



Alabama State Port Authority
Specification Booklet

Project Name McDuffie Unloaders 1 and 3 Dual Barge Shifter Systems Marine
Construction/Equipment Installation
Location Mobile, AL
Project # 10873 **Task #** 3 **October 2023**

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SPECIFICATIONS AND CONTRACT DOCUMENT

ISSUED BY

Engineering Services Department

ALABAMA STATE PORT AUTHORITY

John C. Driscoll, Director & CEO

Kay Ivey, Governor of Alabama



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INVITATION TO BID

Sealed bid proposals will be received via courier to the Alabama State Port Authority (ASPA), 1400 Alabama State Docks Blvd, Room 216, Administration Building, Mobile, AL 36602 by 1:00pm on December 5th, 2023. Sealed bid proposals can also be hand delivered from 1:45pm to 2:00pm on Tuesday, December 5th, 2023 to the Alabama State Port Authority in the International Trade Center building, 250 North Water Street, 1st floor – Killian Room, Mobile, AL. Faxed or electronically submitted bids will not be accepted. ATTENDANCE TO THE BID OPENING IS NOT MANDATORY.

**McDuffie Unloaders 1 and 3 Dual Barge Shifter Systems Marine Construction and Equipment
Installation
MOBILE, ALABAMA**

The work consists principally of providing bonds, labor, materials, equipment, and supervision necessary for the construction, fabrication, installation of structures and equipment at McDuffie Terminal. Construction drawings/specifications, installation procedure manuals/drawings, installation technical information are provided herein. QAQC of installation work (REW equipment to be installed), commissioning of the two complete dual barge shifter systems at the Alabama State Port Authority’s McDuffie Terminal in Mobile, Alabama shall be provided by REW, CMG and the owner. All equipment noted supplied by REW will be installed under this contract. All areas of the ASPA McDuffie Coal Terminal are restricted access facilities and require valid Port Access Credentials for entry.

Specifications, proposal forms, bond forms, and plans will be available on the Alabama Port Authority website under bid notices at the following address: <https://www.alports.com/procurement/#bids>. Any issues related to the retrieval of the contract documents from the website should be directed to the ASPA Project Manager, Tom Alvarez, PE at tom.alvarez@alports.com or 251-441-7534.

A **MANDATORY** Pre-Bid Meeting is scheduled for Tuesday, November 14th, 2023 at 10:30a.m. at the Alabama State Port Authority in the International Trade Center building, 250 North Water Street, 1st floor – Killian Room, Mobile, Alabama 36602 ([30°41'50.03"N, 88° 2'24.94"W](#)). At the conclusion of the Pre-Bid Meeting, a site visit will be offered to allow prospective Contractors to observe the existing conditions of the project site on the McDuffie Terminal. Access to the site will require a TWIC card (please refer to Division III, Item SP-15). All bidders not possessing proper access credentials must contact the ASPA PM at least 24 hours in advance to arrange an escort. **No same day escorts will be provided.** All escorted individuals are required to have a valid state or federal identification. All vehicles entering ASPA properties are required to have proof of vehicle registration and insurance.

All Contractors submitting bids are to carefully examine the site of the proposed work and thoroughly review the contract requirements prior to submission of a bid proposal. Each Bidder shall satisfy oneself as to the character, quality, and quantities of work to be performed, and as to the requirements of the proposed Contract. The submission of a proposal shall be proof that the bidding Contractor has made such examination and is satisfied as to the conditions to be encountered in performing the work and as to the requirements of the proposed Contract. Electing to not visit the site before bidding will not relieve the



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prospective bidders from the stated requirements to “satisfy oneself as to the character, quality, and quantities of work to be performed, and as to the requirements of the proposed contract”.

A Guarantee will be required with each bid as follows: (5%) percent of the amount bid, but in no event more than Ten Thousand (\$10,000) Dollars, shall be furnished in the form of a certified check or bid bond payable to the Alabama State Port Authority.

Performance and Payment bonds will be required at the signing of the contract in an amount not less than One Hundred (100%) percent of the contract price.

No bid will be considered unless the bidder, whether resident or non-resident of Alabama, is properly qualified to submit a proposal for this work in accordance with all applicable laws of the State of Alabama. All bidding Contractors must hold a current license from the State Licensing Board for General Contractors, Montgomery, Alabama with the classification of (H/RR) Heavy/Railroad or (H/RR-S) Specialty Construction: Marine Construction. Also, non-residents of the State must show evidence of having qualified with the Secretary of State to do business in Alabama.

Insofar as practical, the order of work will be as scheduled by the Contractor and approved by the ASPA Project Manager. The Contractor is required to submit a schedule detailing the construction within 10 calendar days of receipt of the Notice to Proceed. Contractor’s attention is directed to the fact that the facility’s cargo handling operation is a priority item, therefore, close coordination with McDuffie Operations and the project manager is required. All deliveries and construction activities shall be according to these specifications and all reference documents and coordinated with McDuffie Operations personnel.

All individuals doing any work on this project, including operators, supervisors, maintenance personnel, truck drivers, etc. must have a valid Transportation Worker Identification Credential (TWIC) card, ASPA badge and an ASPA vehicle decal with no exceptions. Information regarding ASPA’s access policy is provided on the ASPA website at the link below.

<https://www.alports.com/port-access>

Bids will be publicly opened at 2:00 pm on December 5th, 2023 at the Alabama State Port Authority in the International Trade Center building, 250 North Water Street, 1st floor – Killian Room, Mobile, Alabama. The right is reserved, as the interest of the Alabama State Port Authority may require, to reject any and all bids and to waive informalities in bids received.



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INSTRUCTIONS TO BIDDERS

1.0 ADDENDA AND INTERPRETATIONS

All questions about the meaning or intent of the Contract Documents shall be submitted in writing to the Cowles, Murphy, Glover & Assoc. Project Manager, John Glover, at jglover@cmg-a.com. Replies will be issued by Addenda emailed to all parties recorded as having received the bidding documents. All addenda so issued shall become part of the Contract Documents. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect. Deadline for submitting questions is 10:00am on Tuesday, November 30th, 2023.

2.0 PREQUALIFICATION OF BIDDERS

No proposal will be considered from any Contractor unless he has complied with the requirements of Paragraph SP-04 of the DIVISION III Special Provisions.

3.0 SUBMISSION OF PROPOSALS

Before submitting his proposal, the Contractor shall comply with the following:

- a) The Proposals, including the acknowledgement of addenda, shall be filled in ink on the form provided herein and all blank spaces in the form shall be fully filled. The signature shall be in long hand and the complete form shall be without interlineations, alteration or erasure.
- b) If the Bidder is a corporation organized in a state other than Alabama, attach to the Proposal a certificate from the Secretary of State showing that the Corporation is qualified to transact business in Alabama.
- c) Attach a certified check or Bid Bond in the amount of 5% of the Proposal, but not more than \$10,000 made payable to the Alabama State Port Authority.
- d) Non-resident (out of state) Contractor shall attach all items included by SP-6.
- e) Attach a copy of the State Contractor's License to Proposal.
- f) Certificate of Compliance with the Beason-Hammon Alabama Taxpayer and Citizen Protection Act (see page I-10)



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the Bidder, the certified check or bid bond accompanying this bid and the monies payable thereon shall be paid into the funds of the Owner not as penalty, but as a liquidation of a reasonable portion of the damages incurred by the Owner due to the Bidder’s failure to execute the Contract.

Additional Contract Documents

1. Reference Equipment Installations Specification

- A. Mechanical Installation and Commissioning Manual
- B. General Specification for Fabrication and Assembly REV 2
- C. Equipment Storage Procedures REV 0
- D. Standard Paint Specifications PS-4 REV 1
- E. Bolt Torque Table REV 3
- F. ASPA-McDuffie Island Terminal Estimated Weights

2. Drawing List:

<u>Drawing No.</u>	<u>Description</u>	<u>Revision</u>
4224M-C0	Cover Sheet	B
4224M-G1	General Notes	B
4224M-G2	General Notes	B
4224M-C1	Dual Barge Shifter Overall Existing Site Plan	B
4224M-C2	Dual Barge Shifter BU3 Enlarged Existing Site Plan	B
4224M-C3	Dual Barge Shifter BU1 Enlarged Existing Site Plan	B
4224M-C4	Dual Barge Shifter Demolition Plan	B
4224M-C5	Dual Barge Shifter New Overall Site Plan	B
4224M-C6	Dual Barge Shifter BU3 New Enlarged Site Plan	B
4224M-C7	Dual Barge Shifter BU1 New Enlarged Site Plan	B
4224M-S1	Dual Barge Shifter BU3 New Enlarged Dock Plan	B
4224M-S2	BU3 Dock Section	B
4224M-S3	Dual Barge Shifter BU1 New Enlarged Dock Plan	B
4224M-S4	BU1 Dock Section	B
4224M-S8	Dolphin “A” & “B” Elevation and Details	B
4224M-S9	Dolphin “C” Elevation and Details	B
4224M-S15	New Barge Breasting/Sheave Support Structure Details & Sections	B
4224M-S16	PCPS Pile Details	B



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4224M-S17	New Barge Breasting Structure Pile Layout	B
4224M-S18	Ladder Placement	B

APA – Additive Alternate Bid Option Drawings

MPR-1	Garrow’s Bend Mooring Pile Replacement
S1	Existing 30” Diameter Mooring Pile Detail & Sections
Sketch 1	42” DIA. Mooring Pipe Pile Detail

