methods.

1.4.5 The laboratory shall submit compression test results to the Engineer on a weekly basis. Breaks of 500 psi below the specified design strength at 28 days shall be submitted on the same day. Reports shall contain the project identification name and number, date of concrete placement, name of contractor, name of concrete supplier and truck number, name of concrete testing service, concrete type and class, location of concrete in structure, design compressive strength at 28 days, compressive break strength, and type of break.

1.4.6 Prior to placing reinforcing steel, the contractor shall submit the following for review by the engineer:

- Bar lists for fabrication of reinforcing steel.

- Field placing drawings.

- Certified mill test reports for each bar size for each heat of reinforcing steel delivered.

1.5 Delivery

1.5.1 Concrete

1.5.1.1 Deliver ready mixed concrete in truck mixer, meeting the requirements of ASTM C94.

1.5.1.2 Water reducing and air entraining admixtures are to be added at the batch plant, while accelerators and retarders may be added at the batch plant or jobsite. Refer to ACI 304, Section 4.5, for requirements for charging of ingredients into the mixer.

1.5.1.3 Add high range water reducing admixtures to the concrete at the project site, if specified.

1.5.2 Reinforcing Steel

1.5.2.1 Reinforcing steel shall be prepared for shipment in such a manner that quality and cleanliness shall be maintained during shipment. Materials shall be adequately protected against damage during shipment.

1.5.2.2 Shipments shall be by structure to the maximum extent possible.

1.5.2.3 Store reinforcement above ground and protect from dirt, oil, and grease.

2.0 PRODUCTS

2.1 General

2.1.1 Any product not listed under the following Materials section may be submitted to the engineer for review and approval. A product that is not listed is not to be used without written approval of the engineer.

2.1.2 Products shall meet applicable local VOC (Volatile Organic Compounds) regulations.

2.2 Materials

2.2.1 Concrete Materials

2.2.1.1 Cement: ASTM C150, Type I, or as shown and indicated on drawings; use only 1 brand for all cement.

2.2.1.2 Fly ash: ASTM C618, Class F.

2.2.1.3 Fine and coarse aggregates: ASTM C33 for normal weight concrete; ASTM C330 for lightweight concrete.

2.2.1.4 Water: Mixing water for concrete shall meet the requirements of ASTM C94.

2.2.2 Admixtures

2.2.2.1 Air entrainment: ASTM C260, liquid air-entraining admixture, equivalent to Micro Air by the Masterbuilders Co., or Air Mix by the Euclid Chemical Co.

2.2.2.2 Water reducing: ASTM C494, Type A, Equivalent to Pozzalith 200N by the Masterbuilders Co., or Eucon WR-75 by the Euclid Chemical Co.

2.2.2.3 Water reducing, retarding: ASTM C494, Type D, equivalent to Pozzalith 122R by the Masterbuilders Co., or Retarder 75 by the Euclid Chemical Co.

2.2.2.4 High range water reducer: ASTM C494, Type F or G, (superplasticizer) equivalent to Rheobuild 100 by the Masterbuilders Co., or Eucon 37 by the Euclid Chemical Co. Note: Superplasticizer shall not be used without the written consent of the Engineer.

2.2.2.5 Noncorrosive, nonchloride accelerator, if so specified: The admixture shall conform to ASTM C494, Type C or E, and not contain more chloride ions than are present in municipal drinking water. The admixture

manufacturer must have long term noncorrosive test data of at least a year's duration, from an independent testing laboratory, using an acceptable accelerated corrosion test method such as that using electrical potential measures, equivalent to Pozzutec 20 by Masterbuilders, or Accelguard 80 by the Euclid Chemical Co.

2.2.2.6 Admixtures containing calcium chloride, thiocyanates, or any admixture shall not contribute more than 5 ppm (0.005 percent) by weight, of chloride ions to the total concrete constituents.

2.2.2.7 Admixtures from only 1 supplier are to be used.

2.2.3 Concrete Accessories

2.2.3.1 Bonding compounds: Nonrewettable; the compound shall be a polyvinyl acetate type such as Euco Weld by the Euclid Chemical Company. .

2.2.3.2 Epoxy adhesive: The compound shall be a 2-component, 100 percent solids, 100 percent reactive compound suitable for use on dry or damp surfaces, Euco Epoxy Number 452MV or Number 620 by the Euclid Chemical Company or Sikadure Hi-Mod by the Sika Chemical Company.

2.2.3.3 Repair topping (thicknesses of 1/16" to 1/2"): Latex and microsilica modified cementitious mortar designed for use as a floor or deck topping. Thin top supreme by the Euclid Chemical Company.

Repair topping (thicknesses of 1/2" to 2"): Latex and microsilica modified cementitious mortar designed for use as a floor or deck topping. Concrete Top Supreme by the Euclid Chemical Company, or approved equal.

2.2.3.4 Vapor barrier: 6 mil thick clear polyethylene film or fabric reinforced plastic film, type recommended for below grade applications.

2.2.3.5 Synthetic fibers: Monofilament or fibrillated polypropylene fibers for secondary reinforcing of concrete members. Product shall be Fiberstrand by the Euclid Chemical Company or Fibermesh, by Fibermesh, Inc. Product shall have a UL rating.

2.2.3.6 Patching mortar shall be a free-flowing polymer-modified cementitious coating equivalent to Euco Thin Coat by the Euclid Chemical Company.

2.2.4 Curing Compounds and Accessories

2.2.4.1 Liquid membrane curing compounds conforming to ASTM C309, Type I, ID, Class A and B shall be water clear, styrene acrylate type, minimum solids content 30 percent; maximum moisture loss as determined by independent testing laboratory tests shall not exceed 0.025 grams per square centimeter when applied at a coverage rate of 300 square feet per gallon. The curing and sealing compound shall be certified to comply with this specification and Federal Specification TT-C800A, Type I. Application rate shall not exceed that as stated by the manufacturer which shall meet the above moisture retention requirements. Products shall be equal to Super Diamond Clear VOX or Super Aqua-Cure VOX by the Euclid Chemical Co., Master Kure by the Masterbuilders Co., Dress and Seal 30 or Dress and Seal 30 WB by L & M Construction Chemicals, Inc. These products also seal and dustproof.

2.2.4.2 Liquid chemical curing compounds conforming to ASTM C309, Type I, ID, Class A and B, shall be Master Kure or Master Kure W by Masterbuilders, Inc., Kurez DR by the Euclid Chemical Co., L & M Cure by L & M Construction Chemicals, Inc., and have a minimum solids content of 17 percent.

2.2.4.3 In states or areas that require VOC (Volatile Organic Compounds) compliance for curing compounds, the contractor shall select a product and submit for the engineer's approval; especially in enclosed areas of existing operating plants and in the state of California.

2.2.4.4 Polyethylene film: ASTM C171, 4 mil thick, clear, white opaque color, or black.

2.2.4.5 Absorptive mats: ASTM C171, cotton fabric or burlap-polyethylene, minimum 8 ounce per square yard, bonded to prevent separation during handling and placing.

2.2.5 Products for Joints in Concrete

2.2.5.1 Joint Primer

A 2-component penetrating liquid resinous primer, for use with urethane and epoxy sealants such as U-Seal Joint Sealant 3203 Primer by Burke.

2.2.5.2 Backup Material

ASTM D1056, round closed cell foam rod; oversized 30 to 50 percent larger than joint width.

2.2.5.3 Waterstop

Waterstops shall be dumbbell or centerbulb type and shall be made from extruded PVC (polyvinyl chloride) with a minimum width of 6 inches, unless noted otherwise.

2.2.5.4 Joint Filler

2.2.5.4.1 ASTM D994, bituminous impregnated fiberboard, 1/2 of an inch and 1 inch thick.

2.2.5.4.2 ASTM D1751; asphalt impregnated cork, with asphalt saturated glass-fiber felt liners; 1/2 of an inch thick.

2.2.5.5 Joint Sealant

2.2.5.5.1 Joint sealants shall conform to the provisions of ACI 504R.

2.2.5.5.2 Expansion and isolation joints: Self-Leveling, 2-component polyurethane sealant such as U-Seal Joint Sealant 3202 Hand-Mix, Non-Sag by Burke.

2.2.5.5.3 Control and construction joints: Corrosion resistant, 2-component resin hardener for joints cut with Soff-Cut saws such as Edge Pro 50 by Metzger McGuire Co., or Euco 700 by the Euclid Chemical Company.

2.2.6 Reinforcing Steel

2.2.6.1 Fabrication

2.2.6.1.1 Reinforcing bars: ASTM A615, deformed billet-steel bars, plain finish.

2.2.6.1.2 Reinforcing bar mat: ASTM A184, deformed billet-steel bars, plain finish.

2.2.6.1.3 Spiral reinforcing: ASTM A82, cold-drawn plain steel wire, plain finish; for spiral reinforcing in columns, cast-in-place piles, drilled piers, and caissons.

2.2.6.1.4 Welded wire fabric: ASTM A185, cold-drawn plain steel; ASTM A497, cold-worked deformed steel; in flat sheets, plain finish.

2.2.6.1.5 Coatings: ASTM A767 for galvanized coating or ASTM A775 for epoxy coating.

2.2.6.1.6 Material shall be new and in accordance with the ASTM specification or other recognized standards specified. Materials not manufactured in the United States shall be submitted for approval. The owner reserves the right to reject the use of such materials.

2.2.6.1.7 Bar bends and fabrication tolerances shall be in accordance with ACI 315.

2.2.6.1.8 Reinforcing steel shall be bent cold. Rebending of hooks shall not be permitted. Bars may be straightened provided the bend is more than or equal to 2 times the recommended minimum diameter of bends.

2.2.6.1.9 Bar supports shall be according to Chapter 5 of ACI 301.

2.2.6.1.10 Tie wire shall be black annealed wire, 16 gage minimum.

2.2.6.2 Placing Drawings and Bending Schedules

2.2.6.2.1 Placing drawings and bending schedules showing the number, grade, size, length, mark, location, and bending diagrams for reinforcing steel shall be prepared in accordance with ACI 315.

2.2.6.2.2 Lap splices shall be as indicated on the design drawings.

2.2.6.2.3 Each structure or foundation shall have a different identity number. Drawings shall indicate the related PO number and drawing number.

2.2.6.3 Identification and Tagging

2.2.6.3.1 Tag reinforcing in accordance with this specification; use embossed metal tags.

2.2.6.3.2 Tag each bundle of bars, straight or bent, showing drawing number, structure, mark number, bar quantity, and size.

2.2.6.3.3 Tag stock length straight bars showing number of bars, size, and length.

2.2.7 Products for Concrete Formwork

Design and installation of formwork, tolerances, preparation of form surfaces, removal of forms, and reshoring is to be in strict accordance with Chapter 4, ACI 301.

2.3 Design Criteria

2.3.1 Concrete Strength

2.3.1.1 Unless shown otherwise on drawings, minimum 28-day compressive strength f '(c) shall be as follows:

2.3.1.1.1 Foundations: f '(c) = 4,000 psi

2.3.1.1.2 Slab-on-grade f '(c) = 4,000 psi

2.3.1.1.3 Structures; columns, beams, slabs: f '(c) = 4,000 psi

2.3.1.1.4 Underground duct envelopes: f '(c) = 2,000 psi

2.3.1.1.5 Fireproofing: f '(c) = 3,000 psi

2.3.1.2 If high early strength concrete is specified, compressive strength shall be 7-day strength.

2.3.2 Slump

2.3.2.1 Footings, piers, and walls: 4 inches to 6 inches.

2.3.2.2 Beams and columns: 4 inch to 6 inches.

2.3.2.3 Slabs: 4 inches to 6 inches.

2.3.2.4 Fireproofing and underground duct envelope: 4 inches to 6 inches.

2.3.2.5 Pours over 2.5 feet thick: 4 inch to 6 inches.

2.3.2.6 Concrete containing high range water reducer:

2.3.2.6.1 When high range water reducer is added to maintain slump with lower water/cement ratio, slump shall be as specified in Section 2.3B.1 through 2.3B.5, of this specification, after addition of the reducer.

2.3.2.6.2 When high range water reducer is added to increase slump without changing water/cement ratio, slump before addition of reducer shall be as specified in Section 2.3B.1 through 2.3B.5, of this specification, and shall not exceed 8 inches after addition of reducer.

2.3.3 Water-Cement Ratio

Maximum 0.40 for water retaining (hydraulic) structures, 0.45 for other structures.

2.3.4 Formwork

Design and construction shall comply with Chapter 4 of ACI 301 and the building code of the local jurisdiction.

2.4 Concrete Mixes

2.4.1 Proportioning

2.4.1.1 Proportion normal weight concrete mixes in accordance with Chapter 3 of ACI 301, mass concrete mixes in accordance with Appendix 5 of ACI 211.1, and lightweight concrete mixes in accordance with ACI 211.2 on the basis of either previous field experience or trial mixes; do not proportion concrete mixes based on empirical data. Refer to Appendix A of ACI 301 for flow chart on proportioning normal weight concrete mixes. Mixing and transportation of concrete shall be in accordance with Chapter 4 of ACI 304R-89.

2.4.1.2 Include proposed chemical admixtures in mix design in same proportions and batching sequence as shall be used in production concrete.

2.4.1.3 The proposed mix designs shall be accompanied by complete standard deviation analysis of trial mix data.

2.4.1.4 Determine standard deviation and required average compressive strength in accordance with the requirements of ACI 301.

2.4.1.5 Concrete shall contain a coarse aggregate with a nominal size of 1.5 inches unless a smaller nominal size is permitted by the design documents. Refer to ACI 301, Section 3.6 for additional requirements.

2.4.1.6 Give particular attention to aggregate gradation for pumpable concrete mixes.

2.4.2 Concrete shall be air entrained according to Table 3.4.1 of ACI 301. Interior floor slabs preferably shall have no air entrainment, but no more than 3 percent.

2.4.3 Fly ash may be used as a cementitious material, with the fly ash replacing a maximum of 20 percent of the cement (by weight). The fly ash shall be used in calculating the water-cement ratio and shall come from the same source.

3.0 EXECUTION

3.1 Preparation

3.1.1 Anchor Bolts and Embedments

3.1.1.1 Steel, ironwork, pipe sleeves, inserts, wood blocking, nailer strips, isolation joint material, construction joint dowels, and other fixtures as shown, specified, or required to be built into concrete shall be placed accurately and secured against displacement during concreting. Sufficient time between erection of forms and placing concrete shall be given to the various trades to permit proper installation of their work. The installation of anchors, inserts, and sleeves for electrical, mechanical, plumbing, heating, and ventilation work shall be subject to the inspection and approval of the supervisor of the particular trade or trades involved before concrete is placed.

3.1.1.2 The installation of and tolerances for anchor bolts and embedded items shall comply with Paragraph 7.5 of the AISC Code of Standard Practice. Anchor bolts shall be located within 1/8 of an inch of design position.

3.1.1.3 Locate plate inserts within plus or minus 1/4 of an inch horizontally or vertically.

3.1.1.4 Protect bolt threads against damage and concrete; cap or plug sleeves to keep out water, concrete, and debris.

3.1.1.5 Tack welding of anchor bolts, reinforcing steel, and embedments is not permitted unless noted on drawings.

3.1.2 Placing Concrete

Preparation before placement and conveying of concrete shall be in accordance with Chapter 8, Section 8.1 and 8.2 respectively of ACI 301.

3.2 Installation

3.2.1 Concrete Production

Production of concrete shall comply with Chapter 7 of ACI 301. Water may be added to the mix at the point of delivery in accordance with Section 11.7 of ASTM C94 when permitted by the testing agent but in no case shall the total amount of water added at the jobsite batch plant exceed the quantity specified for the design mix.

3.2.2 Placing

3.2.2.1 Placement of concrete shall be in accordance with Chapter 8 of ACI 301. The temperature of plastic concrete, as placed, shall not exceed 90 degrees F. During cold weather, as placed, temperature shall not be less than 50 degrees F. Hot and cold weather concreting shall be in accordance with ACI 305 and ACI 306.

3.2.2.2 Color top surface of underground duct envelopes; sprinkle colored iron oxide powder over

3.2.2.2.1 Red for underground electrical ducts.

3.2.2.2.2 Yellow for underground instrument air line ducts.

3.2.2.3 Ensure that discharge of ready mixed concrete is completed within 2.0 hours after batching.

3.2.2.4 Maintain records of concrete placement; record date, location, quantity, air temperature, field test results, and test samples taken; maintain concrete delivery tickets with record for ready mixed concrete.

3.2.2.5 Redosage: Redosage with the specified high range water reducing admixture (superplasticizer) may be done

3.2.2.6 Concrete conveying by pumping shall meet the requirements of ACI 304R, Chapter 9. Concrete conveying by belt conveyor shall meet requirements of ACI 304R, Chapter 10.

3.2.2.7 After concrete placement and form removal, clean exposed reinforcing steel and embedded items of concrete splatter, dirt, and other foreign matter.

3.2.2.8 Concrete that has achieved initial set or has been contaminated by foreign matter shall not be deposited in the structure. Retempered concrete shall not be used.

3.2.3 Slabs on Grade

3.2.3.1 Construct slabs in accordance with Chapter 11 of ACI 301.

3.2.3.2 Place concrete in alternating strips.

3.2.3.3 When separate floor toppings are called for, place the floor toppings to required lines and grade after the concrete has cured. Screed toppings level or sloped on the drawings.

3.2.3.4 Floor slab tolerance shall conform to Chapter 7, Section 7.15 of ACI 302.1R (unless otherwise noted on the design drawings).

3.2.3.4.1 When ACI 302.1R is used, the Composite F-numbers for flatness and levelness shall be no less than the following for troweled surfaces:

- F(f) - 20
- F(l) - 15 and for elevated slabs

3.2.3.4.2 Local F-numbers shall be no less than the following:

- F(f) - 15
- F(l) - 10

3.2.3.5 If a vapor barrier is called for on the drawings, and if sharp backfill may puncture the barrier, place a sand layer 3 inches thick as a cushion. Lap vapor barrier 6 inches at joints and seal with duct tape. Carefully fit vapor barrier around service openings.

3.2.4 Slab Finishes

3.2.4.1 Concrete slab surfaces shall be finished in accordance with ACI 302.1R.

3.2.4.2 Finish interior concrete floor slabs in accordance with ACI 302.1R for Class 5 (industrial) floors unless otherwise shown on the drawings.

3.2.4.3 Provide a "floated finish" at equipment bases and exterior slabs according to ACI 301, Section 11.7.2. Provide a "broom finish" to equipment bases, exterior slabs, stairs, steps, ramps, and walks.

3.2.4.4 If no finish is specified, refer to ACI 301, Section 11.8.

3.2.5 Finishing Formed Surfaces

Formed concrete surfaces shall be finished in accordance with Chapter 10 of ACI 301, unless otherwise noted on the design drawings.

3.2.6 Formwork

3.2.6.1 The design, installation, and removal of formwork shall be in accordance with ACI 347 except as modified herein. Wall and soil supported member forms may be removed after 48 hours provided the concrete is sufficiently hard not to be damaged by form removal, and provided curing operations start immediately. Self-supporting member forms may be removed after 7 days provided the concrete strength is 80 percent of the 28-day strength. No superimposed load shall be applied before the 28-day strength has been verified by field cured cylinders. Formwork tolerances shall meet ACI 301 Table 4.3.1.

3.2.6.2 Unless otherwise shown on the concrete drawings, exposed edges shall have a 1-inch chamfer. Unexposed corners may be either square or chamfered.

3.2.6.3 Obtain approval before framing openings in structural members if openings are not indicated on the drawings.

3.2.6.4 Do not apply form release agent wherever concrete surfaces shall receive special finishes or wherever applied coverings are affected by agent; soak inside surfaces of untreated forms with clean water; keep surfaces coated before placing concrete.

3.2.6.5 Coordinate work of other specifications in forming and placing openings, slots, reglets, recesses, chases, sleeves, bolts, anchors, and other inserts.

3.2.7 Reinforcement

3.2.7.1 The grade, type, and details of reinforcing steel shall be in accordance with the design drawings. Placement of reinforcement shall be in accordance with Section 5.7 of ACI 301.

3.2.7.2 Place, support, and fasten reinforcing before placing concrete; do not insert dowels into fresh concrete; do not float welded wire fabric down into fresh concrete. Support slab reinforcement at the required depth and secure prior to placing concrete; do not pull welded wire fabric up into fresh concrete as it is placed.

3.2.7.3 Secure at least 25 percent of bar intersections (including wall dowels) with wire in 2-way mats.

3.2.7.4 Splice reinforcing bars only as shown on the design drawings. Necessary splices not shown on the drawings shall be lapped sufficiently, to develop the strength of the bars by bond for bars through size Number 11. Mechanical splices shall be made only as shown and noted on the drawings. Welded splices are not allowed.

3.2.7.5 Minimum concrete cover shall be according to ACI 301, Section 5.7. Areas subject to chemical exposure, as noted on the design drawings, shall have a minimum cover of 2 inches, unless otherwise noted.

3.2.8 Joints and Embedded Items

3.2.8.1 Joints and embedments shall be in accordance with Chapter 6 of ACI 301.

3.2.8.2 Construction joints shall be located as shown on the concrete drawings. Should the concrete operation require the placement of an intermediate construction joint, the concrete shall be struck off square with the structure, water stops added if the normal joint has a waterstop, the location completely recorded and reported to the engineer in writing.

3.2.8.3 Construction, isolation, and control joints in slabs on grade are to be built in accordance with and located according to the design drawings. Control joints in slab toppings are to be located directly above and in line with the control joints in the underlying concrete slab. Saw cut joints are to begin as soon as the concrete is hard enough to prevent raveling of the surface and dislodging of the aggregate, but no later than 12 hours after concrete placement. Prime and seal joints according to Sealant Manufacturer's instructions. Control joints are to be cut using a Soff-Cut Saw and in strict accordance with the saw manufacturer's written recommendations. Determine the sawing sequence based upon slab pour time and size.

3.2.8.4 The surface of construction joints shall be thoroughly cleaned and defective or contaminated concrete, surface film, and laitance removed. Prewet the remaining concrete followed by a brush application of a neat cement paste. Coating of vertical construction joints is not required.

3.2.8.5 Locate construction joints in girders, beams, and framed slabs according to the design drawings.

3.2.8.6 Locate construction joints in walls no more than 100 linear feet apart. Install weakened plane control joints at 25-foot maximum spacing between construction joints.

3.2.8.7 Provide and install waterstops in joints as detailed on drawings. Join waterstop sections according to the manufacturer's recommendations. Anchor securely to prevent movement during concrete placement. Provide at all joints subject to either groundwater or process fluids.

3.2.8.8 Continue reinforcing through construction joints.

3.2.8.9 Isolation joints in walls are to be provided as detailed on the drawings. Interrupt reinforcing at isolation joints; provide and install dowels as detailed on the drawings. Install isolation joints as located on the drawings and where paving adjoins vertical surfaces such as walls, columns, catch basins, manholes, and equipment foundations. Gap width shall be 3/4 of an inch unless otherwise detailed.

3.2.8.10 Control or construction joints not specified on the design drawings shall be located at the column centerlines and at intermediate intervals so that each panel does not exceed 600 square feet in area. Concrete shall be placed in alternate paving lanes utilizing construction and control joints as specified.

3.2.9 Repair of Surface Defects

3.2.9.1 Tie holes, honeycombs, and other concrete surface defects shall be repaired in accordance with Chapter 9 of ACI 301 and alternate methods in 9.2.2 ACI 301, as soon as practicable after form removal at such times and in such manner as shall not delay, interfere with, or impair the proper curing of the fresh concrete.

3.2.9.2 Prepackaged grouts and patching compounds may be used As an alternate, a patching mortar similar to the concrete mix minus the coarse aggregate can be used. Do not use more than 1 part cement to 2-1/2 parts sand by damp, loose volume. Match the color of the surrounding area.

3.2.9.3 Remediation of Out-Of-Tolerance Slabs

3.2.9.3.1 Grind down high points.

3.2.9.3.2 Raise low points by using the specified underlayment compound or repair topping if the areas are exposed.

3.2.9.3.3 Critical slab areas that must be replaced if out-of-tolerance are identified on drawings.

3.2.9.3.3.1 Demolish and replace out-of-tolerance areas that are identified on drawings.

3.2.9.3.3.2 Submit demolition and replacement plan to the engineer for review and concurrence before demolition.

3.2.9.3.3.3 Replacement slab shall meet tolerance requirements as shown on drawings for critical slab areas.

3.2.10 Curing and Protection

3.2.10.1 Freshly deposited concrete shall be protected from premature drying and excessively hot or cold temperatures and shall be maintained with minimal moisture loss at a relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete. Curing shall conform to the requirements in Chapter 12, ACI 301.

3.2.10.2 Follow the manufacturer's recommendations for curing and sealing when hardeners, metallic, or mineral aggregate toppings are specified on the design drawings.

3.2.10.3 Concrete Surfaces in Contact with Forms

The time during which concrete surfaces are in contact with wood or metal forms may be considered as curing time. Wood forms shall be maintained in a moist condition until removal. After form removal, the concrete shall be cured until the end of the curing period by one of the methods of concrete surfaces not in contact with forms. Moist wood forms in contact with concrete shall not be considered as curing for hydraulic structures. Curing time shall commence as soon as the wall forms have been loosened and sprinkling has begun. Wall forms shall be loosened between 24 and 48 hours after concrete placement and sprinkling begins. Wood forms shall be kept moist until the forms are loosened and the curing procedure begins.

3.2.10.4 Sealing and Dustproofing

3.2.10.4.1 Exposed concrete floor surfaces shall be sealed and dustproofed. Where the concrete is cured by using a liquid membrane curing compound, this sealing and dustproofing can be a part of the curing process by applying a second coat of the curving compound, provided a suitable compound is used. Where some other curing method is used, the concrete surface shall be coated with a liquid sealing and dustproofing compound. Apply compounds in accordance with the manufacturer's instructions.

3.2.10.4.2 Liquid membrane curing compounds that also seal and dustproof may be used on exposed concrete floors. Do not use membrane forming compounds on surfaces to receive bonded treatments, tiles, adhered finishes, paint, epoxy toppings, tiles, and additional concrete.

3.2.10.5 Concrete Surfaces Not in Contact with Forms

Concrete surfaces not in contact with forms can utilize any of the methods indicated in ACI 301, Section 12.2.1 for preservation of moisture, except do not use ponding, sprayed water, or wet sand on exposed concrete slabs.

SECTION 05500
FABRICATED METALWORK AND CASTINGS

1. SCOPE

1.1 WORK INCLUDED: This section covers the work necessary to furnish and install, complete, all fabricated metalwork and castings.

1.2 GENERAL:

1.2.1 Like items of materials provided hereunder shall be the end products of one manufacturer in order to achieve standardization for appearance, maintenance, and replacement.

1.2.2 See Part 3, CONDITIONS OF THE CONTRACT, and Division 1, GENERAL REQUIREMENTS, which contain information and requirements that apply to the work specified herein and are mandatory for this project.

1.3 SUBMITTALS DURING CONSTRUCTION: Submittals during construction shall be made in accordance with Division 1, GENERAL REQUIREMENTS. In addition, the following specific information will be required:

1.3.1 Certificates of Compliances shall be submitted on all other materials prior to delivery.

2. MATERIALS

2.1 GENERAL:

2.1.1 The use of a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired only. Products of other manufacturers will be considered in accordance with the General Conditions.

2.1.2 Unless otherwise indicated, all materials shall conform to the latest issue of the following ASTM Specifications:

Item	ASTM Specification
Grating and Angle	Galvanized per A-307
Galvanized Bolts	A 307, A 153

2.1.3 The miscellaneous metalwork and castings indicated on the drawings, or required to secure the various parts together and provide a complete installation, shall be included under this section. The tabulation of items herein is not intended to be all-inclusive, and it shall be the Contractor's responsibility to provide all metalwork and castings shown, specified, or which can reasonably be inferred as necessary to complete the project.

2.2 BOLTS, INSERTS, AND FASTENERS:

2.2.1 Bolts, nuts, embedded items, and other hardware shall be galvanized in accordance with ASTM A 153, Latest Edition. The temperature of the galvanizing bath shall not exceed 920 degrees Fahrenheit.

3. WORKMANSHIP

3.1 GENERAL:

3.1.1 Workmanship and finish of all work specified under this section shall be the highest grade and equal to the best practice of modern work. Exposed surfaces shall have smooth finish and sharp, well-defined lines. Provide all necessary rabbets, lugs, and brackets so that the work can be assembled in a neat, substantial manner. Conceal fastenings where practical. Drill countersink holes as required for attaching materials. Fabricate materials as specified. Bolting connection as required.

3.1.2 Smooth all exposed edges of welds smooth. All sharp edges shall be rounded to a 1/8 inch minimum radius; all burrs, jagged edges, and surface defects shall be ground smooth.

3.1.3 Field Changes to a galvanized surface shall be held to a minimum. In the event of field welding, the following procedure must be followed:

The zinc must be removed from the weld area prior to welding to prevent zinc penetration of the weld and subsequent cracking.

After welding, the affected area shall be water washed to remove welding slag and other foreign material.

"DRYGALV", "GALVANOX" or an approved equal shall be applied over the affected area in accordance with manufacturer's recommendations.

3.1.4 Mechanically damaged portions of galvanized surfaces shall be repaired as follows:

Solvent wash the area to remove grease and other foreign material.

"DRYGALV", "GALVANOX" or an approved equal shall be applied over the affected area in accordance with manufacturer's recommendations.

3.1.5 All decking shall be fastened by stainless screws. A minimum of 1" of screw thread shall penetrate framing. A minimum of two screws shall be set at each connection.

4. PAYMENT

4.1 No separate payment shall be made for bolts and fasteners required to erect the piers. This work shall be considered incidental to construction of the pier.

SECTION 06100
ROUGH CARPENTRY

1.0 SCOPE

1.1 Work Included: This section covers the work necessary to furnish and install, complete, the rough carpentry.

1.2 General: See CONDITIONS OF THE CONTRACT and Division 1, GENERAL REQUIREMENTS, which contains information and requirements that apply to the work specified herein and are mandatory for this project.

1.3 Submittals During Construction: Submittals during construction shall be made in accordance with Division 1, GENERAL REQUIREMENTS.

2.0 MATERIALS

2.1 Quality Assurance:

2.1.1 Lumber grading rules and wood species shall be in conformance with U. S. Product Standard PS 20 and the National Forest Products Association. The wood members shall conform to the requirements above and provide design values equal to those published in the "Design Values for Wood Construction", a supplement to the 1977 edition of National Design Specification for Wood Construction published by the National Forests Products Association.

2.1.2 Plywood grading rules shall be in accordance with latest edition of the U. S. Product Standard PS 1/ANSI A199.1 or American Plywood Association Standards.

2.1.3 Joints and connections of wood trusses shall conform to the Uniform Building Code Standards 25-17.

2.2 Grademarks:

2.2.1 Each piece of lumber shall be stamped or branded with the grade as determined by an approved grading association indicating conformance with U. S. Product Standard PS 20.

2.2.2 Each panel of plywood shall be identified with the appropriate grade trademark of the American Plywood Association.

2.2.3 Moisture content shall not exceed 19 percent, unless otherwise specified.

2.2.4 Preservative and pressure treated material shall conform to American Wood Preservers Association Standards (AWPA) and bear the American Wood Preservers Bureau (AWPB) quality mark designation. All lumber shall be treated.

2.3 Material Handling:

2.3.1 General:

2.3.1.1 Immediately upon delivery to jobsite, place materials in area protected from weather.

2.3.1.2 Store materials in a minimum of 6 inches (150 mm) aboveground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation or ventilation.

2.3.1.3 Protect materials against breaking of corners and damaging of surfaces while unloading and while stored or during handling.

2.4 Lumber:

2.4.1 Dimensions given are full cut.

2.4.1.1 Unless otherwise noted, lumber shall be as follows:

Use	Minimum Grade
Structural light framing 2 inches to 4 inches thick 2 inches to 4 inches wide	Select structural southern pine or better
Structural beams, stringers, 2 inches to 4 inches thick 5 inches and wider and headers	Select structural southern pine or better

2.4.2 Dimensions given are nominal.

2.4.2.1	Structural posts 5 inches thick and larger 5 inches wide and larger	Select structural southern pine or better
	Tongue & grove roof decking 2 inches to 4 inches thick 6 inches to 8 inches wide	Select Pine Grade #1 or better
	General framing, studs, plates blocking, furring, braces and nailers	Grade #1 southern pine or better

2.5 Rough Carpentry Hardware: Conforming to Southern Standard Code.

2.5.1 Nails: Steel common nails for framing, sizes as indicated on drawings. Use hot-dipped zinc-coated nails. Use deformed shank nails for fastening underlayment.

2.5.2 Bolts and Screws: Conforming to ASTM A307, sizes as indicated on drawings, galvanized where exposed.

2.5.3 Framing Anchors, Joist and Beam Hangers: Simpson, Teco, or Bowman stainless minimum 18-gauge steel, complete with nails. Use items noted on drawings.

2.5.4 Bar or Strap Anchors: stainless steel, 18-gauge minimum.

3.0 WORKMANSHIP

3.1 General:

3.1.1 Use only skilled workers and the highest standards of the craft. Plan work in advance and perform in proper sequence to facilitate prompt and continuous progress of the work.

3.1.2 Layout, cut, fit and install all rough carpentry items. Anchor sufficiently to ensure rigidity and permanence and as noted on drawings.

3.1.3 Install items accurate to dimension, true to line, level and square unless indicated otherwise on drawings. Provide for installation and support of other work.

3.2 Conditions of Surfaces: Verify that surfaces to receive rough carpentry materials are prepared to exact grades and dimensions.

3.3 Installation:

3.3.1 Install in continuous, staggered horizontal row where shown on drawings or required by code.

3.3.2 Locate blocking to facilitate installation of finishing materials, fixtures, specialty items, hardware and trim.

4.0 PAYMENT

4.1 Payment for work in this section shall be included in the unit price/lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials, and incidentals complete.

SECTION 06135
TREATED TIMBER AND LUMBER

1.0 SCOPE

1.1 Work Included: This section covers the work necessary for installing treated timber and lumber in accordance with the drawings and these specifications.

1.2 General:

1.2.1 This work shall consist of furnishing and installing treated timber and lumber in the sizes shown on the drawings.

1.2.2 See Part 3, CONDITIONS OF THE CONTRACT and Division 1, GENERAL REQUIREMENTS, which contain information and requirements that apply to the work specified herein and are mandatory for this project.

1.3 Submittals During Construction: Submittals during construction shall be made in accordance with Division 1, GENERAL REQUIREMENTS. In addition, the following specific information shall be provided:

1.3.1 Manufacturer's copy of Material Safety Data Sheets, CCA, Type C, and ACQ, Pressure treated wood.

1.3.2 Preservative Treatment Certification: Treating plant's certification of compliance with specified standards, process employed, and preservative retention values for each type material/treatment provided.

1.3.3 For waterborne-treated products include statement that moisture content of treated materials was reduced to levels indicated before shipment to project site.

1.3.4 Hammer: Include type, make, weight of hammer, maximum rated energy, and rated energy per blow of hammer.

1.4 Quality Assurance

1.4.1 Source Quality: All treated timber products shall be new and obtained from a single approved source.

1.4.2 Preservative Treatment: Mark each piece of timber to show compliance with specified standards.

1.5 Delivery, Storage, and Handling

1.5.1 Handling, storage, and field fabrication, including treating of cut ends and damage to coating, shall be in accordance with AWPA M4.

1.5.2 All damages to materials due to delivery and handling shall be reported to the engineer the same working day as material arrives onsite. Any damages shall be addressed prior to installing materials.