APA Geotechnical Reference Drawings

ASD Boring Location – Plant Area	1972
ASD Soil Profile (DVA)	1973
IDB-ASD Site Plan (DVA)	
IDB-ASD Boring Logs (DVA)	

CMG – Reference Drawings

4224M-GA1	Dual Barge Shifter Site Plan	0
4224M-GA2	Dual Barge Shifter General Arrangement	0
4224M-GA3	Dual Barge Shifter	0

Richmond Engineering Works (REW) Reference Drawings

S03828-8001	Gen Arrangement of BU-1 Dual Barge Shifter System	D
S03828-8002	Gen Arrangement of BU-1 Dual Barge Shifter System Section Views	D
S03828-8010	Gen Arrangement of BU-1 Cable Reel	D
S03828-8011	Gen Arrangement of BU1 Cable Reel Section Views	B
S03828-8021	Gen Arrangement of Dua Shifter Barge System BU1 Anchor Bolt Locations & Loads	B
S03828-8051	Gen Arrangement of BU-3 Dual Barge Shifter System	C
S03828-8052	Gen Arrangement of BU-3 Dual Barge Shifter System Section Views	C
S03828-8060	Gen Arrangement of BU-3 Cable Reel	C
S03828-8061	Gen Arrangement of BU3 Cable Reel Section Views	B
S03828-8071	Gen Arrangement of Dual Barge Shifter System BU3 Anchor Bolt Locations & Loads	C
S03828-8097	Gen Arrangement of Barge Haul Drive Assembly for BU-1 & BU-3	A

3. Appendix 1 – Existing Barge Unloader Drawings (Provided as PDF)

- 003 MD-475 NE,NW. CAR DUMBER & BARGE UNLO.MCC VOLK 82.PDF
- 010 ELECT DISTR VOLK 81.PDF
- 031 BARGE UNLOADER PH. 3 VOLK 81.PDF
- 033 DOLPHIN,FNDERS & CHL MARKERS VOLK 74.PDF
- 034 BARGE UNLDER BUCKEY ELEV. H&P 73.PDF



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- 038 BARGE STG AREA DREDGE PHASE I&II VOLK 73.PDF
- 070 BARGE UNLOADER FND. VOLK 82.PDF
- 072 CONT. BARGE UNLOADER DET. DRAVO 1981.PDF
- 084 CONTINUOUS BARGE UNLDR BARGE HAUL DRAVO 1980.PDF
- 087 BUCKET ELEV. BARGE UNLOADER H&P 1973.PDF
- 089 BARGE U.L#3 H&P 1981 ELR. FILE ONLY.PDF
- 126 BARGE FLEETING & HAULING SYS.MOD GBB 2000.PDF
- 178 BARGE UNLDR. SPEC.& DET h&p 1973.PDF

- 6427-3-0709.PDF
- 6440-3-0101.PDF
- 6440-3-0102.PDF
- 6440-3-0103.PDF
- 6440-3-0104.PDF
- 6440-3-0105.PDF
- 6440-3-0106.PDF
- 6440-3-0107.PDF
- 6440-3-0108.PDF
- 6440-3-0109.PDF
- 6440-3-0110.PDF
- 6440-3-0111.PDF
- 6440-3-0112.PDF
- 6440-3-0113.PDF
- 6440-3-0114.PDF
- 6440-3-0115.PDF
- 6440-3-0116.PDF
- 6440-3-0117.PDF
- 6440-3-0118.PDF
- 6440-3-0119.PDF
- 6440-3-0120.PDF
- 6440-3-0121.PDF
- 6440-3-0122.PDF
- 6440-3-0123.PDF
- 6440-3-2502.PDF
- 6440-3-2503.PDF
- 6440-3-2601.PDF
- 6440-3-2701.PDF
- 6440-3-2801.PDF
- 6440-3-3101.PDF
- 6440-3-7202.PDF
- 6440-3-7403.PDF
- 6440-3-7405.PDF
- 6440-3-7606.PDF



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Binder1.pdf
Binder1a.pdf
Sketch 1.pdf
Sketch 2.pdf



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SCHEDULE OF PRICES

Description		Unit	Quantity	Unit Price	Total
1	Demolition BU3				
1.1	Remove Existing Sheet Pile Cell	LS	1	\$	\$
1.2	Remove Existing North (4) Pile Sheave Dolphin	LS	1	\$	\$
1.3	Remove All Fendering Within the Unloading Slip	LS	1	\$	\$
1.4	Remove Existing Winches	LS	1	\$	\$
1.5	Remove Existing Camel Barge Haul System; Camels, Cables, Sheaves, Fairleads, Etc.	LS	1	\$	\$
1.6	Remove Existing Cable Reel	LS	1	\$	\$
1.7	Remove All Existing Miscellaneous Structures/Equipment/Appurtenances Required for the Performance of the Work	LS	1	\$	\$
Subtotal					\$
2	Marine Structures BU3				
2.1	Furnish and Install New Five (5) Pile Breasting/Sheave Support Structures	EA	2	\$	\$
2.2	Furnish and Install New Single Pile Dolphins 30" Type "B"	EA	6	\$	\$
2.3	Furnish and Install New Single Pile Dolphins 36" Type "A"	EA	2	\$	\$



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2.4	Furnish and Install New Fender Structure, Elements, and Panels Type I	EA	6	\$	\$
2.5	Furnish and Install New Fender Structure, Elements, and Panels Type II	EA	6	\$	\$
Subtotal					\$
3	Mechanical BU3				
3.1	Receive, Handle, Store, and Install New REW Furnished Dual Barge Shifter Barge	LS	1	\$	\$
3.2	Receive, Handle, Store, and Install New REW Furnished Barge Haul Winches	EA	2	\$	\$
3.3	Receive, Handle, Store, and Install New REW Furnished Wire Ropes and Wire Rope Fittings	LS	1	\$	\$
3.4	Receive, Handle, Store, and Install New REW Furnished Snatch Block w/swivel	EA	2	\$	\$
3.5	Receive, Handle, Store, and Install New REW Furnished Four Roller Fairlead	EA	6	\$	\$
3.6	Receive, Handle, Store, and Install New REW Furnished Cable Reel and Cable Guide	LS	1	\$	\$
3.7	Receive, Handle, Store, and Install New REW Furnished Cable Reel Cable	LS	1	\$	\$
3.8	Receive, Handle, Store, and Install New REW Furnished Miscellaneous Parts and Appurtenances	LS	1	\$	\$
Subtotal					\$



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4	Demolition BU1				
4.1	Remove Existing (4) Pile Sheave Dolphin	EA	2	\$	\$
4.2	Remove All Fendering Within the Unloading Slip	LS	1	\$	\$
4.3	Remove Existing Winches	LS	1	\$	\$
4.4	Remove Existing Camel Barge Haul System; Camels, Cables, Sheaves, Fairleads, Etc.	LS	1	\$	\$
4.5	Remove Existing Cable Reel	LS	1	\$	\$
4.6	Remove All Existing Miscellaneous Structures/Equipment/Appurtenances Required for the Performance of the Work	LS	1	\$	\$
Subtotal					\$
5	Marine Structures BU1				
5.1	Furnish and Install New Five (5) Pile Breastings/Sheave Support Structures	EA	2	\$	\$
5.2	Furnish and Install New Single Pile Dolphins 30" Diameter Type "B"	EA	5	\$	\$
5.3	Furnish and Install New Single Pile Dolphins 36" Diameter Type "A"	EA	4	\$	\$
5.4	Furnish and Install New Fender Structures, Elements, and Panels Type III	EA	6	\$	\$
5.5	Furnish and Install New Fender Structures, Elements, and Panels Type IV	EA	12	\$	\$
5.6	Furnish and Install New Single Pile Dolphins 36" Diameter Type "A"	EA	2	\$	\$



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5.7	Furnish and Install New Single Pile Dolphins 60" Diameter Type "C"	EA	2	\$	\$
Subtotal					\$
6 Mechanical BU1					
6.1	Receive, Handle, Store, and Install New REW Furnished Dual Barge Shifter Barge	LS	1	\$	\$
6.2	Receive, Handle, Store, and Install New REW Furnished Barge Haul Winches	EA	2	\$	\$
6.3	Receive, Handle, Store, and Install New REW Furnished Wire Ropes and Wire Rope Fittings	LS	1	\$	\$
6.4	Receive, Handle, Store, and Install New REW Furnished Snatch Block w/swivel	EA	2	\$	\$
6.5	Receive, Handle, Store, and Install New REW Furnished Four Roller Fairlead	EA	6	\$	\$
6.6	Receive, Handle, Store, and Install New REW Furnished Cable Reel and Cable Guide	LS	1	\$	\$
6.7	Receive, Handle, Store, and Install New REW Furnished Cable Reel Cable	LS	1	\$	\$
6.8	Receive, Handle, Store, and Install New REW Furnished Miscellaneous Parts and Appurtenances	LS	1	\$	\$
Subtotal					\$
7 General Conditions					
7.1	Mobilization/Demobilization	LS	1	\$	\$



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7.2	Insurance	LS	1	\$	\$
7.3	Performance and Labor & Material Bonds	LS	1	\$	\$
Subtotal					\$
Base Project Total					\$

- (1) The general requirements cost shall be absorbed into the listed line items with the schedule of prices, including insurances, overhead profit and all other miscellaneous fabrication activities involved with the specific equipment system supply phase including the drawings, installation manuals and construction related activities.
- (2) Miscellaneous (Item 3.8 and 6.8) should include any other items not specifically detailed in the schedule of prices but included in the complete construction and installation of the dual barge shifter systems in accordance with the specifications.
- (3) All construction work and equipment installation shall be warrantied for (2) years.