1.6 References:

1.6.1 ASTM: American Standards for Testing and Materials

ASTM A123/A123M – Standard Specification for Zinc Coating (Hot-Dipped Galvanized) on Iron and Steel Hardware.
ASTM A307 – Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A563 – Standard Specification for Carbon and Alloy Steel Nuts
ASTM A603 – Standard Specification for Zinc-Coated Steel Structural Wire Rope
ASTM A653 / A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
ASTM D25 – Specification for Round Timber Piles
ASTM D1143 – Method of Testing Piles Under Static Axial Compressive Load
ASTM D3689 – Method of Testing Individual Piles Under Static Axial Tension Load

1.6.2 AWPA: American Wood Preservative Association

AWPA C1 – All Timber Products - Preservative Treatment by Pressure Processes.
AWPA C3 – Piles - Preservative Treatment by Pressure Processes.
AWPA C18 – Standard for Pressure treated Material in Marine Construction.
AWPA E12 – Standard method of determining the corrosion of metal in contact with wood.
AWPA M4 – Standard for the Care of Preservative Treated Wood Products.
AWPA P5 – Standard for Waterborne Preservatives.
AWPA P23 – Standard for Chromated Copper Arsenate Type C (CCA-C).
AWPA T1 – Use Category System: Processing and Treatment Standard.
AWPA U1 – Use Category System: User Specification for Treated Wood.

2.0 MATERIALS

2.1 All Materials shall meet the following criteria:

2.1.1 Service Condition/Use Category System: Marine (Brackish/Saltwater)/UC5C – southern waters.

2.1.2 End-Use Application: Marine piling, bulkhead, seawall, cross-bracing, fender, waler, boats/harbors and aquaculture/mariculture.

2.1.3 Timber and Lumber: All timber and lumber shall be of Southern Pine, medium grained or better, cut from straight, sound, live trees; shall be well manufactured and shall conform in all respects to applicable requirements of the standard specifications for structural timber, lumber and piling of AASHTO designation M-168. The following requirements apply to all treated timber and lumber:

Caps, Stringers, Joists, Cross Bracing	Select Structural	S2S, Full cut
Deck Planks, Handrails, Top Cap, studs, plates	Grade No. 1+ btr	S4S Nominal width/thickness
Roof Decking	Grade No. 1	S4S Nominal width/thickness, T & G
Posts/columns	Select structural	S4S Nominal width/thickness

2.1.4 Preservative treatment shall be given prior to delivery, in accordance with the requirements of AWPA C1 and AWPA C3 latest revision.

2.1.5 Preservative treatment shall be in accordance with the U.S. EPA Supplemental label requirements for forest products and in accordance with AWPA U1, AWPA P5, and AWPA P23. Retention level of all timber materials to be appropriate for marine exposure zones and no less than the rates shown below.

Caps, Stringers, Joists, Cross Bracing, Beams, etc.	2.5# pcf CCA-C
Deck Planks, Handrails, Top Cap, Glulam Beams/ Rafters, T & G Roof Decking, Posts/Columns, Studs, Plates, Plywood	0.23# pcf MCA

2.1.6 Treatment of each product shall be identified by a quality mark, label, or certification from treatment plant.

2.1.7 Treated wood shall be carefully handled with no sudden dropping, breaking of outer fibers, bruising, or penetrating the surface with tools, peaveys, cant hooks, pikes, hooks, or other pointed tools shall not be used in handling treated wood. All cuts or damaged surfaces of wood shall be given two coasts of a brush treatment recommended by the manufacturer. (Cop-R-Tox, formula 202, manufactured by Mobile Paint Mfg. Co., Inc., or equal)

~~2.2 Timber Piles:~~

~~2.2.1 Piles shall be round and conform to ASTM D-25, Class B, Friction Piles.~~

~~2.2.2 Pile Size: Butt of pile shall not be less than 12 inches in diameter, unless otherwise indicated on the drawings.~~

~~2.2.3 Pile Length: Piles shall be a minimum length of 40 feet.~~

~~2.2.4 Pile Head Coverings: Pile heads are to be treated as specified under Treatment.~~

2.3 Timber Members

2.3.1 All material shall be straight, non-twisted, unused, with minimal cracks or checking. Engineer has the right to reject poor quality material with excessive cracks or checking; splintering; delaminating; apparent inconsistent treatment; weathered, aged, excessive bark exposure, excessive knots or does not appear new; and/or appears to be structurally deficient.

2.4 Hardware:

2.4.1 All new bolts, nuts, washers, and other fasteners shall be hot-dipped galvanized meeting requirements of ASTM A307.

2.4.2 All bolts shall be ¾" diameter, unless otherwise noted. Length of bolts to be determined by contractor based on typical details provided for each connection, location of materials to be replaced, re-aligned, and by verifying field conditions.

2.4.3 All nuts shall be heavy hex nuts per ASTM A563 Grade DH sized to match bolt diameter.

2.4.4 All washers to be heavy Ogee, Class 30, gray iron castings per ASTM A48 sized per bolt diameter.

2.4.5 Galvanizing shall meet requirements of ASTM A123.

2.4.6 Retap threads of nuts after galvanizing according to ASTM A123.

2.4.7 All deck screws shall be #10 stainless steel with lengths 3" longer than the wood deck member or 4½" min., whichever is greater.

3.0 WORKMANSHIP

3.1 General

3.1.1 Wood shall be accurately cut and tightly jointed. Washers shall be used under nuts and bolt heads. Installation shall be as shown on the drawings.

3.1.2 Materials shall be carefully handled with no sudden dropping, breaking of outer fibers, bruising, or penetrating the surface with tools. Peavey, cant hooks, pikes, hooks, or other pointed tools shall not be used in handling treated piles.

3.1.3 All bored holes, pile cut-off, damaged surfaces, field cuts, or modified areas of treated materials, including the tops of piles after heading, shall be given a brush treatment with material supplied by the wood preserver and in full accordance with written instructions conforming to AWPA M4.

3.1.4 Protect existing materials, structures, and utilities supported from damaged resulting from installation of new materials and re-alignment of existing materials.

3.1.5 Cut ends and drilled holes in pressure treated wood shall be treated with preservative before the lumber is installed. Field treatment of copper naphthenate solution with minimum of 2% copper metal. AWPA standard M4-91. (Cop-R-Tox, formula 202, manufactured by Mobile Paint Mfg., Co., Inc., or equal)

3.2 Timber Piles

3.2.1 Pile Driving:

A. Provide equipment of adequate size and capacity to handle, place, and hold to the designed alignment the piles that are to be installed by their operation. This equipment must be able to maintain the alignment of the pile butt, tip, and hammer in the leads without damage to either.

B. Maintain pile driving equipment in safe operating condition at all times.

C. Operate pile hammers at the manufacturer's rated number of blows per minute except when necessary to reduce the speed to avoid damage to the piles, e.g., at the beginning of driving long piles with great unsupported length, or end of driving piles near tip elevation.

D. Equipment or methods which result in regular or repeated damage to piles shall be rejected by the Engineer.

E. Use of jets is prohibited.

F. Provide an adequate pressure gauge at the inboard end of the hose for the purpose of checking the pressure for air or steam hammer.

G. Driving Criteria: Drive piles until the butt end of the pile is level with the existing concrete dock top surface. Piles shall be driven the full length indicated, unless the pile is driven to refusal which shall be defined as a 10 blows per inch. Piles driven to refusal shall be cut off level and the surplus material shall be removed from the site of the work.

H. Driving resistance is not a criterion.

I. No extension of piles will be permitted.

3.2.2 Pile Removal:

A. Remove damaged and broken piling which are to be replaced.

B. Remove the broken pile and its stub.

C. Upon removal, broken piling and pile stubs become the property of the Contractor.

D. Pile stubs shall not be pulled with a clam bucket.

E. Pile stubs shall not be pulled laterally to break off at the mud line. Pile stubs shall be pulled in-line with their vertical axis.

3.2.3 Pile Replacement:

A. Penetration shall be at a reasonably quick and uniform rate to an average minimum depth of 15 feet below mud line or to the butt elevation as specified. Use whichever method produces the greatest penetration.

B. Frame to provide tight contact and be flush to surface of chocks.

C. Bolt pile in proper alignment. Bore holes for bolts with a bit no larger than 1/16 inch in diameter than bolt. Minimum bolt diameter and spacing, unless specified otherwise, shall be same as in existing construction.

D. Counterbore for countersinking bolt heads and washers on outboard face of all piles.

E. Treat pile heads within the same working day of cut-off.

~~3.2.4 Pile Loads: All piles shall be 10 tons minimum.~~

~~3.2.5 Installation Tolerance: Piles shall be carefully located to the lines and spacing shown on the plans, and shall be driven either to the plumb position or batter indicated. The maximum permissible deviation for piles out of plumb or off batter shall be ¼ inch per foot of pile length, but not more than 6 inches overall. The maximum permission deviation from indicated locations shall be ± 3 inches. Any pile with the final position and alignment deviating more than the limits specified will be rejected, removed, and replaced at no cost to the Owner.~~

~~3.2.6 Collars: When the piles are being driven, collars or bands of a design approved by the Engineer, shall be used where required for the protection of butts against splitting, brooming, and other damage.~~

~~3.2.7 Record of Driving: A complete record of each pile driven shall be made for submission to the Engineer. This report shall contain a description of the driving equipment, all dimensions, elevation of point and elevation of butt before and after cutting off. The report shall also include an accurate record of the number of blows for each foot of penetration and breaks in driving continuity.~~

~~3.2.8 Damaged and Misplaced Piles: Any pile which is cracked or broken because of improper handling or driving, or which is otherwise injured so as to impair it for its intended use, or any pile driven out of proper location, shall be removed and replaced. All work for removal and cost of replacement shall be borne by the Contractor at no additional expense to the Owner. Any pile furnished by the Contractor which is cracked or broken because of internal defects shall be removed and replaced at no additional expense to the Owner.~~

~~3.2.9 Cut Offs: When for any reason, approved by the Engineer, a pile head has not been driven to the cut off elevation, the pile shall be cutoff perpendicular to the axis of the pile at the cutoff elevation. Cutting methods shall be used which will not damage the portion of the pile to be left in place nor the pile reinforcement. The cut-off elevation shall be the elevation of the existing concrete dock.~~

3.3 Timber Horizontal Members:

3.3.1 Framing: Cut and frame lumber and timber so that joints will fit over contact surface. Secure timbers and piles in alignment. Open joints are unacceptable. Shimming is not permitted.

3.3.2 Use only full length timbers. Splicing of new products will not be permitted.

3.3.3 Bore holes for bolts with a bit no larger than 1/16 inch in diameter than bolt. Bore holes for lag screws in two parts. Make lead hole for shank the same diameter as shank. Make lead hole for the threaded portion approximately two-thirds of the shank diameter.

3.3.4 Counterbore for countersinking bolt heads and washers on outboard face of all outboard timbers or wherever smooth faces are indicated or specified.

3.3.5 All new inboard stringers shall have a minimum of two stainless steel straps as specified on drawings.

3.3.6 Stringers: Place crowns up and, if possible, the better edge of deck stringers down. Tops of stringers shall not vary from a plane more than will permit bearing of the floor on stringers. Butt-Joint and splice outside stringers, but lap interior stringers to take bearing over full width of cap of floor beam at each end, Break joints if stringers cover two spans. Toenail or drift bolt stringers as indicated. Stringers may be of sufficient length to cover two spans, except on sharp horizontal curves. Between stringers, frame and toenail cross-bridging or solid-bridging at each end with at least two nails for cross-bridging and four nails for solid-bridging. Make size and spacing of bridging as indicated.

3.3.7 Decking: Make decking of a single thickness of plank supported by stringers or joists. Unless otherwise indicated, lay plank with heart side down and with tight joints. Screw each plank to each joist with at least two screws. Provide stainless steel screws at least 3 inches greater than the thickness of plank. Place at least 2 inches from edges of the plank. . Cut ends of plank parallel to center line of pier. Grade planks as to thickness and lay so that adjacent planks vary less than 1/16 inch. If planks exceed tolerance, replace or modify plank in a manner acceptable to Engineer.

3.3.8 Wheel Guard: Lay wheel guards in sections at least 12 feet long; bolt through floor plank and through outside stringer with ¾ inch bolts space 4 feet or less apart. Bevel top of wheel guards on pier side. Provide wheel guard material surfaced on four sides (S4S) on the top edge and pier side.

3.4 Hardware

3.4.1 Vertical bolts shall have nuts on the lower end. Horizontal bolts shall have nuts place inboard.

3.4.2 Where bolts are used to fasten timber to timber, provide a washer under both the bolt head and nut.

3.4.3 Where bolts are to be drilled and epoxied into concrete dock, provide washer under the bolt head. All bolts shall be drilled and anchored into existing concrete with epoxy grout adhesive provided in strict accordance with the manufacturer's instructions.

3.4.4 Where bolts are used to fasten timber to timber, timber to concrete, or timber to steel, bolt members together when they are installed and retighten immediately prior to final acceptance of contract.

3.4.5 Provide bolts with sufficient additional threading to provide at least 3/8 inch per foot thickness of timber for future retightening. Provide timber connectors of types indicated. Re-install shear-plate connectors in pre-cut grooves of the dimensions shown.

3.4.7 All bolts at existing rubber bumpers, whether bumper is replaced or not in this contract, shall be tightened prior to completion of project.

3.4.8 Simpson Ties/Straps (per drawings): All Simpson components shall be fastened in strict accordance with the manufacture's recommendations.

3.5 Treatment

3.5.1 Timberwork: Field treat cuts, bevels, notches, refacing and abrasions made in the field in treated piles or timbers in accordance with AWPA M4. Wood preservatives are restricted use pesticides and shall be applied according to applicable standards. Trim cuts and abrasions before field treatment. Paint depressions or openings around bolt holes, joints, or gaps including recesses formed by counterboring, with preservative treatment used for piles or timber; and after bolt or screw is in place, fill with hot pitch or a bitumastic compound.

3.5.2 Piling Protection: In accordance with AWPA M4, immediately after pile tops are cut off and prior to placement of pile cap, protect pile top with several heavy applications of the same preservative used to treat the pile or else copper naphthenate solutions containing a minimum of 2 percent copper metal may be used with treated products. Seal ends with a heavy application of coal-tar pitch applied smooth.

3.5.3 Galvanized Surfaces: Repair and recoat zinc coating which has been field or shop cut, abraded, or otherwise damaged to such an extent as to expose the base metal. Thoroughly clean the damaged area by wire brushing, and remove traces of welding flux and loose or cracked zinc coating prior to painting. Paint cleaned area with two coats of zinc oxide-zinc dust paint conforming to MIL-P-21035.

3.6 Installation Tolerance:

3.6.1 The top of all timber material located at the same elevation of the concrete wharf shall not deviate more than ½" from the existing wharf elevation. Any deviation greater than specified shall result in adjusting, modifying, and/or replacing the member. Consult with engineer prior to taking action.

3.6.2 The top of all other walers shall be provided shall be provided aligned with the adjacent members.

3.6.3 The outboard face of all horizontal members shall be installed flush with one another. If for any reason the outboard face of the new member is offset from the existing member more than ½", then the material shall be modified by cutting and/or sanding the surface at an angle not to exceed ½" per 12".

3.6.4 Where the outboard horizontal members are to be inset between piles, the outboard face of the timbers shall not exceed the leading outboard face of the adjacent pile(s). The ends of each member shall be cut 1" (± ½") from the leading edge of the adjacent piles.

4.0 MEASUREMENT AND PAYMENT

4.1 Payment for work in this section shall be included in the unit price/lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials, and incidentals complete.

SECTION 06180
GLUED LAMINATED CONSTRUCTION

1.0 GENERAL

1.1 RELATED WORK SPECIFICATIONS

1.1.1 Rough Carpentry: Section 06100.

1.2 Treated Timber and Lumber: Section 06135.

1.2.1 Submittals During Construction: Section 02004.

1.3 REFERENCES

1.3.1 ANSI/AITC A 190.1: American National Standard for Wood Products - Structural Glued Laminated Timber by American National Standards Institute, Inc.

1.3.2 ASTM D 2559: Standard Specification for Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions.

1.3.3 User Specification for Treated Wood, American Wood Protection Association Standard (AWPA) U1-02.

1.3.4 AWS D1.1: Structural Welding Code-Steel by the American Welding Society.

1.3.5 AITC 105: Recommended Practice for the Erection of Structural Timber Framing by the American Institute of Timber Construction.

1.4 SUBMITTALS

1.4.1 Shop Drawings: Machine-duplicated copies of Contract Drawings will not be accepted as shop drawings. Shop drawings shall be standard 22 by 36 inch size sheets, except that erection drawings may be larger. The margin line shall be drawn a minimum of 1/2 inch from edge of sheet. The title block shall be placed in the lower right hand corner of the drawing, and shall contain the manufacturer's name and address. Shop drawings shall be prepared by the manufacturer. Failure to submit legible drawings of required size will be cause for their disapproval without review.

1. Early Submission: Include the following:
   a. Drawings of proposed job standards for shop and field connections.
   b. Erection drawings indicating sizes and locations of all members.
   c. Anchor bolt and bearing plate plans.
2. Submit detail drawings, other than for anchor bolts and bearing plates, after approval of the job standards and the erection drawings.
3. Indicate shop and field welds by Standard AWS Welding Symbols in accordance with AWS A2.4.
4. When shop drawings are marked "Approved as Noted", promptly resubmit copies of corrected shop drawings for formal approval and record.

1.4.2 Product Data: Manufacturer's catalog sheets, specifications, storage instructions, and installation instructions for glued laminated members, metal connectors, and bolts.

1.4.3 Samples:

1. Typical Laminated Member: Full depth x 12 inch long pieces, dressed.
2. Factory Finish: On specified wood, 4 x 8 inch sample of stained finish specified.

1.4.4 Quality Control Submittals:

1. Certificates: Affidavits required under Quality Assurance Article.
2. Manufacturer's Qualifications Data:
   a. Name and address of proposed manufacturer.
   b. Evidence that the proposed manufacturer meets the requirements of the Quality Assurance Article.
3. Erector's Qualifications Data:
   a. Name of proposed Supervisor who will be supervising the erection.
   b. Employer's name, business address, and telephone number.
   c. Names and addresses of the required number of similar projects that the Supervisor has worked on which meet the experience criteria.

1.5 QUALITY ASSURANCE

1.5.1 Manufacturer's Qualifications: The manufacturer shall be an AITC licensed firm, qualified to issue the AITC "Quality Inspected" mark.

1.5.2 Erector's Qualifications: The Supervisor for the erection of the structural glued laminated members shall be personally experienced in erecting structural glued laminated members and shall have worked on 5 similar projects during the past 3 years.