I, the undersigned bidder, hereby acknowledge receipt of the following addenda:

ADDENDA NOs. _____ thru _____

Contractor's Signature:		
Contractor Company _____		
Name	Title	Date



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Bid Additive – Barge Fleet Mooring Pile Replacement

Description		Units	Quantity	Unit Price	Total
A	Removal and Disposal of one (1) damaged mooring pipe pile (Location 5 on Dwg. MPR-1)	LS	1	\$	\$
B	Furnish and Install two (2) 42" diameter mooring pipe piles per details on Dwg. MPR-1 (Locations 1 & 5 on Dwg. MPR-1)	EA	2	\$	\$



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BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, undersigned, _____
 _____ as Principal, and _____ as Surety,
 are hereby held and bound unto The Alabama State Port Authority as **OWNER** in the Penal sum of
 _____ for the payment of which will and truly be made, we hereby jointly
 and severally bind ourselves, successors and assigns. Signed, the _____ day of _____,
 20__.

The Condition of the above obligation is such that whereas the Principal has submitted to the Alabama State Port Authority a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for the McDuffie Unloaders 1 and 3 Dual Barge Shifter Systems Marine Construction and Equipment Installaion in Mobile, Alabama, Project No.: 10873, Task No.: 3

NOW, THEREFORE,

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

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

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

Principal	
Surety	
By	



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State of _____

County of _____

**CERTIFICATE OF COMPLIANCE WITH THE BEASON-HAMMON ALABAMA TAXPAYER AND
CITIZEN PROTECTION ACT (ACT 2011-535, as amended by Act 2012-491)**

DATE: _____

RE Contract/Grant/Incentive (describe by number or subject):

_____ by and between
_____ (Contractor/Grantee) and
_____ (State Agency, Department or Public Entity)

The undersigned hereby certifies to the State of Alabama as follows:

1. The undersigned holds the position of _____ with the Contractor/Grantee named above, and is authorized to provide representations set out in this Certificate as the official and binding act of that entity, and has knowledge of the provisions of THE BEASON-HAMMON ALABAMA TAXPAYER AND CITIZEN PROTECTION ACT (ACT 2011-535 of the Alabama Legislature, as amended by Act 2012-491) which is described herein as "the Act".
2. Using the following definitions from Section 3 of the Act, select and initial either (a) or (b), below, to describe the Contractor/Grantee's business structure.

BUSINESS ENTITY. Any person or group of persons employing one or more persons performing or engaging in any activity, enterprise, profession, or occupation for gain, benefit, advantage, or livelihood, whether for profit or not for profit. "Business entity" shall include, but not be limited to the following:

- a. Self-employed individuals, business entities filing articles of incorporation, partnerships, limited partnerships, limited liability companies, foreign corporations, foreign limited partnerships, foreign limited liability companies authorized to transact business in this state, business trusts, and any business entity that registers with the Secretary of State.
- b. Any business entity that possesses a business license, permit, certificate, approval, registration, charter, or similar form of authorization issued by the state, any business entity that is exempt by law from obtaining such a business license and any business entity that is operating unlawfully without a business license.

EMPLOYER. Any person, firm, corporation, partnership, joint stock association, agent, manager, representative, foreman, or other person having control or custody of any employment, place of employment, or of any employee, including any person or entity employing any person for hire within the State of Alabama, including a public employer. This term shall not include the occupant of a household contracting with another person to perform casual domestic labor within the household.

- ____ (a) The Contractor/Grantee is a business entity or employer as those terms are defined in Section 3 of the Act.
- ____ (b) The Contractor/Grantee is not a business entity or employer as those terms are defined in Section 3 of the Act.

3. As of the date of this Certificate, Contractor/Grantee does not knowingly employ an unauthorized alien within the State of Alabama and hereafter it will not knowingly employ, hire for employment, or continue to employ an unauthorized alien within the State of Alabama;
4. Contractor/Grantee is enrolled in E-Verify unless it is not eligible to enroll because of the rules of that program or other factors beyond its control.



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

IN WITNESS WHEREOF, this instrument is executed this _____ day of _____, 20_____.

ATTEST:

(Principal) Secretary
(SEAL)

Witness as to Surety Principal

(Address)

ATTEST:

Witness as to Surety

(Address)

Principal

BY: _____(s)

(Address)

Surety

BY: _____
Attorney-In-Fact

(Address)

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



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ACKNOWLEDGEMENT FOR CHANGE ORDERS

TO: ALABAMA STATE PORT AUTHORITY

RE: McDuffie Unloaders 1 and 3 Dual Barge Shifter Systems Marine Construction and
Equipment Installation

Gentlemen:

In order to avoid the necessity of extensive amendment to the referenced Contract, the undersigned hereby acknowledges that the following conditions are those for which change orders are allowed under the Bid law:

1. Unusual and difficult circumstances which arise during the course of the execution of the Contract which could not have been reasonably foreseen.
2. Where competitive bidding for the new work will be to the serious detriment of the Owner.
3. Emergencies arising during the course of work.
4. Changes or alterations provided for in the original bid and original Contract.
5. The Contractor/Equipment Supplier also acknowledges that he has read paragraph 50-04 (EXTRA WORK) and 60-17 of the (CLAIMS FOR ADJUSTMENT AND DISPUTES) of the General Provisions and agrees that "If for any reason the Contractor deems that additional compensation is due him for work or materials not clearly provided in the Contract, plans, or specifications or previously authorized as extra work, he shall notify the Engineer in writing of his intention to claim such additional compensation before he begins the work on which he bases his claim."

CONTRACTOR

BY: _____

DATE

TITLE



Alabama State Port Authority
Specification Booklet

Project Name McDuffie Unloaders 1 and 3 Dual Barge Shifter Systems Marine
Construction/Equipment Installation
Location Mobile, AL

Project # 10873 **Task #** 3 **October 2023** II-6 | Page

CONTRACT

THIS AGREEMENT, made and executed on this _____ day of the month of _____, Two Thousand and _____ (20____), by and between The Alabama State Port Authority, and _____, domiciled in the state of _____, Party of the Second Part, and hereinafter designated as "CONTRACTOR," WITNESSETH, that in consideration of the covenants and agreements herein contained, to be performed by the parties hereto and of the payments hereinafter agreed to be made, it is mutually agreed as follows:

The CONTRACTOR/EQUIPMENT SUPPLIER," shall and will provide and furnish all equipment and labor, and perform the work required to build, construct, and complete in a thorough and workmanlike manner, to the satisfaction of the Alabama State Port Authority:

Project Name:McDuffie Unloaders 1 and 3 Dual Barge Shifter Systems Marine
Construction and Equipment Installation
Project #: 10873 Task 3

Hereinafter called the project, for the base Contract price of _____ DOLLARS, (\$_____) and all extra work in connection therewith, and in accordance with plans, specifications, and Proposal, which are made a part thereof as fully as is set out herein, and hereby becomes a part of this Contract.

It is agreed and understood that the Alabama State Port Authority shall pay, and the Contractor\ Equipment Supplier," shall receive, the full compensation for the work performed in accordance with the Specifications.

The project shall commence and will be completed in accordance with Paragraph SP-03 of the Special Provisions.

This contract shall become effective immediately upon, and as of the date all necessary parties hereto have approached and signed the same.

By signing this contract, the contracting parties affirm, for the duration of the agreement, that they will not violate federal immigration law or knowingly employ, hire for employment, or continue to employ an unauthorized alien within the State of Alabama. Furthermore, a contracting party found to be in violation of this provision shall be deemed in breach of the agreement and shall be responsible for all damages resulting therefrom.

IN WITNESS WHEREOF, the parties of these presents have executed this Agreement in the year and day first above written.



Alabama State Port Authority
Specification Booklet

Project Name McDuffie Unloaders 1 and 3 Dual Barge Shifter Systems Marine
Construction/Equipment Installation

Location Mobile, AL

Project # 10873

Task # 3

October 2023

WITNESS:

Alabama State Port Authority

BY: _____

WITNESS:

Contractor
Party of the Second Part

BY: _____



Alabama State Port Authority
Specification Booklet

Project Name McDuffie Unloaders 1 and 3 Dual Barge Shifter Systems Marine
Construction/Equipment Installation
Location Mobile, AL

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SP-01 DESCRIPTION OF WORK

The work consists principally of providing bonds, labor, materials, equipment, and supervision necessary for the receiving of delivered equipment supplier materials as directed by the Owner, delivery to McDuffie Terminal, receiving and storage of construction materials, construction of all marine structures, dolphins, fenders, breasting/sheave structures, installation of all REW supplied equipment, commissioning assistance, contractor QAQC responsibility (provide designated personnel) over installation work (i.e. equipment to be installed and commissioned), commissioning of two complete dual barge shifter systems at the Alabama State Port Authority's McDuffie Terminal in Mobile, Alabama. Technical assistance, installation assistance, QAQC assistance and commissioning assistance will be provided by REW and CMG. All areas of the ASPA McDuffie Coal Terminal are restricted access facilities and require valid Port Access Credentials for entry.

SP-02 OWNER PURCHASE OF MATERIALS

The Alabama State Port Authority will utilize its sales tax exemption status on this project. The Contractor will be responsible for the purchase of all materials and will be required to apply for a sales and use tax certificate of exemption upon contract award.

The following shall apply to Section 20-14 (Owner Purchase of Materials) of Division IV General Provisions:

- 1) 20-14.2 Purchase of Materials or Equipment – Delete in its entirety
- 2) 20-14.3 Payment of Materials or Equipment – Delete in its entirety
- 3) 20-14.4 Accounting Procedures – Delete in its entirety
- 4) 20-14.5 Procedures – Delete in its entirety
- 5) 20-14.7 Project Close-Out – Delete in its entirety

SP-03 COMMENCEMENT AND COMPLETION

The Contractor will be required to commence work under this contract in accordance with DIVISION IV GENERAL PROVISIONS Article 90-02 (NOTICE TO PROCEED), to prosecute said work with faithfulness and energy, and to complete the entire project within 240 calendar days after receipt of Notice to Proceed. The time stated for final completion shall include final clean-up of all work sites. Failure to complete work on schedule shall initiate liquidated damages, which will be assessed in accordance with the provisions of Paragraph 20-13 (LIQUIDATED DAMAGES) of DIVISION IV, GENERAL PROVISIONS. In addition, liquidated damages referenced in DIVISION V, CONSTRUCTION SPECIFICATIONS, shall also be initiated.

SP-04 QUALIFICATION OF BIDDERS

In addition to the requirements of Article 20-01 and 20-03 of Division IV, GENERAL PROVISIONS, the Owner may make such investigations as he deems necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right

to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Owner that such bidder is properly qualified to carry out the obligations of the Contract and to complete the work contemplated therein. Conditional bids will not be accepted.

SP-05 ACCEPTANCE OR REJECTION OF BIDS

The Authority reserves the right to accept or reject any or all bids and to waive informalities. In addition, non-residents of the State must show evidence of having qualified with the Secretary of State to do business in Alabama.

SP-06 NON-RESIDENT (OUT-OF-STATE) CONTRACTORS

Preference shall be given to resident Contractors, and non-resident bidders domiciled in a state having laws granting preference to local Contractors shall be awarded Alabama public contracts the same as Alabama Contractors bidding under similar circumstances; and resident Contractors in Alabama are to be granted preference over non-residents in awarding of contracts in the same manner and to the same extent as provided by the laws of the state of domicile of the non-resident.

Non-resident bidders must accompany any written bid documents with a written opinion of any attorney at law licensed to practice law in such non-resident bidders' state of domicile, as to the preferences, if any or none, granted by the law of that state to its own business entities whose principal places of business are in that State in the letting of any or all public contracts.

SP-07 INDEMNIFICATION

To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, the Engineer, and their agents and employees from and against all claims, damages, losses, and expenses, including, but not limited to, attorney's fees arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss, or expense (1) is attributed to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including the loss of use resulting therefrom, and (2) is caused in whole or in part by any negligent act or omission of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity that would otherwise exist as to any party or person described in this Paragraph SP-07.

In any and all claims against the Owner, the Engineer or any of their agents or employees by any employee of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification under this Paragraph SP-07, shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any subcontractor under workers' or workmen's compensation acts, or other employee benefits acts.

SP-08 SUPERVISION

The Contractor shall place a competent superintendent on the Project who shall have experience in the type of work being performed under this Contract. A resume of the superintendent's experience shall be submitted for review prior to the placement of the named person on the project. The Contractor/Equipment Supplier shall also submit an organizational chart, which shall clearly show the Contractor's/Equipment Supplier's personnel assigned to the Project and the position that they hold. The chart shall also define the persons of contact with the Owner and the Engineer.

The Owner reserves the right to request changes in supervision for incompetent actions or other reasons of due cause. Once the Contractor is notified in writing of a request to replace the superintendent, he shall do so within five (5) calendar days of such request.

The Contractor's assigned superintendent shall have responsibility for the day-to-day operations of the work and shall be the on-site safety officer responsible for implementation of the Contractor's safety program unless another named person is so assigned.

The assigned superintendent shall remain on the Project site while work under the Contract is being performed. In the superintendent's absence from the site, another named person shall be responsible for all aspects of the work. Notification of the name of the individual shall be filed with the Owner and Engineer. The Contractor shall not reassign a superintendent without the acknowledgement and approval of the Owner.

SP-09 CONTRACTOR'S REPRESENTATIVE

A representative of the Contractor shall be on the site at all times work is being conducted as required by paragraph 90-01 (SUBLETTING OF CONTRACT) of DIVISION IV. A telephone number should be given to the Engineer where he might contact the Representative after working hours in case of an emergency.

SP-10 METHOD OF PAYMENT

Alabama Port Authority (APA) will issue monthly payments on this project. The Contractor will need to submit their monthly pay application for approval each month.

SP-11 INSURANCE

The following shall apply to Section 40 (Indemnification and Insurance Requirements) of Division IV General Provisions:

1. 40-08 Railroad Protective Liability – Delete in its entirety
2. 40-10 Professional Liability Insurance – Delete in its entirety

SP-12 TAXPAYER AND CITIZEN PROTECTION ACT

Effective October 1, 2011, the Beason-Hammon Alabama Taxpayer and Citizen Protection Act ("the Act") requires that any business entity contracting with or providing any grant or incentives to the state, including the Alabama State Port Authority, certify compliance with the Act. All Bidders must certify such compliance by executing the enclosed Certificate of Compliance and returning it to the Alabama State Port Authority along with proof of the bidding company's enrollment in the e-verify program with your bid package. The affidavit must be notarized. The following E-Verify website link is provided for convenience: <https://www.e-verify.gov/>

SP-13 GUARANTEE

The Contractor shall furnish to the Alabama State Port Authority a written guarantee in accordance with the requirements stipulated in the Division I Schedule of Prices and Division V Construction Specifications. This guarantee shall be issued from the date of final acceptance and shall cover any defective material or workmanship on the specified structure.

SP-14 CPM PROJECT SCHEDULE

The Contractor shall prepare a CPM Project Schedule using Microsoft Project and the schedule shall show all items of work necessary to bring the project to completion. The Contractor shall

submit electronic copies of his Progress Schedule updated monthly to reflect the status of the work. These updates shall be submitted in conjunction with the monthly progress Payment Request and shall be a requisite for the payment request to be processed.

SP-15 ACCESS TO ASPA RESTRICTED FACILITIES

All individuals doing any work on this project, including operators, supervisors, maintenance personnel, truck drivers, etc. must have a valid Transportation Worker Identification Credential (TWIC) card, ASPA badge and an ASPA vehicle decal with no exceptions. Information regarding ASPA's access policy is provided on the ASPA website at the link below.

<https://www.alports.com/port-access/>

SP-16 TEMPORARY WATER AND ELECTRICAL POWER

The responsibility shall be upon the Contractor to provide and maintain at his own expense an adequate supply of water of a quality suitable for his use for construction and domestic consumption. At his own expense, he shall install and maintain any necessary water supply connections and piping. However, he shall do so only at locations and in such workmanship manner as may be authorized by the Owner. Before final acceptance, temporary connections and piping installations by the Contractor shall be removed in a workmanship manner to the satisfaction of the Owner.

All electrical current required by the Contractor shall be furnished by the Contractor at his own expense. All temporary connections for electricity shall be subject to the approval of the Engineer. The Contractor shall at his own expense; install a meter to determine the amount of current used by him/her and will pay for such electricity at prevailing rates.

SP-17 INTENT OF PLANS AND SPECIFICATIONS

The following is in addition to Article 60-03 of Division IV, General Provision:

Any detail which may be incomplete or lacking in the plans and specifications shall not constitute claim for extra compensation. Such detail shall be supplied by the Contractor and submitted to the Engineer in advance of its requirement on the job. The true intent of the plans and specifications is to produce a complete working facility and incomplete detail will not abrogate this intent.

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SECTION 10

DEFINITIONS OF TERMS

Whenever the following terms are used in these specifications, in the Contract, in any documents or other instruments pertaining to construction where these specifications govern, the intent and meaning shall be interpreted as follows:

10-01 ADVERTISEMENT. A public announcement, as required by local law, inviting bids for work to be performed and materials to be furnished.

10-02 AISC. The American Institute of Steel Construction.

10-03 ASTM. The American Society for Testing and Materials.

10-04 AWARD. The acceptance, by the OWNER, of the successful bidder's proposal.

10-05 BIDDER. Any individual, partnership, firm or corporation, acting directly or through a duly authorized representative, who submits a proposal for the work contemplated.

10-06 CALENDAR DAY. Every day shown on the calendar.

10-07 CHANGE ORDER. A written order to the Contractor covering changes in the plans, specifications, or proposal quantities and establishing the basis of payment and Contract time adjustment, if any, for the work affected by such changes. The work, covered by a change order, shall be within the scope of the Contract.

10-08 COMMERCE. The prime business of the OWNER, consisting of the transshipping and storage of goods and materials by highway, rail, barge, and ship.

10-09 CONSTRUCTION MANAGER. The individual, partnership, firm or corporation duly authorized by the OWNER to be responsible for construction management supervision of the Contract work and acting directly or through an authorized representative.

10-10 CONTRACT. The written agreement covering the work to be performed. The awarded Contract shall include, but is not limited to: The Advertisement; The Contract Form; The Proposal; The Performance Bond; The Payment Bond; any required insurance certificates; The Specifications; The Plans; Change Orders and any addenda issued to bidders.