1.5.3 Certifications:

1. Furnish manufacturer's certification that the glued laminated members conform to the requirements of ANSI/AITC A 190.1.
2. Furnish treating plant's certification that exterior members have been pressure preservative treated in accordance with specified standards.

1.5.4 Quality Marks: Mark each member with a "Quality Inspected" mark indicating conformance with ANSI/AITC A 190.1. Place mark on member surface which will not be exposed in the completed Work.

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1 Maintain factory applied protective covering in the weather-tight condition or provide other weather-tight protection until the building is enclosed to the extent necessary to protect interior glued laminated members.

1.6.2 Do not use clear polyethylene film weather covering directly over exposed wood surfaces.

1.6.3 Do not store glued laminated members where the manufacturer's recommended humidity levels will be exceeded.

2.0 PRODUCTS

2.1 MATERIALS

2.1.1 Lumber: Comply with ANSI/AITC A 190.1.

1. Species: Southern Pine
2. Laminating Combinations: Comply with ANSI/AITC A 190.1 and the following allowable design values:
   a. Allowable bending stress (Fb): 2400 psi
   b. Allowable axial tensile stress (Ft): 1450 psi
   c. Compression parallel to grain (Fc): 1850 psi
   d. Compression perpendicular to grain top ($Fc^{\perp}$): 740 psi
   e. Compression perpendicular to grain bottom ($Fc^{\perp}$): 740 psi
   f. Allowable stress shear (Fv): 300 psi
   g. Modulus of elasticity (E): 1.8×10^6 psi
3. Condition of Use:
   a. Dry condition of service (when the moisture content of the member will be at or below 16 percent in service).
4. Appearance:
   a. ~~Industrial Grade.~~
   b. Architectural Grade.
   c. ~~Premium Grade.~~
5. Adhesive: ASTM D 2559, wet-use adhesive.

2.1.2 Metal Connectors: ASTM A 36 structural steel.

1. Connectors exposed to treated wood shall be Hot-Dip galvanized conforming to ASTM Standard A653; Class G-185 and epoxy coated.

2.1.3 Common Bolts: ASTM A 307 Timbe Bolts with Ogee Washers.

1. Bolts exposed to treated wood shall be Hot-Dip galvanized conforming to ASTM Standard A653; Class G-185.

2.2 PRESSURE PRESERVATIVE TREATMENT

2.2.1 Comply with AWPA U1 Standards. Treat lumber prior to gluing.

1. Pressure Preservative treat exterior members.

2.3 FABRICATION

2.3.1 Glued Laminated Members: Fabricate in accordance with ANSI/AITC 190.1 to the sizes and shapes indicated on the Drawings.

1. Finish: Factory finish all surfaces of glued laminated members with manufacturer's standard penetrating acrylic stain and sealers.
   a. Color: As selected by the Director from the manufacturer's standard colors.

2.3.2 Metal Connectors: Form and weld into shapes indicated. Welding shall comply with the AWS Code.

1. Finish: Thoroughly clean all surfaces of metal. Remove oil, grease, and similar contaminants in accordance with SSPC SP-1 "Solvent Cleaning". Remove loose mill scale, loose rust, weld slag and spatter, and other detrimental material in accordance with SSPC SP-2 "Hand Tool Cleaning", SSPC SP-3 "Power Tool Cleaning", or SSPC SP-7 "Brush-Off Blast Cleaning". Paint prepared units with rust inhibitive primer. Provide 5.0 mil wet film thickness.

2.4 FACTORY APPLIED PROTECTION

2.4.1 Protect glued laminated members before shipping by wrapping each member with factory applied, durable, water resistant, plastic coated paper covering, with water resistant seams.

1. Bundle-wrap small members of uniform size, with protective slip sheets between members.

3.0 EXECUTION

3.1 ERECTION

3.1.1 Comply with AITC 105 except as shown or specified otherwise. Install glued laminated units in designated positions indicated on the Drawings.

3.1.2 Do not cut glued laminated members during erection except for fastener drilling or other approved minor cutting. Field coat cut surfaces with stain and sealer materials used at manufacturing plant.

1. Preservative Treated Members: Apply heavy brush coat of same treatment material to cut surfaces; Comply with AWPA C 28.

3.1.3 Temporarily support members with protective slings and blocking to prevent damage to surfaces visible after erection.

3.1.4 Do not remove protective wrappings or coverings from members until glued laminated units are protected from the weather and from damage or defacement from activities of other trades. Retain wrappings as shields from defacement by painting, and similar operations.

4.0 PAYMENT

4.1 Payment for work performed in this section will be included in the lump sum or unit price bid to which it is subsidiary.

SECTION 07413
5V CRIMP – METAL ROOF PANELS

1.0 GENERAL

1.1 SECTION INCLUDES

A. Preformed roofing and accessories.

1.2 RELATED SECTIONS

A. Section 01000: General Requirements
B. Section 01300: Submittals During Construction
C. Section 06100: Rough Carpentry
D. Section 06135: Treated Timber and Lumber
E. Section 07900: Joint Sealing

1.3 REFERENCES

A. SMACNA: “Architectural Sheet Metal Manual” Sheet Metal and Air Conditioning Contractors National Association, Inc.
B. AISC: “Steel Construction Manual” American Institute of Steel Construction.
C. AISI: "Cold Form Steel Design Manual" American Iron and Steel Institute.
D. ASTM A446 - Standard Specification for Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
E. ASTM A526 - Standard Specification for Steel Sheet, Zinc, Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.
F. ASTM A527 - Standard Specification for Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality.
G. ASTM A792 - Standard Specification for Steel Sheet, Aluminum-Zinc Alloy Coated by the Hot Dip Process, General Requirements.
H. ASTM B 117 - Salt spray testing of coating 1000 Hrs.
I. ASTM G 23 - Accelerated testing of coating 2000 hrs.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.
4. Performance Testing documents.

C. Shop Drawings:
1. Show methods of erection, elevations, and plans of roof panels, sections and details, anticipated loads, flashings, roof curbs, vents, sealants, interfaces with all materials not supplied and proposed identification of component parts and their finishes.
2. Submit complete shop drawings and erection details to Architect for review. Do not proceed with manufacture prior to review of shop drawings. Do not use drawings prepared by Architect for shop or erection drawings.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors.

E. Warranty:
1. Provide sample warranties.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Manufacturer with a minimum of five years' experience in manufacturing panels of this nature in a permanent, stationary, indoor production facility utilizing industrial equipment.
   2. Manufacturer with current nationally recognized model building code (IBC 2012) agency product approvals for fastening design pressure capacities that meet project's uplift resistance test requirements for 150 mph wind speed, Exposure C, Risk Category 1, Open.
   3. Manufacturer with an approved independent quality assurance inspection program to validate certified material and finished product specifications.
   4. Manufacturer with permanent ink marking on panels that identifies the manufacturer, building code approvals, and date of production for material traceability and warranty validation.
   5. Manufacturer's product shall be listed in the UL (Underwriters Laboratory) fire resistant directory.

B. Installer Qualifications: Installation of panels and accessories by installers with a minimum of two years' experience in panel projects of this nature.

C. Performance Requirements:
   1. UL 263 - Fire Resistance Rating
   2. UL 580 Class 90 Wind Uplift Construction
   3. UL 790 Class A Fire Resistance Rating
   4. UL 2218 Class 4 Impact Resistance

D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by Architect.
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver panels to job site properly packaged to provide protection against transportation damage.

B. Exercise extreme care in unloading, storing, and erecting panels to prevent bending, warping, twisting, end and surface damage.

C. Store all material and accessories above ground on well skidded platforms.

D. Store under waterproof covering. Provide proper ventilation to panels to prevent condensation buildup between each panel.

E. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 PROJECT CONDITIONS

A. Anticipate environmental weather conditions and schedule work within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Roof assembly rated for 150 mph Wind Speed, Exposure C, Risk Category 1, Open.

1.8 WARRANTY

A. Metal panel manufacturer, upon final acceptance for project, shall furnish a warranty covering bare metal against rupture, structural failure, and perforation due to normal atmospheric corrosion exposure for a period of 25 years.

B. Metal panel manufacturer, upon final acceptance for project, shall furnish a warranty covering panel finish against cracking, checking, blistering, peeling, flaking, chipping, chalking, and fading for a period of 25 years.

2.0 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer:
   1. MBCI
   2. Metal Sales
   3. Or Equal

2.2 FORMED PANELS

A. Panel: 5V- Crimp 7/16 inch (11 mm) height rib by 24 inches (610 mm) coverage width.

B. Panel Physical Characteristics:
   1. Panel Style: Sidelap seam with exposed fastener.
   2. Texture: Smooth.
   3. Gauge: 24 gauge.
   4. Material: Galvalume steel sheet, 0.55 ounces/square foot, minimum yield of 50,000 psi (345 MPa).
   5. Finish: Galvalume (25-year warranty).

2.3 FABRICATION

A. Roll form panels in continuous lengths, full length of detailed runs, true to shape, accurate in size, square, and free from distribution and/or manufacturing defects..

B. Material surfaces shall be free of scratches or marks caused during fabrication.

C. Fabricate trim, flashing and accessories to detailed profiles.

D. Fabricate trim and flashing from same material as panel.

2.4 ACCESSORIES

A. All fasteners shall be non-corrosive type, as recommended by the panel manufacturer. Provide self-tapping screws, and other suitable fasteners, designed to withstand the building design loads and salt environment. Exposed fasteners shall have heads matching the adjacent panels. Provide combination metal/EPDM, PVC or neoprene sealing washers.

B. Flashing: Unless noted otherwise, shall be the same material and gauge and the panels.

C. Panel Sealants:
   1. Sealant Tape: Pressure sensitive, gray isobutylene compound sealant tape with release paper backing. Provide permanently elastic, non-sag, non-toxic, non-staining tape.
   2. Joint Sealant: ASTM C90; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class and use classifications required to seal joints in metal wall panels and remain weathertight; and as recommended in writing by the metal panel manufacturer.
   3. Non-Skinning Butyl Sealant: ASTM C734 Non-hardening, non-drying, non-oxidizing butyl rubber-based sealant.

4. Closures: Provide closures at eaves, and rakes, fabricated of the same material at the panels.
5. Closure Strips: Closed-cell expanded, cellular, rubber or cross-linked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1 inch thick, flexible closure strips; cut or pre-molded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

3.0 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Inspect installed work of other trades and verify that such work is complete to a point where this work may continue.

C. Verify that installation may be made in accordance with approved shop drawings and manufacturer's instructions.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
1. In event of discrepancy, do not proceed with installation until discrepancies have been resolved.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. All roof deck (substrate) seams are to be taped/sealed. Do not proceed with roof panel installation if deck is not taped/sealed.

INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install panels straight, weather tight, without waves, warps, buckles, fastening, stresses or distortion, allowing for expansion and contraction.

C. Install panels using the longest possible lengths to omit or reduce the splices.

C. Install panels in accordance with manufacturer's installation instructions and shop drawings.

D. Install panels plumb, level, and straight with seams and ribs/battens parallel, conforming to design as indicated.

3.3 CLEAN-UP AND PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

C. Dispose of excess materials and remove debris from site.

D. Clean work in accordance with manufacturer's recommendations.

E. Protect work against damage until final acceptance. Replace or repair to the satisfaction of the Architect, any work that becomes damaged prior to final acceptance.

F. Touch up minor scratches and abrasions.

G. At completion of each day's work and at work completion, sweep panels and flashing clean. Do not allow fasteners, cuttings, filings or scrapes to accumulate on finished surfaces.

4.0 PAYMENT

A. Payment for work in this section shall be included in the lump sum bid price.

SECTION 15001
PIPING – GENERAL

1.0 SCOPE

1.1 Work Included:

1.1.1 This section covers the work necessary to furnish and install, complete, the piping specified herein, and as further specified in the Detail Piping Specifications hereinafter.

1.2 General:

1.2.1 Like items of material provided hereunder shall be the end products of one manufacturer.

1.2.2 See CONDITIONS OF THE CONTRACT and Division 1, GENERAL REQUIREMENTS, which contain information and requirements that apply to the work specified herein and are mandatory for this project.

1.3 Submittals during Construction: See SUBMITTALS DURING CONSTRUCTION, Division 1, GENERAL REQUIREMENTS. Additionally, all material shall be certified by the manufacturer indicating that it is in accordance with all provisions of these specifications.

1.4 Related Work Specified and Performed Under Other Sections: Materials, workmanship, and payment for the following buried piping items will be found in Sections EARTHWORK, and EXCAVATION, BACKFILL AND COMPACTION FOR UNDERGROUND PIPING.

1.5 Unless otherwise noted on the drawings, the piping material schedule shall be as follows:

1.5.1 Pressure Sewer and Potable Water: PVC per 02501-01. Provide HDPE per 02501-04 in areas shown on the drawings.

1.5.2 Buried Pressure Sewer where specified and fittings: Ductile Iron Per 02501-02.

2.0 MATERIAL

2.1 Pipe Joints for Exposed Piping:

2.1.1 Flange joints shall be used on exposed ductile iron pipe.

2.1.2 Flanges shall be used for pipe joints when specifically shown on the drawings.

2.2 Pipe Ends for Buried Pressure Piping:

2.2.1 Push-on joint restrained each way at all fittings for the lengths indicated. Joints for buried pressure pipe at pump station shall be mechanical joints, anchored by retainer glands with setscrews. Joints for the PVC force main and water mains should be push-on joints restrained for the following lengths:

Fittings	Length of Restrained Joint Pipe (Each Way)
90^{o}	72
45^{o}	54
22^{o}	36

Restrain all pipe installed inside casings, whether gravity or pressure, for the entire length of the casing.

2.2.2 Within the limitations noted above, all pipe materials and joints do not necessarily have to be the same for all lines in a specific service, except that the materials and joints for any particular structure or between any two structures or for any particular buried line, shall be the same. An exception to this is where ends must be changed from grooved to flange to accommodate valves or fittings.

2.3 Restraint: PVC pipe shall be restrained by megalug as manufactured by EBBA Manufacturing Co., Series 1300 as manufactured by Uni-Flange or equal. Ductile iron pipe shall be restraint by restraining gaskets or manufacturer's standard restraining joint.

2.4 Valves: The valves specified below are for general use. Several valves may be supplied by the equipment manufacturer under Division 11700. Where Mueller Valves are available, they shall be provided.

2.4.1 Gates valves 2-inches and larger for buried water or sewer services shall be iron body, resilient seated gate valves with mechanical joint ends, double-disc gate, nonrising bronze stem, O-ring sealed stuffing box and 2-inch square wrench nut conforming to AWWA C509. Valves shall be Mueller; or equal.

2.4.2 Angle Valves: Angle type hose valves 1 1/2 inches and smaller shall have brass or bronze body with rising stem and composition disc, rated 250-pound WOG minimum. Valves shall have straight iron pipe thread, 1 ½ threads per inch; 1 ½ inch size shall have National Standard thread, 9 threads per inch. Valves shall be Fairbanks Figure 74; Jenkins Figure 112, DeSanno No. 111 or 114; or equal.

2.4.3 Ball Valves: Ball valves 2 inches and smaller, for general service shall be all-bronze, top or bottom entry tape, with screwed ends, full bore ports, Teflon seats, and hand lever operators, rated 250-pound WOG minimum 125 psi SWP. Valves shall be Crane Co. Accesso, Cat. No. 2330-TF; Lunkenheimer Figure No. 700-SB; or equal. Provide SST ball valves on SST piping.

2.4.4 Drain Cocks: Drain cocks, 1 inch and smaller, shall be 125-pound bronze body square head type with screwed ends and stop, Crane Co. Cat. No. 254; Lunkenheimer Figure 454; or equal.

2.4.5 Gauge Cocks: Gauge cocks shall be ½ inch bronze body valves, hexagon end pattern with tee head and male and female ends, rated for 125-pound SWP. Cocks shall be Lunkeheimer Figure 1180; Crane No. 744; or equal.

2.4.6 Check Valves: Check valves 2 inches and smaller shall be all bronze, with screwed ends and cap, regrinding seat, Y-pattern body, and swing type disc. Valves shall be rated for 125-pound SWP, 200-pound WOG, and shall be Walworth Company Figure 406; Crane Cat. No. 37; or equal.

2.4.7 Check Valves 2 1/2 inches through 12 inches inclusive shall be flanged end, cast iron body, bronze mounted swing type with solid bronze hinges and stainless steel hinge shaft. Valves shall be rated 200-pound WOG, and shall be Series 500 as manufactured by Val-Matic Valve and Manufacturing Corporation or equal.

2.5 Valve Boxes: Valve boxes shall be Buffalo two-piece sliding type, cast iron with 5- inch shaft of appropriate length for the installation. The word WATER or SEWER, as appropriate, shall be cast into the top of the lid. Extension pieces, if required, shall be the manufacturer's standard type. Units shall be Mueller H-10364, Clow Corporation F-2452, or equal. All units shall be complete with all necessary bases and accessories.

2.6 Service Clamps: Service clamps shall be double strap stainless steel clamps for the size of pipe specified.

2.7 Pressure gauges: Bellows or bourdon tube, 4 ½" dial; scale as required for approximate range reading and liquid-filled. Provide Ashcraft "Duragauge" Model No. 1279/1379 Margh "Mastergauge" or equal.

2.8 Air valves: Air valves shall be APCO Model 400 or equal.

2.9 Tapping sleeves: Tapping sleeves shall be all stainless steel, 18-8 Type 304, with a carbon steel flange, AWWA C207 Class D, ANSI 150lb. drilling, recessed for tapping valve, and with a full circumferential gasket. Tapping sleeves shall be JCM 462, or equal.

3.0 PIPE HANGERS AND SUPPORTS

3.1 General:

3.1.1 Piping shall be supported as described hereinafter. Manufacturers; catalog figure numbers are typical of the types and quality of standard pipe supports and hangers to be employed.

3.1.2 No attempt has been made to show all required pipe supports in all locations, either on the drawings or in the details. The absence of pipe supports and details on any drawing shall not relieve the Mechanical Contractor of the responsibility for furnishing and installing them throughout.

3.1.3 The design intent is to provide sound and vibration isolation on all pumped systems. No metal-to-metal contact will be allowed between the pipe and any support bracket, hanger, or clamp.

3.1.4 All submerged piping supports, guides, and fasteners or those installed below channel and wetwell cover slabs shall be Type 316 stainless steel. Concrete anchors and anchor bolts shall be as specified in Section FABRICATED METALWORK AND CASTINGS.

3.1.5 Where piping connects to equipment, it shall be supported by a pipe support and not by the equipment.

3.1.6 Pipe support system components shall withstand the dead loads imposed by the weight of the pipes filled with water plus any insulation, and shall have a minimum safety factor of 5.

3.2 Products:

3.2.1 Manufacturers:

A. Pipe Hangers and Supports: Grinnel, Fee & Mason, Unistrut, Super Strut, or equal.

B. Pipe Hanger Isolation Shield: Pipe Shields, Inc., Insul-Shield, or equal.

C. Isolation Pads: Mason Industries, Korfund, or equal.

3.2.2 Pipe Supports:

3.2.2.1 Unless detailed otherwise on the drawings, pedestal pipe supports shall be adjustable, with stanchion, saddle, and anchoring flange as shown, Grinnel Figure 264 or 259, or Fee & Mason Figure 291 or 259. Provide neoprene waffle isolation pad under anchoring flanges adjacent to equipment or where otherwise required to provide vibration isolation. Pads shall be Mason Industries, Inc., Type W or Korfund Type Korpad.

3.2.2.2 Vertical piping hangers and supports shall be channel and pipe straps manufactured by Unistrut or Super Strut.

3.2.2.3 Piping supports for vertical piping passing through floors shall be galvanized steel riser clamps, Grinnel Figure 261 or Fee & Mason Figure 241.

3.2.3 Support Spacing:

3.2.3.1 Unless otherwise noted on the drawings, pipe support spacing for steel or ductile iron pipe shall be as follows:

Pipe Size	Max. Support Spacing
1-inch & smaller	6 feet
1-1/4-incch thru 2-inch	8 feet
3-inch thru 4-inch	10 feet
6-inch thru 8-inch	12 feet
10-inch thru 12-inch	14 feet
14-inch thru 16-inch	16 feet
18-inch	16 feet
20-inch thru 24-inch	18 feet

3.2.3.2 Support spacing for plastic piping shall be as recommended by the manufacturer for the fluid temperature in the pipe.

4.0 EXECUTION

4.1 All piping shall be supported in a manner which will prevent undue stress on any valve, fitting, or piece of equipment. In addition, pipe support shall be provided at changes in directions or elevation, adjacent to flexible couplings, and where otherwise shown. Pipe supports and hangers shall not be installed in equipment access areas.

4.2 Joint for Dissimilar Pipe: Joints between dissimilar buried pipe shall be made with flexible mechanical compression joint coupling with No. 305 stainless steel bands as manufactured by Joints, Inc. (Calder) of Gardena, CA; Fernco Joint Sealer Co. of Ferndale, MI; or equal with a concrete closure collar as directed by the Engineer.

4.3 Slab, Floor, Wall and Roof Penetrations and Closures: All piping penetrations of slabs, floors, walls, and roof shall be ductile iron wall pipes with integrally cast seep rings, unless otherwise noted on the drawings. It shall be the Contractor's responsibility to verify the size and location of all building and structure penetrations prior to pouring concrete.

4.3.1 Wall Pipes:

4.3.1.1 Provide wall pipes of the proper diameter and with ends as shown on the drawings for connection to adjacent pipes where they pass through concrete walls, floors, slabs or roofs that are to be watertight. Wall pipes shall be of a thickness equal to or greater than the remainder of the pipe in the line, and shall comply with the requirements for fittings in the applicable Detail Piping Specification.

4.3.2 Pipe Sleeves:

4.3.2.1 Piping passing through concrete or masonry shall be installed through galvanized steel pipe sleeves. Holes drilled with a suitable rotary drill will be considered in lieu of sleeves in existing walls.

4.3.2.2 All sleeves in exterior or water-bearing walls shall have a center flange for water stoppage. The annular space between pipes shall be caulked with one-part polyurethane sealant conforming to Federal Specification TT-S-00230, Type II, Class A, N/S; Mameco Vulkem 116; Sika Sikaflex IA; or equal, or sealed by a modular mechanical unit consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall sleeve.

5.0 WORKMANSHIP

5.1 Pipe Preparation and Handling:

5.1.1 Each pipe and fitting shall be carefully inspected before the exposed pipe or fitting is installed or the buried pipe or fitting is lowered into the trench. The interior and exterior protective coating shall be inspected, and all damaged areas patched in the field with material similar to the original. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after laying.

5.1.2 Use proper implements, tools, and facilities for the safe and proper protection of the pipe. Carefully handle pipe in such a manner as to avoid any physical damage to the pipe. Do not drop or dump pipe into trenches under any circumstances.

5.2 Preparation of Trench:

5.2.1 Line and Grade:

5.2.1.1 Do not deviate more than 1-inch from line or 1/4-inch from grade. The grade should be measured from the invert as opposed to the top of pipe due to the likely scenario that there will be permissible variation in pipe wall thickness. Readings shall be obtained in Mean Sea Level Datum for reading deflection is not allowed for establishing or verifying grade.

5.2.1.2 Grade the bottom of the trench by hand to the line and grade to which the pipe is to be laid with proper allowance for pipe thickness and for shell cushion when specified or indicated. Remove hard spots that would prevent a uniform thickness of bedding. Before laying each section of the pipe, check the grade with a straightedge and correct any irregularities found. The trench bottom shall form a continuous and uniform bearing and support for the pipe at every point between bell holes, except that the grade may be disturbed for the removal of lifting tackle.

5.2.2 Bell (Joint) Holes: At the location of each joint, dig bell (joint) holes of ample dimensions in the bottom of the trench and at the sides where necessary to permit easy visual inspection of the entire joint.

5.2.3 Removal of Water: Provide and maintain ample means and devices at all times to remove and dispose of all water entering the trench during the process of pipe laying. The trench shall be kept dry until the pipe laying and jointing are completed.

5.2.4 Prevent Trench Water and Animals from Entering Pipe: When the pipe laying is not in progress, including the noon hours, the open ends of pipe shall be closed, and no trench water, animals, or foreign material shall be permitted to enter the pipe.

5.2.5 Pipe Cover: Minimum pipe cover shall be 3 feet unless otherwise indicated.

5.3 Lay Buried Pipe:

5.3.1 All buried pipe shall be prepared as herein before specified and shall be laid on the prepared granular base and bedded to ensure uniform bearing. No pipe shall be laid in water or when, in the opinion of the Engineer, trench conditions are unsuitable. Joints shall be made as herein specified for the respective types. Take all precautions necessary to prevent uplift and floating of the pipe prior to backfilling.

5.3.2 Where the pipe is connected to concrete structures, the connection shall be made as shown. If the connection is not shown, make connection such that a standard pipe joint is located no more than 18 inches from the structure.

5.3.3 Connecting Dissimilar Pipe Materials: Connect dissimilar pipe materials by means of a flexible coupling specified under JOINTS FOR DISSIMILAR PIPE or a concrete closure collar as directed by the Engineer. Install couplings in strict accordance with the manufacturer's recommendations.

5.4 Pipe Restraint: Install the restraint in strict according with manufacturer's recommendations. All bolts shall be sheared utilizing a torque wrench and the torque required to shear the bolts shall be recorded.

5.5 Testing:

5.5.1 Preparation and Execution:

5.5.1.1 Conduct final acceptance tests on buried pressure piping that is to be hydrostatically tested after the trench has been completely backfilled. The Contractor may, if field conditions permit, as determined by the Engineer, partially backfill the trench and leave the joints open for inspection and conduct an initial service leak test. The acceptance test shall not, however, be conducted until all backfilling has been completed.

5.5.2 Equipment: Furnish the following equipment for the hydrostatic tests:

Amount	Description
2	Graduated containers
2	Pressure gauges
1	Hydraulic force pump with a water meter on the discharge line with suitable hose and suction pipe as required

5.5.3 Where any section of pipe is provided with concrete thrust blocking, do not make the pressure test until at least 5 days have elapsed after the thrust blocking is installed. If high-early cement is used for thrust blocking, the time may be reduced to 2 days. When testing cement-mortar lining piping, slowly fill the section of pipe to be tested with water and allow standing for 24 hours under slight pressure to allow the cement-mortar lining to absorb water.

5.5.3.1 Expel all air from the piping system prior to testing and apply and maintain the specified test pressure by means of the hydraulic force pump.

5.5.4 Hydrostatic Pressure and Leakage Tests:

5.5.4.1 All newly installed pipelines and appurtenances shall be tested by a hydrostatic pressure test conducted at a minimum of 150 psig, or static pressure plus 50% whichever is greater.

5.5.4.2 After the water lines or isolated sections of the pipeline have been filled with water, the pressure shall be increased to the test pressure by means of a hydraulic force pump. The leakage test shall be in accordance with AWWA M23.

5.5.4.3 The CONTRACTOR shall furnish all necessary equipment, material, make all taps in pipe and provide all labor for conducting the tests.

5.5.4.4 The duration of the hydrostatic leakage test shall be two (2) hours or as specified by the Engineer.

5.5.4.5 The source of water for the pump suction shall be potable water from the City's distribution system. The vessel used must be approved by the Engineer.

5.5.4.6 All interior valves including valves on fire hydrants and other appurtenances shall be open during all tests.

5.5.4.7 The maximum leakage per hour for ductile iron and P.V.C. pipe shall be as calculated from the following formula (All rubber gasket or O-ring joints):

$$\frac{L = ND\sqrt{P}}{7400}$$

L = allowable leakage, (gallons per hour)
N = number of joints
D = nominal diameter of pipe, (inches)
P = average test pressure during test, (psig)

5.5.4.8 After the specified test pressure has been applied the entire pipeline shall be checked in the presence of the Engineer's representative giving particular attention to that part of the pipeline and those appurtenances that are exposed.

5.5.4.9 After the CONTRACTOR has taken the necessary action to repair or replace any part of the pipeline or appurtenances where leaks were apparent or if no leaks were apparent, the water lines shall be subjected to a leakage test at the pressure specified with a meter inserted in the test pump discharge line.

5.5.4.10 If any test of pipe laid discloses leakage greater than the allowable leakage as calculated from above formula or table, the CONTRACTOR shall, at his expense, locate the leak or leaks and perform whatever work and/or replace whatever material that is require din order to remedy the defect and stop the leak. All corrective work must be approved by the Engineer.

5.5.5 Air Testing of Gravity Sewer Lines

5.5.5.1 The CONTRACTOR shall perform the testing of manhole construction, pipe materials and/or other materials incorporated into the construction of the sanitary sewer system to determine leakage and water tightness. Testing is to be supervised by the Engineer.

5.5.5.2 All gravity sewer lines shall be tested in accordance with the following procedures:

(a) Plug all pipe outlets with suitable test plugs. Brace each plug securely.
(b) Pipe air supply to the pipeline to be tested in such a manner that the air supply may be shut off, pressure observed and air pressure released from the pipe without workmen entering the manhole.
(c) Add air slowly to the portion of pipe under test until the internal pressure of the lien is raised to approximately 4 psig but less than 5 psig.

(d) Shut the air supply off and allow at least two minutes for the air pressure to stabilize.
(e) When the pressure has been bled down to 3 ½ psig and stabilized, start the test.
(f) If the pipe section does not drop below 3.0 psig in the allotted time the section passes the test.

5.5.5.3 Gravity Sewer Air Testing Time Requirements

Minimum Time Requirements for 0.5 PSIG
Pressure drop from 3.5 PSIG to 3.00 PSIG
(Not less than shown between manholes)

Pipe Size	Time
8”	5.0 minutes
10”	6.5 minutes
12”	7.5 minutes
15”	9.5 minutes
18”	11.5 minutes
24”	13.5 minutes

5.6 Hydrostatic Pressure and Leakage Test of Force Mains

All sewer force mains and appurtenances shall be tested by a hydrostatic pressure test conducted at a minimum of 150 psig, or static pressure plus 50% whichever is greater.

5.6.1 After the sewer force mains have been filled with water, the pressure shall be increased to the test pressure by means of a hydraulic force pump. The leakage test shall be in accordance with AWWA M23.

5.6.2 The CONTRACTOR shall furnish all necessary equipment, material, make all taps in the pipe and all labor for conducting the tests.

5.6.3 The duration of the hydrostatic leakage test shall be two (2) hours or as specified by the Engineer.

5.6.4 The source of water for the pump suction shall be potable water from the City’s distribution system. The vessel used must be approved by the Engineer.

5.6.5 The maximum leakage per hour for ductile iron and P.V.C. pipe shall be as calculated from the following formula (All rubber gasket or O-ring joints):

$$\frac{L = ND\sqrt{P}}{7400}$$

L = allowable leakage, (gallons per hour)
N = number of joints
D = nominal diameter of pipe, (inches)
P = average test pressure during test, (psig)

5.6.6 After the specified test pressure has been applied the entire pipeline shall be checked in the presence of the Engineer giving particular attention to that part of the pipeline and those appurtenances that are exposed.

5.6.7 After the CONTRACTOR has taken the necessary action to repair or replace any part of the pipeline or appurtenances where leaks were apparent or if no leaks were apparent, the sewer force mains shall be subjected to a leakage test at the pressure specified with a meter inserted in the test pump discharge line.

5.6.8 If any test of pipe laid discloses leakage greater than the allowable leakage as calculated from above formula or table, the CONTRACTOR shall, at his expense, locate the leak or leaks and perform whatever work and/or replace whatever material that is required in order to remedy the defect and stop the leak. All corrective work must be approved by the Engineer.

5.7 Testing Safety Precautions

5.7.1 The low-pressure air test may be dangerous to personnel if, through lack of understanding or carelessness, a line is over pressurized or plugs are installed improperly. It is extremely important that the various plugs be installed so as to prevent the sudden expulsion of a poorly inflated plug. As an example of the hazard, a force of 250 pounds is exerted on an 8" plug by an internal pressure of 5 psi. Observe the following safety precautions:

5.7.2 No person shall be allowed in the manholes during the test or when a plugged pipe is under pressure.

5.7.3 Gauges, air piping manifolds and valves shall be located at the top of the ground. Install and brace all plugs securely.

5.8 Ground Water Elevation

5.8.1 If the pipeline to be tested is below the ground water level, the starting test pressure shall be increased by 0.43 psi for each foot the groundwater level is above the invert of the sewer pipe. In no case shall the starting test pressure exceed 9.0 psig.

5.9 Test Equipment

5.9.1 All necessary equipment to perform the air test in accordance with this specification shall be provided by the CONTRACTOR. The test gauge shall have incremental division of 0.10 psig.

5.10 Deflection Test: Per MDEQ Design Guidance Section 23.7.5 using a mandrel.

5.10.1 Deflection tests shall be performed on all flexible pipe. The test shall be conducted after the final backfill has been in place at least 30 days.

5.10.2 No pipe shall exceed a deflection of 5%.

5.10.3 The mandrel (go/no-go) device shall be cylindrical in shape and constructed with either 9 or 16 evenly spaced arms or prongs. Mandrels with fewer arms will be rejected as not sufficiently accurate. The contact length of the mandrel's arms shall equal or exceed the nominal inside diameter of the sewer to be inspected. Critical mandrel dimensions shall carry a tolerance of plus or minimum 0.01". The mandrel and all necessary equipment for the mandrel test shall be provided by the CONTRACTOR. No hand made mandrel devices shall be used for testing.

5.10.4 The mandrel shall be hand-pulled by the CONTRACTOR through all flexible pipe sewer lines no earlier than 30 days after the trench has been completely backfilled. Any sections of the sewer not passing the mandrel shall be uncovered and the CONTRACOTR shall re-bed, re-round or replace the sewer to the satisfaction of the Engineer. Any repaired section shall be re-tested.

5.10.5 The outside diameter of the mandrel shall be set according to the following table:

NOMINAL DIAMETER (IN)	MANDREL O.D. (IN)
8"	7.28"
10"	9.08"
12"	10.79"
15"	13.20"
18"	16.12"

5.11 Manhole Vacuum Testing

5.11.1 The manhole vacuum test shall be performed with suitable apparatus made for such purpose and shall draw a vacuum of 10" of mercury (Hg). The test shall pass if the vacuum remains at 10" of mercury (Hg) or drops to not less than 9" of mercury (Hg) in one minute. Vacuum test will be performed by construction CONTRACTOR. Test shall be witnessed and documented by the Engineer. If, after three (3) attempts to perform a satisfactory vacuum test have failed, the Engineer may require that the manhole be removed and replaced/poured.

5.12 Acceptance of Installation

5.12.1 No gravity sewer or manhole will be accepted that does not comply with the minimum requirements of tests described within these specifications.

5.13 Interim Cleaning: Care shall be exercised during fabrication to prevent the accumulation of weld rod, weld spatter, pipe cuttings and filings, gravel, cleaning rags, etc. within piping sections. All piping shall be examined to assure removal of these and other foreign objects prior to assembly. Shop cleaning may employ any conventional commercial cleaning method if it does not corrode, deform, swell, or otherwise alter the physical properties of the material being cleaned.

5.14 Final Cleaning: Following assembly and testing and prior to final acceptance, all pipelines installed under this section shall be flushed with water and all accumulated construction debris and other foreign matter removed. Flushing velocities shall be a minimum of 2.5 feet per second.

6.0 **DISINFECTION:** Potable water pipelines shall be disinfected before placing in service. Disinfecting procedures shall conform to AWWA C651, as hereinafter modified or expanded.

6.1 Flushing: Before disinfecting, flush all foreign matter from the pipeline. The contractor shall provide hoses, temporary pipes, ditches, etc. as required to dispose of flushing water without damage to adjacent properties. Flushing velocities shall be at least 2.5 fps. For larger diameter pipe where it is impractical or impossible to flush the pipe at 2.5 fps velocity, clean the pipeline in place from the inside by brushing and sweeping, then flush the line at a lower velocity.