10-11 CONTRACT ITEM (PAY ITEM). A specific unit of work for which a price is provided in the Contract.

10-12 CONTRACT TIME. The number of calendar days or working days, stated in the special provisions, allowed for completion of the Contract, including authorized time extensions. If a calendar date of completion is stated in the proposal, in lieu of a number of calendar or working days, the Contract shall be completed by that date.

10-13 CONTRACTOR. The individual, partnership, firm or corporation primarily liable for the acceptable performance of the work Contracted and for the payment of all legal debts pertaining to the work who acts directly or through lawful agents or employees to complete the Contract work.

10-14 DEPARTMENT. The Alabama State Port Authority.

10-15 DIRECTOR. The Director of the Alabama State Port Authority, as constituted under the laws of Alabama.

10-16 ENGINEER. The individual, partnership, firm or corporation duly authorized by the OWNER to be responsible for Engineering supervision of the Contract work and acting directly or through an authorized representative.

10-17 EQUIPMENT. All machinery, together with the necessary supplies for upkeep and maintenance, and also all tools and apparatus necessary for the proper construction and acceptable completion of the work.

10-18 EXTRA WORK. An item of work not provided for in the awarded Contract is previously modified by change order or supplemental agreement, but which is found by the Engineer to be necessary to complete the work within the intended scope of the Contract as previously modified.

10-19 FEDERAL SPECIFICATIONS. The Federal Specifications and Standards, and supplements, amendments and indices thereto are prepared and issued by the General Services Administration of the Federal Government. They may be obtained from the Specifications Activity, Printed Materials Supply Division, Building 197, Naval Weapons Plant, Washington D.C. 20407.

10-20 FORCE ACCOUNT. The term used to describe a method of accounting which may be employed as a basis of payment to the Contractor for Extra Work.

10-21 INSPECTOR. An authorized representative of the Engineer assigned to make all necessary reviews of the work performed or being performed, or of the materials furnished or being furnished by the Contractor.

10-22 INTENTION OF TERMS. Whenever, in these specifications or on the plans, the words "directed", "required", "permitted", "ordered", "designated", "prescribed", or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Engineer is intended; and similarly, the words "approved", "acceptable" "satisfactory", or words of like import, shall mean approved by, or acceptable to, or satisfactory to the Engineer, subject to each case to the final determination of the OWNER.

Any reference to a specific requirement of a numbered paragraph of the Contract specifications or a cited standard shall be interpreted to include all general requirements of the entire section, specification item, or cited standard that may be pertinent to such specific reference.

10-23 LABORATORY. The official testing laboratories of the OWNER or such other laboratories as may be designated by the Engineer.

10-24 MAJOR AND MINOR CONTRACT ITEMS. A major Contract item shall be any item that is listed in the proposal, the total cost of which is equal to or greater than 10 percent of the total amount of the awarded Contract. All other items shall be considered minor Contract items.

10-25 MATERIALS. Any substance specified for use in the construction of the Contract work.

10-26 NOTICE TO PROCEED. A written notice to the Contractor to begin the actual work on a previously agreed to date. If applicable, the Notice to Proceed shall state the date on which the Contract time begins.

10-27 OWNER. The term OWNER shall mean the State of Alabama acting by and through the Alabama State Port Authority.

10-28 PAYMENT BOND. The approved form of security furnished by the Contractor and his surety as a guaranty that he will pay in full all bills and accounts for materials and labor used in the construction of the work.

10-29 PERFORMANCE BOND. The approved form of security furnished by the Contractor and his surety as a guaranty that the Contractor will complete the work in accordance with the terms of the Contract.

10-30 PLANS. The official drawings or exact reproductions, approved by the Engineer, which show the location, character, dimensions and details of the work to be done and which are to be considered as a part of the Contract, supplementary to the specifications.

10-31 PROJECT. The agreed scope of work for accomplishing specific development.

10-32 PROPOSAL. The written offer of the bidder (when submitted on the approved proposal form) to perform the contemplated work and furnish the necessary materials in accordance with the provisions of the plans and specifications.

10-33 PROPOSAL FORM. The approved, prepared form on which the OWNER requires that formal bids be submitted for the work contemplated.

10-34 PROPOSAL GUARANTY. The security furnished with a proposal to guarantee that the bidder will enter into a Contract if his proposal is accepted by the OWNER.

10-35 SPECIAL PROVISIONS. Specific directions and provisions additional to these GENERAL PROVISIONS and to any CONSTRUCTION SPECIFICATIONS setting forth conditions or requirements of construction which are not satisfactorily covered by these GENERAL PROVISIONS or the CONSTRUCTION SPECIFICATIONS. SPECIAL PROVISIONS shall prevail over the GENERAL PROVISIONS and CONSTRUCTION SPECIFICATIONS because they set forth the final Contractual intent as to the matter involved.

10-36 SPECIFICATIONS. A part of the Contract containing the written directions and requirements for completing the Contract work. Standards for specifying materials or testing which are cited in the Contract specifications by reference shall have the same force and effect as if included in the Contract physically.

10-37 STATE. The State of Alabama, the Party of the First Part to the Contract, acting by and through the Alabama State Port Authority.

10-38 STRUCTURES. Port facilities such as wharves, piers, dolphins, bridges, culverts, catch basins, inlets, retaining walls, cribbing, storm and sanitary sewer lines, water lines, under drains, electrical ducts, manholes, handholes, lighting fixtures and bases, transformers, flexible and rigid pavements, buildings, vaults, and other man-made features of the port that may be encountered in the work and not otherwise classified herein.

10-39 SUBCONTRACTOR. Any properly qualified individual undertaking the performance of any part of the work under the terms of the Contract, by virtue of an agreement between himself and the Contractor, with the approval of the OWNER.

10-40 SUPERINTENDENT. The Contractor's executive representative who is present on the work site during progress, authorized to receive and fulfill instructions from the Engineer, and who shall supervise and direct the construction.

10-41 SUPPLEMENTAL AGREEMENT. A written agreement between the Contractor and the OWNER covering: (1) work that would increase or decrease the total amount of the awarded Contract by not more than 10 percent; or any major Contract item, by more than 25 percent, such increased or decreased work being within the scope of the originally awarded Contract, or (2) work that is not within the scope of the originally awarded Contract.

10-42 SURETY. The corporate body, licensed under the laws of Alabama, bound with and for the Contractor for the acceptable performance of the Contract and also for the payment of all claims recoverable under the Contract Bonds.

10-43 WORK. The furnishing of all labor, materials, tools, equipment and incidentals necessary or convenient to the Contractor's performance of all duties and obligations imposed by the Contract, plans and specifications.

10-44 WORKING DAY. A working day shall be any day other than a national legal holiday, Saturday, or Sunday, on which the normal working forces of the Contractor may proceed with regular work for at least 6 hours toward completion of the Contract. Unless work is suspended for causes beyond the Contractor's control, Saturdays, Sundays and national holidays on which the Contractor's forces engage in regular work, requiring the presence of an inspector, will be considered as working days.

SECTION 20 PROPOSAL REQUIREMENTS AND CONDITIONS

20-01 PREQUALIFICATION OF BIDDERS

Proposal forms will be issued only to prospective Bidders who are licensed under the terms of the existing State laws. If the applicant is a corporation organized in a state other than Alabama, it shall furnish a certificate from the Secretary of State showing that it is qualified to transact business in Alabama.

20-02 CONTENTS OF PROPOSAL FORMS

The OWNER shall furnish bidders with proposal forms. All papers bound with or attached to the proposal forms are necessary parts and must not be detached.

The plans, specifications, and other documents designated in the proposal form shall be considered a part of the proposal whether attached or not.

20-03 ISSUANCE OF PROPOSAL FORMS

The OWNER reserves the right to refuse to issue a proposal form to a prospective bidder should such bidder be in default for any of the following reasons:

- (a) Failure to pay, or satisfactorily settle, all bills due for labor and materials on former Contracts in force with the OWNER.
- (b) Contractor default under previous Contracts with the OWNER.
- (c) Proposal withdrawal or Bid Bond forfeiture on previous project with the OWNER.
- (d) Unsatisfactory work on previous Contract with the OWNER.
- (e) Performance failure of manufacturer's product or materials.

20-04 INTERPRETATION OF ESTIMATED PROPOSAL QUANTITIES

An estimate of quantities of work to be done and materials to be furnished under these specifications is given in the proposal. It is the result of careful calculations and is believed to be correct. It is given only as a basis for comparison of proposals and the award of the Contract. The OWNER does not expressly, or by implication, agree that the actual quantities involved will correspond exactly therewith; nor shall the bidder plead misunderstanding or deception because of such estimates of quantities, or of the character, location or other conditions pertaining to the work. Payment to the Contractor will be made only for the actual quantities of work performed or materials furnished in accordance with the plans and specifications. It is understood that the quantities may be increased or decreased as hereinafter provided in the subsection titled 50-02 ALTERATION OF WORK AND QUANTITIES of Division IV, without in any way invalidating the unit bid prices.

20-05 EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE

The bidder is expected to carefully examine the site of the proposed work, the proposal, plans, specifications, and Contract forms. He shall satisfy himself as to the character, quality, and quantities of work to be performed, materials to be furnished, and as to the requirements of the proposed Contract. The submission of a proposal shall be prima facie evidence that the bidder has made such examination and is satisfied as to the conditions to be encountered in performing the work and as to the requirements of the proposed Contract, plans, and specifications.

Boring logs and other records of subsurface investigations and tests are available for inspection of bidders. It is understood and agreed that such subsurface information, whether included in the plans, specifications, or otherwise made available to the bidder, was obtained and is intended for the OWNER's design and estimating purposes only. Such information has been made available for the convenience of all bidders. It is further understood and agreed that each bidder is solely

responsible for all assumptions, deductions, or conclusions which he may make or obtain from his examination of the boring logs and other records of subsurface investigations and tests that are furnished by the OWNER.

20-06 PREPARATION OF PROPOSAL

The bidder shall submit his proposal on the forms furnished by the OWNER. All blank spaces in the proposal forms must be correctly filled in where indicated for each and every item for which a quantity is given. The bidder shall state the price (written in ink or typed) both in words and numerals for which he proposed to do each pay item furnished in the proposal. The Department will check the gross sum given in the proposal and in case of error or discrepancy, the gross sum obtained by adding the products of the unit prices and the various estimated quantities listed in the proposal shall prevail and this shall be the Contract Bid Price. In case of conflict between words and numerals, the words, unless obviously incorrect, shall govern.

The bidder shall sign his proposal correctly and in ink. If the proposal is made by an individual, his name and post office address must be shown. If made by a partnership, the name and post office address of each member of the partnership must be shown. If made by a corporation the person signing the proposal shall give the name of the State under the laws of which the corporation was chartered and the name, titles, and business address of the president, secretary, and the treasurer. Anyone signing a proposal as an agent shall file evidence of his authority to do so and that the signature is binding upon the firm or corporation.

20-07 IRREGULAR PROPOSALS

Proposals shall be considered irregular for the following reasons:

- (a) If the proposal is on a form other than that furnished by the OWNER, if the OWNER's form is altered, or if any part of the proposal form is detached.
- (b) If there are unauthorized additions, conditional or alternate pay items, or irregularities of any kind which make the proposal incomplete, indefinite, or otherwise ambiguous.
- (c) If the proposal does not contain a unit price for each pay item listed in the proposal, except in the case of authorized alternate pay items, for which the bidder is not required to furnish a unit price.
- (d) If the proposal contains unit prices that are obviously unbalanced.
- (e) If the proposal is not accompanied by the bid bond specified by the OWNER.

The OWNER reserves the right to reject any irregular proposal and the right to waive technicalities if such waiver is in the best interest of the OWNER and conforms to laws and ordinances pertaining to the letting of construction Contracts.

20-08 PROPOSAL GUARANTY

Each separate proposal shall be accompanied by a certified check, or other specified acceptable collateral, in the amount of 5% of the bid price, but not more than \$10,000. Such check, or collateral, shall be made payable to the Alabama State Port Authority.

20-09 DELIVERY OF PROPOSAL

Each proposal submitted shall be placed in a sealed envelope plainly marked on the outside with the project description, Bidder's name and address, and the time and date of bid opening. When sent by mail, preferably registered, the sealed proposal, marked as indicated above, should be enclosed in an additional envelope. No proposal will be considered unless received at the place specified in the advertisement before the time specified for opening all bids.

Proposals received after the bid opening time shall be returned to the bidder unopened.

20-10 WITHDRAWAL OR REVISION OF PROPOSALS

A bidder may withdraw or revise (by withdrawal of one proposal and submission of another) a proposal provided that the bidder's request for withdrawal is received by the OWNER in writing or by telegram before the time specified for opening bids. Revised proposals must be received at the place specified in the advertisement before the time specified for opening all bids.

20-11 PUBLIC OPENING OF PROPOSALS

Proposals shall be opened, and read, publicly at the time and place specified in the advertisement. Bidders, their authorized agents, and other interested persons are invited to attend.

Proposals that have been withdrawn (by written or telegraphic request) or received after the time specified for opening bids shall be returned to the bidder unopened.

20-12 DISQUALIFICATION OF BIDDERS

A bidder shall be considered disqualified for any of the following reasons:

- (a) Submitting more than one proposal from the same partnership, firm or corporation under the same or different name.
- (b) Evidence of collusion among bidders. Bidders participating in such collusion shall be disqualified as bidders for any future work of the OWNER.
- (c) If the bidder is considered to be in "default" for any reason specified in the paragraph titled ISSUANCE OF PROPOSAL FORMS of this subsection.
- (d) If an out-of-state bidder has not qualified with the Secretary of State to do business in Alabama.

20-13 LIQUIDATED DAMAGES

Time is an essential element in the Contract. As the prosecution of the Work will inconvenience the public, obstruct traffic, and interfere with business, it is important that the work be pressed vigorously to completion. Also, the cost to the Department of the administration of the Contract, supervision, inspection, engineering, and in some cases maintenance of detours around or over the work under construction will be increased or decreased as the time occupied in the Work is lengthened or shortened. Therefore, exclusive of Sundays, national holidays, and other exceptions and extensions as detailed elsewhere in these Specifications for each day that the Work remains incomplete after the time specified in the Contract, or additional time that may be allowed by the Engineer for the completion of the work when extra or additional work is ordered by the Engineer, the amount specified in the following schedule shall be paid by the Contractor to the Department as liquidated damages for the loss sustained by the State because of failure of the Contractor to complete the work within the specified time.

SCHEDULE OF LIQUIDATED DAMAGES

Contract Bid Price	Amount of Liquidated Damages per Day
\$100,000 and less	\$ 100.00
More than \$100,000 and less than \$250,000	150.00
\$250,000 and less than \$600,000	200.00
\$600,000 or more	1,200.00

20-14 OWNER PURCHASE OF MATERIALS

20-14.1 In accordance with the State of Alabama Statutes for **Sales Tax exemptions for a State Agency**, it is the intent of this Contract for the Alabama State Port Authority (Owner) to reduce sales tax.

20-14.1.1 The Owner reserves the right to purchase all of the required materials or equipment to be used on this project which will become part of the realty.

20-14.1.2 The cost of the Materials and Equipment which will become part of the realty is to be included in the Bid Price. Sales taxes, which will become part of the realty in accordance with the Alabama Statutes, are not to be included.

20-14.1.3 In order to achieve sales tax exemption and avoid jeopardizing immunity from sales taxes it is essential that the following procedures be followed.

20-14.2 Purchase of Materials or Equipment

20-14.2.1 All purchase orders must be executed on the Owner's Purchase Order Letterhead/Form.

20-14.2.2 The purchase order form format is to be designed at the Owner's discretion with the Owner reserving approval rights concerning terms and conditions boilerplate.

20-14.2.3 The Contractor's organization will be designated as an agent of the Owner for Material and Equipment purchases and will provide the names of two individuals in the Organization who will be authorized to purchase on the behalf of the Owner.

20-14.2.4 Purchase Orders are to be numerically sequenced with two executed copies furnished to the Construction Manager, one copy of which will be forwarded to the Owner by the Construction Manager. If a Construction Manager is not assigned to the project, the copies should go directly to the Owner's Project Manager within the Engineering Services Division.

20-14.2.5 Owner Purchase Orders are invalid for gross amounts less than \$2,000.00. Any materials purchased directly by the Contractor for the project shall be subject to Sales Tax and paid by the Contractor.

20-14.3 Payment of Materials or Equipment

20-14.3.1 All payments in connection with the purchase orders generated by Owner's Contractor/Agent will be in the form of a check from the Alabama State Port Authority to the appropriate vendors or suppliers.

20-14.3.2 Check Request Form will be furnished to the Contractor by the Owner. The Check Request Form will be numerically sequenced and accounted for.

20-14.3.3 The Contractor is responsible for preparing the Check Request Form for the Owner's signature.

20-14.3.4 An Invoice Transmittal Form is to be designed by the Contractor with the Owner reserving the right of approval of the Invoice Transmittal Form design. It is a primary requirement that the Invoice Transmittal Form indicate that the Owner is the sole payer for materials or equipment. The Invoice Transmittal Form will be numerically sequenced and accounted for.

20-14.3.5 All Contractor requests for payment for materials and equipment purchased under the provisions of this Article will be forwarded to the Construction Manager under cover of the Invoice Transmittal Form, submitted in duplicate, with one copy retained by the Construction Manager and one copy retained by the Owner. The Invoice Transmittal shall be backed-up with signed receiving or delivery tickets, invoices and

prepared Check Request Form plus one (1) additional copy of the Check Request Form which will be kept by the Construction Manager.

20-14.3.6 Upon signature by the Owner of the Check Request Form, a check from the Alabama State Port Authority will be issued directly to the vendor or supplier.

20-14.4 Accounting Procedures

20-14.4.1 The Contractor's Schedule of Values shall be broken down into three categories, if requested by Owner, showing Material, Equipment and with the remaining category containing labor, fee, rentals, overhead and other costs on a line item basis.

20-14.4.2 Check Request Forms generated by the Contractor/Agent for the Owner shall be collated on a monthly basis and assembled into a credit amount showing amounts to be deducted from the current Payment Application and Contract Sum.

20-14.4.3 The Contractor's Payment Application will be adjusted on a monthly basis in accordance with the preceding monthly accumulated credit amounts for Owner purchases.

20-14.4.4 Discounts which accrue from Owner payments for prompt payment will accrue as 50% to the Owner and 50% to the Contractor.

20-14.4.5 Retainage will not be withheld on Owner purchased Materials or Equipment.

20-14.5 Procedures

The Contractor shall follow the procedures set forth below, but nothing herein shall be construed to reduce, limit or change the Contractor's overall responsibility for the quality, scheduling, coordination, warranty, overhead, profit or retainage, except as provided in subparagraph 20-14.4.5 of the complete Contract scope of work in accordance with all provisions of the Contract Documents.