6.2 Disinfecting Mixture:

6.2.1 Disinfecting mixture shall be a chlorine-water solution having a free chlorine residual of 40 to 50 ppm. The disinfecting mixture shall be prepared by injecting: (1) a liquid chlorine gas-water mixture; (2) dry chlorine gas; or (3) a calcium or sodium hypochlorite and water mixture into the pipeline at a measured rate while fresh water is allow to flow through the pipeline at a measured rate so that the combined mixture of fresh water and chlorine solution or gas is of the specified strength.

6.2.2 The liquid chlorine gas-water mixture shall be applied by means of a standard commercial solution feed chlorinating device. Dry chlorine gas shall be fed through proper devices for regulating the rate of flow and providing effective diffusion of the gas into the water within the pipe being treated. Chlorinating devices for feeding solutions of the chlorine gas or the gas itself must provide means for preventing the backflow of water into the chlorine cylinder.

6.2.3 If the calcium hypochlorite procedure is used, first mix the dry powder with water to make a thick past, then thin to approximately a 1 percent solution (10,000 ppm chlorine). If the sodium hypochlorite procedure is used, dilute the liquid with water to obtain a 1 percent solution. The following proportions of hypochlorite to water will be required:

Product	Quantity	Water
Calcium Hypochlorite (1) (65-70 percent C1)	1 lb.	7.5 gal.
Sodium Hypochlorite (2) (5.25 percent C1)	1 gal.	4.25 gal.

(1) Comparable to commercial products known as HTH, Perchloron, and Pittchlor.
(2) Known as liquid laundry bleach, Clorox, Purex, etc.

6.2.4 Point of Application: Inject the chlorine mixture into the pipeline to be treated at the beginning of the line through a corporation stop or suitable tap in the top of the pipeline. Clean water from the existing system or another source shall be controlled so as to flow slowly into the newly installed piping during the application of chlorine. The rate of chlorine mixture flow shall be in such proportion to the rate of water entering the pipe that the combined mixture shall contain 40 to 50 ppm of free available chlorine. Valves shall be manipulated so that the strong chlorine solution in the line being treated will not flow back into the line supplying the water. Use check valves if necessary.

6.2.5 Retention Period:

6.2.5.1 Treated water shall be retained in the pipeline long enough to destroy all nonspore-forming bacteria. With proper flushing and the specified solution strength, 24 hours is adequate. At the end of the retention period, the disinfecting mixture shall have a strength of at least 10 ppm of chlorine.

6.2.5.2 Operate all valves, hydrants, and other appurtenances during disinfection to assure that the disinfecting mixture is dispersed into all parts of line, including dead ends, new services, and similar areas that otherwise may not receive the disinfecting solutions.

6.2.5.3 Do not place concentrated quantities of commercial disinfectants in the line before it is filled with water.

6.2.5.4 After chlorination, flush the water from the permanent source of supply until the water through the line is equal chemically and bacteriologically to the permanent source of supply.

6.2.5.5 Disposal of Disinfecting Water: Dispose of disinfecting water in an acceptable manner that will protect the public and publicly used receiving waters from harmful or toxic concentrations of chlorine. Do not allow disinfecting water to flow into a waterway without adequate dilution or other satisfactory method of reducing chlorine concentrations to a safe level.

6.2.5.6 After completion of the disinfecting of water distribution, the contractor shall arrange for at least two consecutive samples to be collected by the Mississippi State Department of Health, consulting engineer or owner for bacteriological examination. If the water in the line is indeed disinfected, the chlorine concentration in the water will be minuscule. Two consecutive samples with no coliform bacteria per 100 ml and no confluent growth indicated shall constitute a satisfactory disinfected system when analyzed by the Mississippi Department of Health Laboratory or a laboratory certified by the Mississippi State Department of Health. The contractor will be responsible for the cost of the test.

7.0 CLEARANCE BETWEEN SEWER AND WATER LINES

7.1 The clearance between water lines and sewer lines shall not be closer horizontally than ten feet.

7.2 A minimum vertical separation of 18 inches shall be maintained between the water and sewer mains with water mains always above sewer mains, unless otherwise directed by the Project Engineer. Where it is necessary for waterlines and sewer lines to cross, both the waterlines and sewer lines shall be constructed of mechanical joint cast iron or ductile iron pipe for a distance of ten feet on each side of the crossing with no joint located within eight feet of the crossing; or the sewer line shall be encased in concrete with a minimum of four inch thickness at the bells at ten feet on either side of the crossing.

8.0 PAYMENT

Payment for work in this section shall be included in the unit price / lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials and incidentals complete.

SECTION 15001-04
DETAIL PIPING SPECIFICATION
HIGH DENSITY POLYETHYLENE PIPE

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1. SCOPE

1.1 General: This section covers the work necessary for furnishing and installing the high density polyethylene (HDPE) pipe, complete.

1.2 See Section Piping-General for additional requirements.

2. MATERIALS

2.1 Pipe Materials:

2.1.1 High density polyethylene pipe shall be fabricated from ultra-high molecular weight high density polyethylene and shall have an ASTM Classification of Type III, Class C, Category 5, Grade P34 as tabulated in ASTM D-1248.

2.1.2 The resin used to fabricate the pipe shall have a Plastic Pipe Institute (PPI) recommended hydrostatic stress rating (HDS) of at least 800 psi at 73.4 degrees F and a PPI material designation of PE 3408. The material shall be of virgin quality, shall have a melt flow of less than 5.0 gms/10 minutes (determined by ASTM D-1238) and shall exceed 1000 hours on environmental stress crack resistance (ASTM D-1693).

2.1.3 The pipe shall be Polypipe as manufactured by Polypipe Industries, Gainesville, Texas; Driscopipe as manufactured by Phillips Driscopipe, Inc., Dallas, Texas; or equal. The Contractor shall furnish certified lab reports from the pipe manufacturer to verify that the physical properties of the materials supplied meet these specifications.

2.2 Fittings: Pipe fittings shall be molded or fabricated from high density polyethylene. Fittings shall be molded in accordance with ASTM D-1248, Type III, Class C, Category 5, Grade P34 and PPI PE-3408. Fabricated fittings shall be prepared from polyethylene pipe with a manufacturer recommended HDS rating of at least 730 psi based on material with 1460 psi design in accordance with ASTM D-2837.

2.3 Joints: All pipe joints and fittings shall be joined together by Thermal Butt Fusion. Polyethylene pipe lengths, fittings and fanged connection to be used shall be of the same type, grade and class of polyethylene compound and shall be supplied by the same raw material supplier.

2.4 Pipe Classification: The pipe shall have a standard dimension ratio (SDR) of 11, and shall be rated at 160 psi. The pipe shall have a nominal diameter and an average outside diameter as specified on the drawings.

2.5 Manufacturer Testing:

2.5.1 HDPE pipe shall have a minimum burst pressure of (at 73.4 degrees F as determined by ASTM D-1599) as determined according to the following equation:

$$t = \frac{PD}{2S+P}$$

Where t = minimum thickness, in inches
P = burst pressure, in psi
D = outside diameter, in inches
S = hoop stress, in psi (1600)

2.5.2 The pipe shall not fail, balloon, burst or weep as defined in ASTM D-1598, latest revision, when tested in accordance with Section 6(g) of ASTM D-2239 and under the following conditions:

Temperature (degrees F)	Time (Hours)	Hoop Stress (psi)
73.4	1000	1500
150	1000	800
190	300	500

3. WORKMANSHIP

3.1 Manufacture of Pipe:

3.1.1 Surfaces: The inside and outside surface of all material shall be free from nicks, scratches, and other surface defects and blemishes. The pipe shall be homogeneous throughout, free of any bubbles, voids, or inclusions.

3.1.2 Jointing Areas: The jointing areas of each length of pipe shall be free from dents and gouges.

3.2 Installation of Pipe:

3.2.1 Pipe Unloading at the Site:

3.2.1.1 Inspect each shipment of pipe and make provisions for a timely replacement of any damaged material. Damaged material shall be replaced and removed from the site.

3.2.1.2 Pipe stockpiled for more than 30 days shall be covered to protect it from the sun's rays. Provide for air circulation through the stockpile.

3.2.2 Butt fusion of pipe and fittings shall be performed in accordance with the pipe manufacturer's recommendations. The machine to bond the pipe shall be either furnished by the pipe manufacturer or certified by the pipe manufacturer.

3.2.3 Buried line identification per Section 15001.

3.3 Tests:

3.3.1 All lines tested per Section 15001

4. PAYMENT

4.1 Payment for work in this section will be made as specified in Section 15001.

SECTION 15080
MANUALLY OPERATED VALVES AND CHECK VALVES

1. SCOPE

1.1 Work Included: This section covers the work necessary for furnishing and installing the various manually operated valves and check valves in the piping systems, complete.

1.2 General:

1.2.1 Like items of equipment specified herein shall be the end products of one manufacturer in order to achieve standardization for operation, maintenance, spare parts, and manufacturer's service.

1.2.2 See CONDITIONS OF THE CONTRACT and Division 1, GENERAL REQUIREMENTS, which contain information and requirements that apply to the work specified herein and are mandatory for this project.

1.3 Submittals During Construction: Submittals during construction shall be made as required in Division 1, GENERAL REQUIREMENTS. In addition, the following specific information shall be provided:

A. Catalog cuts of each valve depicting the valve components and general arrangement of parts.

B. Materials list for each valve that provides ASTM Designations for each component of the subject valve.

2. MATERIALS

2.1 General:

2.1.1 All valves shall be complete with all necessary operating handwheels, chain wheels, extension stems, floor stands, worm and gear operators, operating nuts, chains, and wrenches which are required for the proper completion of the work included under this section.

2.1.2 Renewable parts including discs, packing, and seats shall be of types recommended by valve manufacturer for intended service.

2.1.3 All units shall have the name of the manufacturer and size of the valve cast on the body or bonnet or shown on a permanently attached plate in raised letters.

2.1.4 For the purpose of designating the type and grade of valve desired, a manufacturer's name and list or figure number is given in the following specifications. Valves of equal quality by other manufacturers will be considered in accordance with the General Conditions.

3. WORKMANSHIP

3.1 General:

3.1.1 Bolt holes of flanged valves shall straddle the vertical centerline of the pipe run. Prior to installing flanged valves, the flange faces shall be thoroughly cleaned. After cleaning, insert gasket and bolts, and tighten the nuts progressively and uniformly. If flanges leak under pressure, loosen or remove the nuts and bolts, reseat or replace the gasket, retighten and/or reinstall the nuts and bolts, and retest the joints. Joints shall be watertight at test pressures before acceptance.

3.1.2 Thoroughly clean threads of screwed joints by wire brushing, swabbing, or other approved methods. Apply approved joint compound to threads prior to making joints. Joints shall be watertight at test pressures before acceptance.

3.2 Placing:

3.2.1 Generally, unless otherwise indicated on the drawings, all valves installed in horizontal runs of pipe having centerline elevations 4 feet 6 inches or less above the finish floor shall be installed with their operating stems vertical. Valves installed in horizontal runs of pipe having centerline elevations between 4 feet 6 inches and 6 feet 9 inches above the finish floor shall be installed with their operating stems horizontal. If adjacent piping prohibits this, the stems and operating handwheel shall be installed above the valve horizontal centerline as close to horizontal as possible. Valves installed in vertical runs of pipe shall have their operating stems orientated to facilitate the most practicable operation.

3.3 Anchor Bolts: Anchor bolts for floor stands, stem guides, etc., shall be cast-in-place during construction placement. Threads shall be protected and shall be cleaned before the nuts are attached and tightened.

3.4 Testing:

3.4.1 Valves shall be tested at the same time that the adjacent pipeline is tested. Joints shall show no visible leakage under test. Repair joints that show signs of leakage prior to final acceptance. If there are any special parts of control systems or operators that might be damaged by the pipeline test, they shall be properly protected. The Contractor will be held responsible for any damage caused by the testing.

3.4.2 If requested by the Engineer, the valve manufacturer shall furnish an affidavit stating the materials options furnished and/or that he has complied with these and other referenced specifications.

4. PAYMENT

4.1 Payment for work in this section shall be included in the lump sum or unit price bid to which it is subsidiary.

SECTION 16010
BASIC ELECTRICAL REQUIREMENTS

1.0 GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes: This section provides basic electrical requirements.

1.02 BASIC ELECTRICAL REQUIREMENTS

A. Quality Assurance:

1. Workers possessing the skills and experience obtained in performing work of similar scope and complexity shall perform the Work of this Division.

2. Refer to other sections of the Specifications for other qualification requirements.

B. Drawings and Specifications Coordination:

1. For purposes of clearness and legibility, Drawings are essentially diagrammatic and the size and location of equipment is indicated to scale whenever possible. Verify conditions, dimensions, indicated equipment sizes, and manufacturer's data and information as necessary to install the Work of this Division. Coordinate location and layout with other Work.

2. Drawings indicate required size and points of termination of conduits, number and size of conductors, and diagrammatic routing of conduit. Install conduits with minimum number of bends to conform to structure, avoid obstructions, preserve headroom, keep openings and passageways clear, and comply with applicable code requirements.

3. Routing of conduits may be changed provided that the length of any conduit run is not increased more than 10 percent of length indicated on the Drawings.

4. Outlet locations shall be coordinated with architectural elements prior to start of construction. Locations indicated on the Drawings may be distorted for clarity.

5. Coordinate electrical Work with all other Work.

6. The scope of the electrical work includes furnishing, installing testing and warranty of all Electrical work and complete electrical systems shown on the electrical drawings and specified herein.

7. The drawings and specifications complement each other and together complete the contract documents for the electrical work included in this project. Neither the drawings or the specifications are complete without the other. Any item mentioned in either document is binding. Where conflicts arise between the drawings and the specifications, the more stringent requirement shall prevail.

8. The contractor shall provide and install all electrical systems to provide a complete package as indicated by the contract documents. The documents are intended to provide an outline for the required installations. The contractor shall ultimately provide a complete and operational system at the conclusion of the project.

9. Details are provided as they relate to the installation. Contractor shall provide and install all miscellaneous components, parts, materials, fasteners, splices, and any other incidental items necessary to provide a complete installation.

C. Terminology:

1. Low Voltage: Applies to signal systems operating at 120 volts and less, and power systems operating at less than 600 volts.

2. UL: Underwriter's Laboratories Inc, Nationally Recognized Testing Laboratory (NRTL), or equal.

D. Regulations:

Work shall comply with the requirements of authorities having jurisdiction and the Electrical and Building Codes. Material shall conform to regulations of the National Board of Fire Underwriters for electrical wiring and apparatus. Materials shall be new and listed by UL, or another NRTL.

E. Structural Considerations for Conduit Routing:

1. Where conduits pass through or interfere with any structural member, or where notching, boring or cutting of the structure is necessary, or where special openings are required through walls, floors, footings, or other buildings elements, contractor shall submit shop drawings to the architect for approval.

F. Electrically Operated Equipment and Appliances:

1. Furnished Equipment and Appliances:

a. Work shall include furnishing and installing wiring enclosures for, and the complete connection of electrically operated equipment and appliances and electrical control devices which are specified to be furnished and installed in this or other sections of the Specifications, wiring enclosures shall be concealed except where exposed Work is indicated on the Drawings.

b. Connections shall be provided as necessary to install equipment ready for use. Equipment shall be tested for proper operation and, if motorized, for proper rotation. If outlets are of incorrect electrical characteristics or any specified equipment fails to operate properly, repair and/or replace the outlet and/or equipment.

2. Equipment and Appliances Furnished by Others:

a. Equipment and appliances indicated on Drawings as "not in contract" (NIC), "furnished by others," or "furnished by the Owner," will be delivered to the Project site. Required electrical connections shall be performed for such equipment and appliances. Motorized equipment will be furnished factory-wired to a control panel or junction box unless otherwise indicated. Appliances will be furnished equipped with portable cord and cap. Provide disconnect switches where required.

b. Connections to equipment furnished under this Division shall be part of the Work of this section. Work shall include internal wiring, installation, connection and adjustment of bolted drive motors in which the motor is supplied as a separate unit, and connections only for equipment furnished with factory installed internal wiring, except as further limited by Drawings and this Specification. Work shall include furnishing and installing suitable outlets, disconnecting devices, starters, push-button stations, selector switches, conduit, junction boxes, and wiring necessary for a complete electrical installation. Devices and equipment furnished shall be of same type used elsewhere on the Work or as specified.

c. Electrical equipment furnished under other sections, for installation and connection under Work of this section, will be delivered to the Project site ready for installation.

d. Equipment furnished under other sections, and requiring electrical connection under this section, will be set in place as part of the Work of the section furnishing such equipment unless noted otherwise. If electrical connections exceed the requirements of the specified equipment, it shall be the responsibility of the contractor or vendor supplying the equipment to compensate the electrical contractor for any and all work to make the electrical connections to the equipment being supplied. Any discrepancies shall immediately be brought to the engineers' attention for coordination between all other disciplines. All increased costs shall be the responsibility of the contractors, not the owner, architect, or engineer.

e. Suitability and condition of equipment furnished under other sections shall be determined in advance of installation. Immediate notice of damage, unsuitability, or lack of parts shall be given to the entity providing such equipment.

G. Protection of Materials:

1. Protect materials and equipment from damage and provide adequate and proper storage facilities during progress of the Work. Damaged materials and/or equipment shall be replaced.

H. Cleaning:

1. Exposed parts of Work shall be left in a neat, clean, usable condition. Finished painted surfaces shall be unblemished and metal surfaces shall be polished.

2. Thoroughly clean parts of apparatus and equipment. Exposed parts to be painted shall be thoroughly cleaned of cement, plaster, and other materials. Remove grease and oil spots with solvent. Such surfaces shall be wiped and corners and cracks scraped out. Exposed rough metal shall be smooth, free of sharp edges, carefully steel brushed to remove rust and other spots, and left in proper condition to receive finish painting.

3. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

I. Permits and Regulations:

1. Include payment of all permit and inspection fees applicable the work in this Division.

2. Work must conform to the National Electric Code, National Electrical Safety Code, and other applicable local, state, and federal laws, ordinances, and regulations. Where drawings or specifications exceed code requirements, the drawings and specifications shall govern. No work shall be installed which is less than minimum legal standards.

3. All work performed under this Division shall be inspected and approved by the Local Authority having Jurisdiction.

J. Site Inspection:

1. Each and all bidders shall inspect the project site prior to bidding.

2. Existing site conditions shall be compared with the information shown on the drawings. Immediately report any discrepancies to the Architect. After project bid date, no allowances will be made for failure to have made inspections.

3. During construction, the contractor shall exercise care and take appropriate precautionary measures to prevent any damage to the existing structures, sidewalks, utilities, communications, etc. during the project. The Contractor shall correct all damage caused by or during the project. Contractor shall provide not less than (2) and not more than (10) working days advance written, electronic, or telephonic notice of the commencement, extent, location and duration of the excavation work to Mississippi One-Call System, Inc. (1-800-227-6477) and any nonmembers operator(s) of any underground utility lines or underground facilities in and near the excavation area, so that Mississippi One-Call System, Inc.

operator(s) and any non-member operator(s) may locate and mark the location of underground utility lines and underground facilities in the excavation area.

K. Utility Company Coordination and Fees:

1. Contractor shall inspect and verify the existing utilities at the project site prior to bidding.

2. Where applicable, the contractor shall contact the local utility companies to verify service arrangements with each. Install all service entrance conduits, pads, duct banks, etc, to meet the requirements of the respective utility company. In instances where contract documents' requirements are more stringent that utility company requirements, the drawings and specifications shall take precedence.

3. The electrical contractor shall be responsible for and shall include in his bid any and all utility company fees required to provide connections for the project. Contractor shall be responsible for any fees assessed by the utility companies. The Architect or Owner shall not be responsible for any fees assessed by the utility companies.

4. The Contractor must coordinate with owner during the project for connection of permanent power to the facility; however, the contractor shall not utilize the permanent utilities unless written permission is granted by the owner. The local utility and authority having jurisdiction shall approve when permanent power may be installed in order to provide electrical start-up and check-out of equipment. Upon written permission of use of permanent electrical power, contractors shall pay any charges for power consumption while utilizing permanent power until the building or facility has been accepted by the owner.

L. Temporary Power for Construction:

1. The electrical contractor shall provide and install temporary power during the construction period as required to complete the project installation. Contractor shall coordinate with the general contractor, utility company, and/or owner to provide 120/240 volt power for the project. All devices shall be provided with ground fault circuit protection. Power shall be provided in central work area(s). This shall not include any remote power needs for any specific trades. For power requirements at voltages other than those listed above, the contractor shall coordinate connection requirements with the local utility company.

2. All temporary power installations shall meet local and national codes and be approved by the local authority having jurisdiction.

3. Temporary services shall be removed at completion of the project. Permanent utilities shall not be used during the Project except with the written permission of the Owner.

1.03 SUBMITTALS

A. Where indicated submit to architect, (7) copies of Shop Drawings including control diagrams, list of materials, catalog cuts, technical data, manufacturer's specifications, and applicable installation details.

1.04 RECORD DRAWINGS

A. The Electrical Contractor shall maintain, at the project site, a separate set of prints of the contract documents and shall show all changes and variations, in a neat and clearly discernible manner, which are made during construction. Upon completion of the work, these drawings shall be turned over to the Architect. Provide the following as-built documents including all contract drawings regardless of whether corrections were necessary and include in the transmittal: "2 sets of CDs and prints for Owner's use, one set of CDs, prints for Architect / Engineers Records". Delivery of these as-built electronic files and prints are a condition of final acceptance.

1.05 OPERATION AND MAINTENANCE MANUALS

A. The Electrical Contractor shall submit to architect (3) copies each of operating and maintenance manuals for each piece of equipment applicable to the project.

B. All shop drawings, installation, operation, and maintenance manuals, wiring diagrams, parts lists, and other information including warranties and technical support, shall be obtained from each manufacturer.

C. Assemble all information into three-ring binders or other suitable binding. Add an index and/or tabbed and labeled sections of all items submitted.

D. The Electrical Contractor shall at all times, maintain a clean set of construction document plans on site. Any and all deviations from the construction documents shall be marked, and clearly noted in red ink. All changes shall exactly indicate the revisions or changes to the design documents. Upon completion of the project, (2) clean sets of "red-line" construction as-built documents shall be submitted to the architect. Unclear, illegible, or inaccurate plans will be returned to the contractor for correction and resubmission. As-built documents shall be corrected by the Electrical Contractor and resubmitted at no additional cost.

1.06 INSPECTIONS AND PUNCH LIST

A. The Electrical Contractor shall survey and inspect his work and develop his own punch list to confirm that work is complete and finished. He shall then notify the General Contractor that work is complete and ready for inspection by the Architect. It is not the Architects or Engineers obligation to perform a final inspection until the contractor states his work has been inspected and is complete and ready for final inspection.

B. Request to the Architect, Engineer, or Owner for final inspection may be accompanied by a limited list of known deficiencies with a brief explanation or status of deficiencies and schedule for completion of each. Correction of these items shall be completed within (30) days of inspection or before final acceptance of occupancy.

1.07 WARRANTY

A. The Electrical Contractor shall warrant all workmanship, equipment, and materials installed under this contract for a period of (1) year minimum from the date of final acceptance as agreed between the Contractor and the Architect, unless indicated by other sections of these specifications.

B. Any equipment, materials, etc. proving to be defective during the warranty period shall be corrected or replaced without any expense to the Owner or other parties. This provision shall not be construed to include general maintenance items or luminaire lamps or correcting errors on the part of the owner, owner’s personnel, or owner’s representative.

2.0 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and Equipment furnished under this contract shall be in strict accordance with the specifications and drawings and shall be new and of best grade and quality. When two or more items of equal and similar materials and construction are required, they shall be of the same manufacturer.

B. All electrical equipment and materials shall bear the Underwriters Laboratories, Inc. label, and shall comply with the NEC and NFPA requirements as applicable.

2.02 MATERIALS AND EQUIPMENT SELECTION

A. Selection of Materials and Equipment furnished under this contract shall be determined by the following:

1. Where trade names, brands, and manufacturer’s part numbers are listed, the exact equipment listed shall be furnished. Where more than one name is used, the contractor shall have the

option of selecting between those specified. All products used shall be equal to that specified and shall be of best quality.

2. When the words "or equal" appear, specific approval must be obtained from the Architect during the bidding period in sufficient time to be included in an addendum. The same shall apply for equipment and materials not named in the specifications, where approval is sought.

3. Alternate materials and/or equipment must be submitted for approval a minimum 2 weeks prior to project bid date.

B. Before bidding, when preparing shop drawings, and prior to rough-in for installation, the contractor shall verify that adequate space is available for entry and installation of the item including any accessories. Also that adequate space is available for servicing equipment and required code clearances are satisfied.

3.0 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Advise the general contractor or architect before starting the Work of this Division.

B. Exposed conduits shall be painted to match the surfaces adjacent to installation. Refer to painting and coating section of specifications.

C. Salvaged materials, if applicable, removed from buildings shall be removed from the Project site as required by the general contractor.

D. Trenches outside of barricade limits shall be backfilled and paved within 24 hours after being inspected. Provide traffic plates during the time that trenches are open in traffic areas and in areas accessible to nonconstruction personnel.

E. Where structural walls are cored for new conduit runs, separation between cored holes shall be 3 inches edge to edge, unless otherwise required by the Architect. All coring to be laid out and reviewed by Architect prior to drilling. Contractor to verify location of structural steel, rebar, stress cabling, or similar prior to lay out.

F. Electrical equipment shall be braced and anchored as indicated on the Drawings.

3.02 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.03 PROTECTION

A. Protect the Work of this section until Substantial Completion.

SECTION 16050
BASIC ELECTRICAL MATERIALS AND METHODS

1.0 GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes:

1. Boxes, enclosures, keys and locks.

C. Related Sections:

1. Section 16010: Basic Electrical Requirements.

2.0 PRODUCTS

2.01 BOXES, ENCLOSURES, KEYS AND LOCKS

A. Outlet Boxes and Fittings:

1. In exposed Work, where conduit runs change direction or size, outlet boxes and conduit fittings shall be PVC with hubs integral with box or fitting.

2. Fittings shall be non-metallic

3. Covers for fittings shall be non-metallic and shall be designed for particular fitting installed.

B. Junction and Pull boxes:

1. Junction and pull boxes, in addition to those indicated, shall only be used in compliance with codes, recognized standards, and Contract Documents.

2. Covers shall be fastened to box with a sufficient number of screws to ensure continuous contact all around.

3. Weatherproof NEMA 3R pull and junction boxes shall conform to the following:

a. Cover of flush mounting boxes shall be furnished with a weather-tight gasket cemented to, and trimmed even with, cover all around.

b. Surface or semi-flush mounting pull and junction boxes shall be UL, or another Nationally Recognized Testing Laboratory (NRTL) listed as rain-tight and shall be furnished complete with conduit hubs.

4. Junction and pull boxes shall be rigidly fastened to structure and shall not depend on conduits for support.

5. Polymer Concrete Boxes:

a. Polymer concrete boxes are to be made from aggregates in combination with polymer resin, combined and processed by mixing, molding, and curing, and reinforced with fiberglass.

b. Boxes are to be high strength, impact resistant, corrosion resistant, nonflammable, and noncorrosive.

c. Enclosures, boxes and covers are required to conform to all test provisions of the most current ANSI/SCTE 77 “Specification For Underground Enclosure Integrity”

d. All components in an assembly (box & cover) are manufactured using matched surface tooling.

e. Covers shall be marked as electrical, power, communications, fiber, signal, etc. as required.

f. Bottom of box shall be filled with 6" of pea gravel.

C. Keys and Locks:

1. Provide 2 keys with furnished door locks, including cabinet door locks.

3.0 EXECUTION

3.01 INSTALLATION AND SUPPORT OF BOXES

A. Install outlet boxes and conduit body fittings as required.

B. All changes in direction shall occur using conduit body fittings.

C. Slight offsets shall be accomplished by heating conduit and shaping to form of structure.

D. Heights of outlets and equipment indicated on Drawings shall govern. In absence of such indications and if applicable to the project, the following heights shall be maintained with heights measured to centerline unless otherwise noted:

1. Install switches, 48 inches above finished floor. Refer to other Division 16 Sections.

3. Install panelboards and terminal cabinets 6 feet-6 inches maximum from finish floor to top of cabinet.

3.02 IDENTIFICATION OF CIRCUITS AND EQUIPMENT

A. Provide descriptive nameplates or tags permanently attached to pedestals and control cabinets.

B. Provide nameplates of engraved laminated plastic, or etched metal. Submit Shop Drawings denoting dimensions and format to Architect before installation. Fasten to equipment with escutcheon pins, rivets, self-tapping screws, or machine screws. Self-adhering or adhesive backed nameplates are not permitted.

3.03 PROTECTION

A. Protect Work of this section until Substantial Completion.

3.04 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

SECTION 16060
GROUNDING AND BONDING

1.0 GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes: Provide and install grounding system as indicated or required.

C. Related Sections:

1. Refer to related sections for their system grounding requirements.
2. Section 16010: Basic Electrical Requirements.

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. IEEE 142 Green Book.
2. Underwriter's Laboratories (UL).
3. National Electrical Code.
4. Building Industry Consultant Services International (BICSI) (Signal).
5. EIA/TIA (Signal and power).
6. Nationally Recognized Testing Laboratory (NRTL) or equal.

1.03 SYSTEM DESCRIPTION

A. Metallic objects on the Project site that enclose electrical conductors, or that are likely to be energized by electrical currents, shall be effectively grounded.

B. Metal equipment parts, such as enclosures, raceways, and equipment grounding conductors, and earth grounding electrodes shall be solidly joined together into a continuous electrically conductive system.

C. Metallic systems shall be effectively bonded to the main grounding electrode system.

D. A separately derived AC source shall be grounded to the equipment grounding conductor, and to separate “made” electrode of building grounding electrode system.

E. Electrical continuity to ground metal raceways and enclosures, isolated from equipment ground by installation of non-metallic conduit or fittings, shall be provided by a green insulated grounding conductor of required size within each raceway connected to isolated metallic raceways, or enclosures at each end. Each flexible conduit over 6 feet in length shall be provided with a green insulated grounding conductor of required size.

F. Cold water, or other utility piping systems, shall not be utilized as grounding electrodes due to the installation of insulating couplings and non-metallic pipe in such installations.

G. Non-current carrying metal parts of panelboard enclosures, motor frames, equipment cabinets, and metal frames of buildings shall be permanently and effectively grounded. Provide a NEC sized grounding conductor in every raceway.

H. Neutral of service conductors shall be grounded as follows:

1. Neutral shall be grounded at only one point within the Project site for that particular service. Preferable location of grounding point shall be at the service pedastal, or main switch.
2. Equipment and conduit grounding conductors shall be bonded to that grounding point.

1.04 SUBMITTALS

A. None.

2.0 PRODUCTS

2.01 MATERIALS

A. Electrodes shall be copper-clad steel ground rods, minimum 3/4 inch diameter by 10 feet long.

B. Grounding conductors shall be copper, #12 minimum with green insulation, unless noted otherwise.

3.0 EXECUTION

3.01 INSTALLATION

A. All grounding shall be installed in accordance with details on drawings and per NEC 250.

B. Bond panelboards, pedestals, and all electrical boxes and enclosures.

C. All conduits shall have a grounding conductor, minimum #12 copper. Conductor size shall be increased based on ampacity and/or phase conductors of the circuit.

D. Install grounding conductors at each pedestal location as noted on drawings.

E. All branch circuit, device, and switch junction boxes shall contain a grounding conductor, minimum #12 copper with green insulation, to bond the one or more equipment grounding conductors and the metal box. Connections shall be made to splice the equipment grounding conductors, grounding pig-tail, and metal box by means of a grounding screw or listed grounding device.

F. Grounding electrodes shall be installed in the nearest suitable planting area, where not otherwise indicated on Drawings.

G. Grounding rods shall be driven to a depth of not less than 10 feet. If necessary, permanent ground enhancement material, as manufactured by Erico Electrical Products, or equal, shall be installed at each ground rod to improve grounding effectiveness. Install in accordance with manufacture's installation instructions.

H. Grounding electrodes shall provide a resistance to ground of not more than 25 ohms.

I. When installing grounding rods, if resistance to ground exceeds 25 ohms, 2 or more rods connected in parallel, or coupled together shall be provided to meet grounding resistance requirements.

J. Ground rods shall be separated from one another by not less than 10 feet.

K. Parallel grounding rods shall be connected together with recognized fittings and grounding conductors in galvanized rigid steel conduit, buried not less than 12 inches below finish grade.

3.02 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.03 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

SECTION 16120
LOW-VOLTAGE CONDUCTORS (600 VOLT AC)

1.0 GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes: Low-voltage wire, splices, terminations and installation.

1.02 SUBMITTALS

A. None.

2.0 PRODUCTS

2.01 WIRES

A. Wires shall be single conductor type THHN or THWN insulated with polyvinyl chloride and covered with a protective sheath of nylon, rated at 600 volts. Wires may be operated at 90 degrees C. maximum continuous conductor temperature in dry locations, and 75 degrees C. in wet locations and shall be listed by UL Standard 83 for thermoplastic insulated wires, listed by Underwriter's Laboratories (UL) for installation in accordance with Article 310 of the National Electrical Code (NEC). Conductors shall be solid or stranded copper for 12 AWG and smaller conductors, and stranded copper for 10 AWG and larger conductors. Conductors shall be insulated with PVC and sheathed with nylon. Wires shall be identified by surface markings indicating manufacturer's identification, conductor size and metal, voltage rating, UL symbol, type designations and optional rating. Indentations for lettering are not permitted. Wires shall be tested in accordance with the requirements of UL standard for types THWN, or THHN.

B. Conductors shall be solid Class B or stranded Class C, annealed uncoated copper in accordance with UL standards, or another Nationally Recognized Testing Laboratory (NRTL).

2.02 STANDARDS

A. THWN/THHN wires shall comply with the following standards:

1. UL 83 for thermoplastic insulated wires.
2. UL 1063 for machine tool wires and cables.

3.0 EXECUTION

3.01 INSTALLATION

A. Wires shall not be installed until debris and moisture is removed from conduits, boxes, and cabinets. Wires stored at site shall be protected from physical damage until they are installed and walls are completed.

B. Wire-pulling compounds furnished as lubricants for installation of conductors in raceways shall be compounds approved and listed by UL, NRTL, or equal. Oil, grease, graphite, or similar substances are not permitted. Pulling of 2 AWG or larger conductors shall be performed with a cable pull machine. Any runs shorter than 50 feet are exempt. When pulling conductors, do not exceed manufacturer’s recommended values

C. Pressure cable connectors, pre-insulated Scotchlok, 3M, or equal, Y, R or B spring-loaded twist-on type, may be furnished in splicing number 8 AWG or smaller wires for wiring systems; except public address and telephone systems.

D. Connection of any bonding or grounding conductors shall be securely bolted together with corrosion-resistant plated carbon steel, minimum grade 5 machine screws secured with constant pressure-type locking devices.

E. Wiring in cabinets, pull boxes, and other cabinets, shall be neatly grouped and tied in bundles with nylon ties at 10-inch intervals. In panels and terminal blocks, wires shall be fanned out to terminals.If bundles are longer than 24 inches, a maximum of 9 current carrying conductors may be bundled together.

F. Install conductor lengths with a minimum length within the wiring space. Conductors must be long enough to reach the terminal location in a manner that avoids strain on the connecting lug.

G. Maintain the conductor required bending radius.

H. Neutral conductors larger than 6 gauge, which are not color identified throughout their entire length, shall be taped, painted white or natural gray, or taped white where they appear in cabinet, gutters or pull boxes. Neutral conductors 6 gauge and smaller shall be white color identified throughout their entire length.

I. Wiring systems shall be free from short circuits and grounds, other than required grounds.

3.02 COLOR CODES

A. General Wiring:

1. Color code conductor insulation as follows:

SYSTEM VOLTAGE	
Conductor	120/240 V
Phase A	Black
Phase B	Red
Neutral	White

Neutrals shall be colored-distinguished if circuits of two voltage systems are used in the same raceway.