20-14.5.1 Procurement of Material Selected by Contractor.

With respect to any materials, equipment or product to be purchased by the Owner, the following procedures shall be followed:

1. Immediately upon notice to proceed or award of Contract, the Contractor in conjunction with the Construction Manager shall develop a list of items to be purchased by the Owner for incorporation into the work.
2. When the type, quantity, and price of each lot of materials, equipment or product to be purchased on a single purchase order have been determined by the Contractor, Contractor shall complete the Owner Purchase Order Form and shall sign the form to certify that the material, equipment or product described on the form complies with the requirements of the Contract Documents. The Owner Purchase Order Form, signed by the Contractor shall be forwarded to the vendor by the Contractor. The total monetary value listed on the Purchase Order Form is the cost limitation established for the Purchase Order.
3. Simultaneously, with the Contractor's/Agent's issuance of a purchase order form for major items the Contractor shall then incorporate into his expediting schedule his activities showing purchase time, shop drawing time, submittal approval time, integrated into the updated project schedule and then tied into the activity requiring the purchase material.
4. The supplier shall deliver the material, equipment or product to the Contractor in accordance with the provisions of the purchase order, and as required by the Contract Documents. Upon receipt of the materials

the Contractor shall inspect the materials, equipment or product as necessary to verify conformity of the material, equipment or product received with the Owner Purchase Order and with the shipping documents. The Contractor shall provide to the Vendor written certification of receipt, or signed delivery ticket, of Each delivery of material, equipment or product which certification shall fully describe any shortages, defects, damage or non-compliance to the supplier within five days or receipt of Each delivery and shall arrange for the return and replacement of defective, damaged or non-conforming material, equipment or product on behalf of the Owner, in accordance with the provisions of the Contract Documents.

5. The supplier shall submit each invoice along with aforementioned proof of delivery for material, equipment or product procured pursuant to the provisions hereof to the Owner in care of the Contractor/Consignee. The Contractor/Consignee shall verify and certify to the Owner the accuracy and completeness of each invoice submitted by the supplier. Each certified invoice shall be submitted with appropriate Check Request Form no later than the Contractor's next monthly Application for Payment to the Owner.
6. After the Contractor's Application for Payment, along with Check Request Forms including certified supplier invoices and delivery tickets, has been approved for payment in accordance with the provisions of the General Conditions, the Owner shall make direct payments to the supplier, and the amount of each such payment, shall be deducted from the then-unpaid balance of the Contractor's Contract Sum. The amount deducted shall be in accordance with subparagraph 20-14.4.2.

20-14.5.2 Owner-Purchased Materials

Materials used on the Project which are purchased by the Owner will be available at the location specified in the Purchase Order and in accordance with the periodically adjusted project schedule. The Contractor shall review the updated and adjusted project schedule and will be responsible for coordinating the deliveries with the progress of the work. The Contractor's costs for storing, transporting, handling, protecting and installing Owner purchased material shall be included in the Contract Sum and paid for **when such material is installed**. The Contractor shall be responsible for material furnished to it, and shall pay for storage charges incurred as a result of its failure to take delivery of Owner material on the assigned date.

The Contractor shall be liable to the Owner for the cost of replacing or repairing material lost or damaged from any cause whatsoever after receipt by the Contractor or after the Contractor has failed to take delivery after the assigned date. The costs will be deducted from any monies due or to become due to the Contractor, except those amounts covered under any claims payments made under insurance policies furnished by the Owner. In cases where lost or damaged material was not evident at the time such materials were received by the Contractor, the Contractor will be afforded the same protection by the Owner as the Owner has received from the original shipper and manufacturer. The Owner, in addition, agrees to provide the Contractor with all necessary assistance in communicating with the manufacturer of any materials which fail to function properly once installed.

The Contractor is responsible for providing and performance of warranty work in connection with the Owner purchased materials, for the time periods as required by the Contract Documents.

20-14.6 Materials and Equipment Responsibility

20-14.6.1 The Contractor shall retain as part of his Bid and Fee the following responsibilities for care, custody and control of the Owner purchased Materials and Equipment.

1. Insure that all Materials and Equipment purchased by the Owner are in complete accordance with the plans and specifications.
2. Shop drawings and submittals.
3. Scheduling.
4. Shipment, receipt, unloading, inspection, storage and handling.
5. Return of damaged Materials and Equipment.
6. Filing of freight claims.
7. Installation as required.
8. Startup and testing as required per specifications.
9. Warranty and maintenance as required per specifications.
10. Training as required per specifications.
11. Spare parts. Special tools and additional stock as required by the specifications.
12. In the event the Contractor orders non-specified, wrong size or dimensioned Material or Equipment it will be his responsibility to replace such at no cost to the Owner.

20-14.7 Project Close-Out

The Contractor shall return to the Owner all blank Purchase Order Forms issued, but not used on the project.

(Rev. 3/31/11)

SECTION 30 AWARD AND EXECUTION OF CONTRACT

30-01 CONSIDERATION OF PROPOSALS

After the proposals are publicly opened and read, they will be compared on the basis of the summation of the products obtained by multiplying the estimated quantities shown in the proposal by the unit bid prices. If a bidder's proposal contains a discrepancy between unit bid prices written in words and unit bid prices written in numbers, the unit price written in words shall govern.

Until the award of the Contract is made, the OWNER reserves the right to reject a bidder's proposal for any of the following reasons:

- a) If the proposal is irregular as specified in the subsection titled IRREGULAR PROPOSALS of Subsection 20.
- b) If the bidder is disqualified for any of the reasons specified in the subsection titled DISQUALIFICATION OF BIDDERS of Subsection 20.

In addition, until the award of a Contract is made, the OWNER reserves the right to reject any or all proposals; waive technicalities, if such waiver is in the best interest of the OWNER and is in conformance with applicable laws or regulations pertaining to the letting of construction Contracts; advertise for new proposals; or proceed with the work otherwise. All such actions shall promote the OWNER's best interests.

30-02 AWARD OF CONTRACT

The award of a Contract, if it is to be awarded, shall be made within 60 calendar days of the date specified for publicly opening proposals.

Award of the Contract shall be made by the OWNER to the lowest qualified bidder whose proposal conforms to the cited requirements of the OWNER.

30-03 CANCELLATION OF AWARD

The OWNER reserves the right to cancel the award without liability to the bidder, except return of proposal guaranty, at any time before a Contract has been fully executed by all parties and is approved by the OWNER in accordance with the paragraph titled APPROVAL OF CONTRACT of this subsection.

30-04 RETURN OF PROPOSAL GUARANTY

All proposal guaranties, except those of the three lowest bidders, will be returned immediately after the OWNER has made a comparison of bids as hereinbefore specified in the paragraph titled CONSIDERATION OF PROPOSALS of this subsection. Proposal guaranties of the two lowest bidders will be retained by the OWNER until such time as an award is made, at which time, the unsuccessful bidders' proposal guaranty will be returned. The successful bidder's proposal guaranty will be returned as soon as the OWNER receives the contract bonds as specified in the paragraph titled "REQUIREMENTS OF CONTRACT BONDS" of the subsection.

30-05 REQUIREMENTS OF CONTRACT BONDS

In order to insure the faithful performance of each and every condition, stipulation, and requirement of the Contract and to indemnify and save harmless the OWNER from any and all damages, either directly or indirectly, (arising out of any failure to perform same), the successful Bidder to whom the Contract is awarded shall, within ten (10) days from the date of award, furnish at his expense and file with the OWNER an acceptable Surety Bond in an amount equal to one hundred percent (100%) of the Contract Bid Price of the Contract as awarded. Said Bond shall be made on the approved bond form, shall be furnished by a reputable surety company authorized

to do business in the State of Alabama, shall be counter-signed by an authorized agent resident in the State who is qualified for the execution of such instruments, and shall be attached thereto power of attorney of the signing agent.

In case of default on the part of the Contractor, all expenses incident to ascertaining and collecting losses suffered by the OWNER under the Bond, including both Engineering and legal services, shall lie against the Contract Bond for Performance of the Work.

In addition thereto, the successful Bidder to whom the Contract is awarded shall, within ten (10) days, furnish at his expense and file with the OWNER an acceptable Surety Bond for Payment of Labor, Materials, and Supplies payable to the OWNER in an amount not less than one hundred percent (100%) of the Contract price with the obligation that the Contractor shall promptly make payment to all persons furnishing him or them with labor, materials, foodstuffs, or supplies for, or in, prosecution of the work including the payment of reasonable attorney's fees, incurred by successful claimants or plaintiffs in suits on said bond.

No surety bonds from any insurance company or bonding company which has a lower rating, in the Best Key Rating Guide, than A will be accepted.

30-06 EXECUTION OF CONTRACT

The successful bidder shall sign (execute) the necessary agreements for entering into the Contract and return such signed Contract to the OWNER, along with the fully executed surety bond or bonds specified in the paragraph titled REQUIREMENT OF CONTRACT BONDS of this subsection, within 10 calendar days from the date mailed or otherwise delivered to the successful bidder.

30-07 APPROVAL OF CONTRACT

Upon receipt of the Contract and Contract bond or bonds that have been executed by the successful bidder, the OWNER shall complete the execution of the Contract and return the fully executed Contract to the Contractor. Delivery of the fully executed Contract to the Contractor shall constitute the OWNER's approval to be bound by the successful bidder's proposal and the terms of the Contract.