3.03 FEEDER IDENTIFICATION

A. Feeder wires and cables shall be identified at each point the conduit run is broken by a cabinet, box, gutter, etc. Where terminal ends are available, identification shall be by means of heat shrink wire markers, which provide terminal strain relief. Markers shall be Brady Perma-Sleeve, or equal. Identification in other areas shall be by means of wrap-around tape markers Brady Perma-Code or equal. Markers shall include feeder designation, size, and description.

3.04 TAPE AND SPLICE KITS

A. Splices, joints, and connectors joining conductors in dry and wet locations shall be covered with insulation equivalent to that provided on conductors. Free ends of conductors connected to energized sources shall be taped. Voids in irregular connectors shall be filled with insulating compound before taping. Thermoplastic insulating tape approved by UL, NRTL, or equal for installation as sole insulation of splices shall be furnished and shall be installed according to manufacturer's printed specifications.

3.05 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.06 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

SECTION 16130
RACEWAYS, FITTINGS, AND SUPPORTS

1.0 GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes:

1. Raceways and wire ways
2. Conduit installation.
3. Underground requirements.

C. Related Sections:

1. Section 16010: Basic Electrical Requirements.
2. Section 16050: Basic Electrical Materials and Methods

D. Applicable Standards and Codes

1. EIA/TIA 569 Standards.
2. National American Standards Institute (ANSI)
3. National Electrical Manufacturer's Association (NEMA)
4. Nationally Recognized Testing Laboratory (NRTL)
5. National Electrical Code (NEC)
6. Underwriters Laboratory (UL)

1.02 SUBMITTALS

A. None.

2.0 PRODUCTS

2.01 RACEWAYS

A. Conduit Materials:

1. Non-metallic conduit shall be rigid PVC electrical conduit extruded to schedule 40 dimensions of Type II. Grade 1 high impact, polyvinyl chloride, sweeps, couplings, reducers and terminating fittings shall be listed under the UL, or another NRTL, and shall bear the manufacturer's listed marking.

2. Flexible conduit shall be non-metallic. Connectors shall be compatible with materials installed.

3. Conduit size shall be 1/2" minimum for above grade installations and 3/4" minimum for below grade or in-slab installations.

4. Metal Clad (MC) cable system is not allowed.

B. Pull Wires: Install 1/8 inch polypropylene cords in empty or spare conduits.

3.0 EXECUTION

3.01 CONDUIT INSTALLATION

A. General Requirements:

1. Provide complete and continuous systems of non-metallic conduit, outlet boxes, junction boxes, fittings and cabinets for systems of electrical wiring including lighting, power, and systems, except as otherwise specified.

2. All conduit installations shall be non-metallic.

3. Junction boxes and conduit body fittings shall be used for all conduit changes in direction.

4. Slight offsets shall be accomplished by heating conduit and shaping to form of structure.

5. Non-metallic flexible conduit shall be installed at motor connections. Maximum length shall be 12” from fitting to motor housing.

6. Connectors for non-metallic rigid and flexible conduit and shall be compatible with the conduit being installed.

7. Exposed conduit shall be installed vertically and horizontally following the general configuration of the structure.

8. Underground feeder distribution conduits for systems shall be non-metallic.

9. Conduit shall be concealed behind or on top of structural beams and structure where possible. Conduits exposed to view, shall be installed parallel or at right angles to structural members. Conduits shall be installed to clear access openings.

10. Bends or offsets will not be permitted unless absolutely necessary. Radius of each conduit bend or offset shall be as required by ordinance. Bends and offsets shall be performed with standard industry tools and equipment or may be factory fabricated bends or elbows complying with requirements for radius of bend specified. Heating of conduit shall be accomplished with listed heating elements or blankets. Do not use torch, flame, or similar for heating of conduits.

11. Conduits shall be supported as required by code, but not to exceed 5 feet. Conduit needs to be rigidly supported every 5 feet and supported within 3 feet of every junction box.

12. Flex conduits shall be cut square and not at an angle.

13. Routing of conduits may be changed providing length of any conduit run is not increased more than 10 percent of the length indicated on Drawings.

B. Underground Requirements:

1. Underground conduits and raceways shall be buried to a depth of not less than 24 inches below finished grade to top of the conduit envelope, unless otherwise specified.

2. Assemble sections of conduit with required fittings. Cut ends of conduit shall be reamed to remove rough edges. Joints in conduits shall be provided liquid-tight. Bends at risers shall be completely below surface where possible.

3. The architect or engineer will observe underground installations before and during conduit placement. A mandrel shall be drawn through each run of conduit in presence of the architect or engineer before and after placement. Mandrel shall be 6 inches in length minimum, and have a diameter that is within 1/4 inches of diameter of conduit to be tested.

4. Non-metallic conduit installations shall comply with following additional requirements. Joints in PVC conduit shall be sealed by means of required solvent-weld cement supplied by conduit manufacturer. Non-metallic conduit bends and deflections shall comply with requirements of applicable electrical code, except that minimum radius of any bend or offset for conduits sized from 1/2 inch to 1-1/2 inches inclusive shall not be less than 24 inches.

5. Furnish and install a 6-inch wide, polyethylene, red underground barrier type 12 inches above full length of conduits reading, "CAUTION ELECTRIC LINE BURIED BELOW".

6. Underground conduit systems provided for utility companies shall be furnished to meet the requirements of the utility companies requiring service.

7. Protect inside of conduit and raceway from dirt and rubbish during construction by capping openings.

8. Add bell-end bushings for conduit stub-up including underground entries to pull boxes, and manholes. Under floor standing switchboards and motor control centers provide a 4" galvanized nipple with ground bushing.

9. All underground conduits and raceways shall be swabbed prior to wire pull.

3.02 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.03 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

SECTION 16445
PEDESTALS, SAFETY SWITCHES, CABINETS

1.0 GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes: Lighting and power distribution facilities, including marina pedestals.

C. Related Sections:

1. Section 16010: Basic Electrical Requirements.

2. Section 16050: Basic Electrical Materials and Methods.

3. Section 16500: Lighting.

1.02 SUBMITTALS

A. Provide in accordance with Division 01.

B. Shop Drawings: Include a front elevation indicating cabinet dimensions, make, location and capacity of equipment, size of gutters, type of mounting, finish, and catalog number. General layout of internal devices, wiring drawings with wire numbers and device connections, vendor cut sheets of devices in enclosure and bill of materials listing description, manufacturer, part number, and quantity of items shall be included.

C. Installation Instructions: Submit manufacturer's written installation instructions.

1.03 DESIGN REQUIREMENTS

A. Marina Power Pedestals:

1. General Requirements:

a. Pedestals shall be 120/240 volt, 3-wire, solid neutral.
b. Shall be tested and certified to be in compliance with ANSI/UL 231 entitled "power outlets."
c. If a laboratory other than U.L. is used that laboratory must certify, in writing, that the power outlet has been tested and meets all of the requirements of ANSI/UL 231, including 746C polymeric materials, and that the unit will pass the 94VO-5V flame test.
d. Shall be certified to meet all sections of NFPA 303 DTD "2006 Marinas and Boatyards."
e. Shall meet 406.8 (B)(2)(a) of the national electric code NFPA 70, i.e. "A receptacle installed in a wet location shall be installed in a weatherproof enclosure, the integrity of which is not affected when the attachment plug cap is inserted."

2. Power Pedestal - General Specification

a. The Main Housing shall be constructed of 1/4" thick injection molded heavy resin material and shall be coated with a UV-resistant water based acrylic polyester. It shall be UL listed as a type 3R weatherproof enclosure.
b. The base shall be hinged to the upper unit to provide ease of wiring and plumbing and shall be of heavy resin construction with mounting feet that are 3/4" in thickness. Provide with base extender.

c. The Lighting Assembly top housing shall be constructed of 1/8" thick injection molded heavy resin material and shall be coated with a UV-resistant water based acrylic polymer. It shall be UL listed as a type 3R weatherproof enclosure.

i. Each pedestal shall be equipped with a non-metered light. The lighting assembly shall include one LED light, that is controlled by an electromechanical photocell and protected by a 20 amp, single pole breaker.

3. Wiring:

a. The power pedestal shall be completely pre-wired at the factory to the load side of the compression lug assembly.
b. All load copper wiring shall be of high stranding and tin plated to resist corrosion.
c. The maximum size of the line wiring shall be 350 MCM direct feed or #4/0 loop feed.

4. Loop Feed Bus Bar System:

a. STANDARD - 250 Amp Bus Bar - The bus system shall be of stud compression terminal type using a 3/8" - silicon-bronze stud with a silicon-bronze Belleville type washer. The 3/8" - silicon-bronze hex-nut shall be torqued to 150 inch-pounds with a maximum amperage rating of 250 amps.

5. Grounding: All exposed metallic parts must have an integral ground that is a part of the equipment grounding system.

6. Receptacles: All receptacles shall be mounted behind a weatherproof, hinged door that is under tension to ensure proper closing pressure when the receptacle is or is not in use.

a. All receptacles under 60 amps shall be of the corrosion resistant type conforming to NEMA L-5 and/or NEMA L-6 requirements and are rated for marine use.
b. 20 Amp, 110 Volt, straight blade receptacles shall be 2 pole, 3 wire.
c. 30 Amp, 125 Volt, straight blade receptacles shall be 2 pole, 3 wire.
d. 50 Amp, 125/250 Volt, straight blade receptacles shall be 3 pole, 4 wire.

7. Circuit Breakers: All breakers for receptacles shall be of the thermal magnetic type, 10,000 A.I.C., and shall be UL listed. Circuit breakers shall be located under lockable, weatherproof door cover.

a. Circuit breakers for the 20 Amp, 110 Volt, straight blade receptacles and the 20 Amp, 125 Volt, twist-lock receptacles shall be single pole, 20 Amp GFCI.
b. Circuit Breakers for the 30 Amp, 125 Volt, receptacles shall be single pole, 30 Amp GFCI.
c. Circuit breakers for the 50 Amp, 125/250 Volt, receptacles shall be two pole, 50 Amp.

8. Hose/Cable Bracket: Each pedestal shall have heavy resin brackets capable of holding a 50' length of 5/8" water hose or 50' of 50 Amp, four-conductor boat S.O. cord.

9. Water: The water connection shall be one (1) 1/2” inlet, which divides into two (2) hose bibs. The valves shall be 1/4 turn ball valves.

B. Safety Switches:

1. In accordance with UL 98, NEMA KS1, and NEC.

2. Shall be HP rated.

3. Fusible Switch, 600 amp and smaller: NEMA KS 1, Type HD, with clips or bolt pads to accommodate specified fuses or recommended fuses, lockable handle; interlocked with cover in closed position.

4. Non-Fusible Switch, 600 amp and smaller: NEMA KS 1, Type HD, lockable handle; interlocked with cover in closed position.

5. Shall have the following features:

   a. Switch mechanism shall be the quick-make, quick-break type.
   b. Copper blades, visible in the OFF position.
   c. An arc chute for each pole.
   d. External operating handle shall indicate ON and OFF position and have lock-open padlocking provisions.
   e. Mechanical interlock shall permit opening of the door only when the switch is in the OFF position, defeatable to permit inspection.
   f. Fuse holders for the sizes and types of fuses specified.
   g. Electrically operated switches shall only be installed where shown on the drawings.
   h. Solid neutral for each switch being installed in a circuit which includes a neutral conductor.
   i. Ground lugs for each ground conductor.
   j. Enclosures:
      i. Shall be the NEMA types shown on the drawings for the switches.
      ii. Where the types of switch enclosures are not shown, they shall be the NEMA types most suitable for the ambient environmental conditions. Unless otherwise indicated on the plans, all outdoor switches shall be NEMA 3R.
      iii. Shall be finished with manufacturer's standard gray baked enamel paint over pretreated steel (for the type of enclosure required).

2.0 PRODUCTS

2.01 MANUFACTURERS

A. Marina power and lighting pedestals shall be by Eaton – Marina Power and Lighting, Marina Electrical Equipment, Inc, or equal.

3.0 EXECUTION

3.01 INSTALLATION

A. Equipment shall be located so it is readily accessible and not exposed to physical damage.

B. Equipment installed outdoors shall be specifically listed for wet locations and shall be weatherproof in NEMA Type 3R cabinets.

C. Equipment locations shall provide sufficient working space around pedestals to comply with the National Electrical Code.

D. Disconnects/Safety switches shall be installed in the vertical position with "ON" at the up position and top of the switch.

E. Disconnects/Safety Switches shall be securely fastened to wall or structural member by at least 4 points. Where structural support is not present, uni-strut shall be installed for additional support and points-of-contact.

F. Unused openings in cabinets and disconnects shall be effectively closed as required by the manufacturer.

G. Cabinets shall be grounded as specified in Article 250 of the National Electrical Code.

H. Conduits shall be installed so as to prevent moisture or water from entering and accumulating within the enclosure.

I. Lugs shall be suitable and listed for installation with the conductor being connected.

J. Conductor lengths shall be maintained to a minimum within the wiring gutter space. Conductors shall be long enough to reach the terminal location in a manner that avoids strain on the connecting lugs.

K. Maintain the required bending radius of conductors inside the cabinet.

L. Clean the cabinet of foreign material such as cement, plaster, and paint. Repaint to manufacturers original finish any blemishes that occur during construction.

M. Distribute and arrange conductors neatly in the wiring gutters.

N. Use the manufacturer's torque values to tighten lugs.

O. Before energizing pedestals, the following steps shall be taken:

1. Retighten connections to the manufacturer's torque specifications. Verify that required connections have been provided.
2. Remove shipping blocks from component devices and pedestal interiors.
3. Manually exercise circuit breakers to verify they operate freely.
4. Remove debris from pedestal interior.

P. Follow manufacturer's instructions for installation.

Q. Do not install in highly corrosive environments, unless rated for the application.

R. Install marina power and lighting pedestals as noted on drawing details. Where pedestal are shown to be installed on piers or decks, secure pedestal base securely to the structure. Install pedestal feeder conductors such that no splices are installed below the platform deck. Install per manufacturer’s recommendations.

3.02 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.03 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

SECTION 16500
LIGHTING

1.0 GENERAL

1.01 SUMMARY

A. Provisions of the General and Supplementary Conditions and Division 01 apply to this section.

B. Section Includes: Furnishing and installing lighting fixtures, including lamps, ballasts, wiring, and lighting controls.

C. Light fixtures model numbers were determined at the time this specification was written; model numbers may need to be modified, or may require the addition or deletion of options to fully meet specification requirements.

D. Related Sections:

1. Section 16010: Basic Electrical Requirements
2. Section 16050: Basic Electrical Materials and Methods.

1.02 SUBMITTALS

A. Provide in accordance with Division 01.

B. List of Materials: Submit a complete list of materials proposed for this section.

C. Shop Drawings: Provide detailed and dimensioned Shop Drawings or manufacturer's data sheet with specific model and part numbers indicating kind, weight and thickness of materials, method of fitting and fastening parts together, location and number of sockets, size of lamps, and complete details of method of fitting suspension and fastening fixtures in place.

D. Submittals must comply with contract general provisions.

1.03 MOUNTING REQUIREMENTS

A. Design of lighting fixtures, accessories, supports, and method of fixture installation shall comply with requirements of where fixture is installed.

B. For fixtures mounted to roof structure, provide fixture supports at each end of fixture, and (4) anchors total.

1.04 QUALITY ASSURANCE

A. Components and fixtures shall be listed and approved for the intended application by Underwriter's Laboratories (UL), or other Nationally Recognized Testing Laboratory (NRTL).

B. Owners approval shall be obtained for any equipment or materials substitutions.

1.05 GUARANTEE

A. Provide a 1 year labor warranty.

B. Provide material warranty as specified:

1. Lamps: 1 years
2. Ballasts: 5 years
4. Controls: 3 years

C. Warranty period begins at substantial completion or project acceptance for beneficial occupancy.

2.0 PRODUCTS

2.01 MATERIAL AND FABRICATION

A. Lighting fixtures shall be the type indicated on Drawings and as specified. Fixtures of same type shall be of one manufacturer.

B. Fixtures shall be of the types and manufacturers described in the Luminaire Schedule of the Drawings, with lamps, wattage and voltage as indicated. Alternate fixtures must meet all requirements of the specification and of the specified fixture. Substitute fixtures that do not meet the specification w be replace with the specified product at no additional cost.

C. All fixtures shall be baked-on enamel or powder-coated, unless otherwise specified in subsections below.

2.02 LAMPS AND BALLASTS

A. LED Fixtures, Driver, and Characteristics

1. LED Fixture

a. Cast aluminum heat sink integrated directly with housing.
b. Replaceable PC board with quick connects.
c. High lumen output LED's with 50,000 hours life expectancy.
d. No lead or mercury.

2. Optics System

a. Computer-optimized internal reflector with specular finish with diffusing lens to conceal the LED's for uniform luminance.
b. Low glare, 900 lumens minimum.

3. LED Driver

a. Non-dimming and optical 0-10V dimming driver accommodating 120 or 277 volts AC at 60 Hz.
b. Power factor 0.9 minimum.
c. Driver to accept 120 or 277 volts AC.

3.0 EXECUTION

3.01 INSTALLATION

A. Install a lighting fixture for each lighting outlet indicated and mark new ballasts with day of installation.

B. Fixture voltage shall be as indicated on Drawings.

C. Align rsurface-mounted fluorescent fixtures to form straight lines and follow structure.

D. All fixtures shall be rigidly attached to structure.

3.02 TESTING

A. Check and adjust fixtures for required illumination.

B. Replace defective lamps and ballasts.

C. Test and adjust lighting control equipment for proper operation.

3.03 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.04 CLEANUP

A. Remove rubbish, debris, and waste materials from all areas of work each day.

B. Clean fixture surfaces of dirt, cement, plaster and debris. Furnish cleansers compatible with material surfaces being cleaned.

3.05 HAZARDOUS WASTE DISPOSAL

A. All hazardous waste disposal shall be handled and disposed of by an approved, licensed contractor.

B. Any and all ballasts are assumed to contain PCB unless clearly marked “NO PCB.”

C. Place ballasts and lamps in appropriate containers provided by hazardous waste contractor labeled clearly with:

1. Project Name
2. Quantity of lamps
3. Date lamps became waste

D. Store, remove, transport and dispose of hazardous materials in all accordance with state and federal regulations.

E. Provide Owner with copy of manifest and certificate of destruction.