30-08 FAILURE TO EXECUTE CONTRACT

Failure of the successful bidder to execute the Contract and furnish an acceptable surety bond or bonds within the 10 calendar day period specified in the paragraph titled "REQUIREMENTS OF CONTRACT BONDS" of this subsection shall be just cause for cancellation of the award and forfeiture of the proposal guaranty, not as a penalty, but as liquidation of damages to the OWNER. Award may then be made to the next lowest qualified Bidder or the work may be re-advertised, or otherwise contracted as the Director may decide.

SECTION 40 INDEMNIFICATION AND INSURANCE REQUIREMENTS

40-01 INDEMNIFICATION

The Contractor shall assume all liability for and shall indemnify and save harmless the State of Alabama, the Alabama State Port Authority and its officers and employees, and Engineer from all damages and liability for injury to any person or persons, and injury to or destruction of property, including the loss of use thereof, by reason of an accident or occurrence arising from operations under the Contract, whether such operations are performed by himself or by any subcontractor or by anyone directly or indirectly employed by either of them, occurring on or about the premises, or the ways and means adjacent, during the term of the Contract, or any extension thereof, and shall also assume the liability for injury and/or damages to adjacent or neighboring property by reason of work done under the Contract.

40-02 CONTRACTOR COVERAGE

The Contractor shall not commence work under the Contract until he has obtained all insurance required under the following paragraphs and until such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on his subcontract until all similar applicable insurance required of the subcontractor has been obtained and approved. If the subcontractor does not take out insurance in his own name, then the principal Contractor shall provide such insurance protection for subcontractor and his employees by endorsement to the Contractor's policies or by taking out separate policies in the name of the subcontractor.

40-03 COMMERCIAL GENERAL LIABILITY

The Contractor shall take out and maintain during the life of the Contract Commercial General Liability insurance, including Blanket Contractual and Completed Operations coverage, in an amount not less than \$5,000,000 for any one occurrence for bodily injury, including death, and property damage liability. Policy shall include endorsement identifying the Owner and Engineer as Primary and Non-contributory Additional Insureds as respects the Contractor's work for the Owner, to the extent required by written Contract, including a waiver of all rights of subrogation.

40-04 OWNER'S AND CONTRACTOR'S PROTECTIVE LIABILITY

The Contractor shall take out and maintain during the life of the Contract a separate Owner's and Contractor's Protective Liability policy in the names of the Owner and Engineer in an amount not less than \$2,000,000. Policy shall be delivered to the Owner.

40-05 BUSINESS AUTOMOBILE LIABILITY

The Contractor shall take out and maintain during the life of the Contract Business Automobile Liability insurance covering owned, non-owned and hired vehicles in an amount not less than \$1,000,000 for any one occurrence for bodily injury, including death, and property damage liability. The Owner and Engineer shall be identified as Additional Insureds, to the extent required by written Contract.

40-06 WORKERS COMPENSATION

The Contractor shall take out and maintain during the life of the Contract Workers Compensation and Employers Liability insurance providing coverage under the Alabama Workers Compensation Act in an amount not less than that required by Alabama Law.

Where applicable, Contractor shall take out and maintain during the life of the Contract insurance providing coverage as required by Federal statute, including but not limited to U.S. Longshoremen and Harbor Workers Act (USL&H), Jones Act, and Railroad Federal Employers Liability Act (FELA).

40-07 OCEAN MARINE COVERAGE

In the event work involves the use of watercraft in the completion of the Contract, the Contractor shall provide Protection and Indemnity coverage, including crew, in an amount not less than \$2,000,000 for each loss.

Only the Contractor and/or Subcontractor using watercraft in the completion of its work shall be required to provide evidence of this coverage. In the event the Contractor subcontracts for this portion of the work, the Contractor shall not allow the subcontractor to commence work until such coverage has first been obtained by the subcontractor and approved by the Owner.

40-08 RAILROAD PROTECTIVE LIABILITY (N/A)

In any case where the Contract involves work within 50 feet of an operating railroad track, the Contractor shall provide a Railroad Protective Liability policy in the name of the railroad whose right of way is involved. The limits of the policy shall be not less than \$2,000,000 per occurrence with \$6,000,000 aggregate.

NOTE #1: With the written approval of the Owner, in lieu of the Railroad Protective Liability policy, the Contractor may cause to be attached to its Commercial General Liability policy standard ISO endorsement, "Contractual Liability – Railroads" (CG 24 17). The railroad must be identified as an Additional Insured.

NOTE #2: *Only the Contractor and/or Subcontractor performing the work within 50 feet of the railroad track shall be required to provide evidence of this coverage. In the event the Contractor subcontracts this portion of the work, the subcontractor shall not commence work until such coverage has first been obtained by the subcontractor and approved by the Owner.*

40-09 BUILDER'S RISK or INSTALLATION FLOATER

The Contractor shall take out and maintain during the life of the Contract Builder's Risk insurance or Installation Floater, written on an "All Risk" basis, insuring the work included in the Contract against all physical loss. The amount of insurance shall at all times be at least equal to the amount of the Contract. The policy shall be in the names of the Owner, Engineer, Contractor, and "all Subcontractors," as their interests appear. Policy shall be provided to the Owner prior to commencement of work.

When changes in scope of work by written Change Order or aggregate Change Orders equal 15 percent of the total Contract, the amount of coverage provided in the Builder's Risk/Installation Floater policy shall be increased accordingly and evidence of increased coverage delivered to the Owner.

40-10 PROFESSIONAL LIABILITY INSURANCE

The Contractor shall "NOT" be required to take out and maintain during the life of the contract Professional Liability insurance.

40-11 PROOF OF CARRIAGE OF INSURANCE

The Contractor shall furnish to the Owner, in triplicate, Certificates of Insurance, signed by the licensed agent, evidencing the required coverage, along with letter of transmittal giving date of delivery. A copy of this letter shall also be delivered to the Engineer. The Owner reserves the right to require certified copies of any and all policies. Each Certificate of Insurance shall note the project name, project number and task number for which the policy is applicable.

All coverage and bonds shall be provided by companies acceptable to the Owner. Each policy of insurance shall provide, either in body of the policy or by endorsement, that such policy cannot be substantially altered or cancelled without thirty (30) days' written notice to the Owner and insured.

SECTION 50 SCOPE OF WORK

50-01 INTENT OF CONTRACT

The intent of the Contract is to provide for construction and completion, in every detail, of the work described. It is further intended that the Contractor shall furnish all labor, materials, equipment, tools, transportation, and supplies required to complete the work in accordance with the plans, drawings, specifications, and terms of the Contract.

50-02 ALTERATION OF WORK AND QUANTITIES

The OWNER reserves and shall have the right to make such alterations in the work as may be necessary or desirable to complete the work originally intended in an acceptable manner. Unless otherwise specified herein, the Engineer shall be and is hereby authorized to make such alterations in the work as may increase or decrease the originally awarded Contract quantities, provided that the aggregate of such alterations does not change the total Contract cost by more than 10% or the total cost of any major Contract item by more than 25 percent (total cost being based on the unit prices and estimated quantities in the awarded Contract). Alterations which do not exceed the 25 percent limitation shall not invalidate the Contract nor release the surety, and the Contractor agrees to accept payment for such alteration as if the altered work had been a part of the original Contract. These alterations, which are for work within the general scope of the Contract shall be covered by "Change Orders" issued by the Engineer. Change orders for altered work shall include extensions of Contract time where, in the Engineer's opinion, such extensions are commensurate with the amount and difficulty of added work.

Should the aggregate amount of altered work exceed the 25 percent limitation hereinbefore specified, such excess altered work shall be covered by supplemental agreement. If the OWNER and the Contractor are unable to agree on a unit adjustment for any Contract item that requires a supplemental agreement, the OWNER reserves the right to terminate the Contract with respect to the item and make other arrangement for its completion.

All supplemental agreements shall require consent of the Contractor's surety and separate performance and payment bonds.

50-03 OMITTED ITEMS

The Engineer may, in the OWNER's best interest, omit from the work any Contract item, except major Contract items. Major Contract items may be omitted by a supplemental agreement. Such omission of Contract items shall not invalidate any other Contract provision or requirement.

Should a Contract item be omitted or otherwise ordered to be non-performed, the Contractor shall be paid for all work performed toward completion of such item prior to the date of the order to omit such item. Payment for work performed shall be in accordance with the paragraph titled PAYMENT FOR OMITTED ITEMS of Subsection 100.

50-04 EXTRA WORK

Should acceptable completion of the Contract require the Contractor to perform an item of work for which no basis of payment has been provided in the original Contract or previously issued change orders or supplemental agreements, the same shall be called Extra Work. Extra work that is within the general scope of the Contract shall contain agreed unit prices for performing the change order work in accordance with the requirements specified in the order, and shall contain any adjustment to the Contract time that, in the Engineer's opinion, is necessary for completion of such extra work.

When determined by the Engineer to be in the OWNER's best interest, he may order the Contractor to proceed with extra work by force account as provided in the paragraph titled PAYMENT FOR EXTRA AND FORCE ACCOUNT WORK of Subsection 100.

Extra work that is necessary for acceptable completion of the project, but is not within the general scope of the work covered by the original Contract shall be covered by a Supplemental Agreement as hereinbefore defined in the paragraph titled SUPPLEMENTAL AGREEMENT of Subsection 10.

Any claim for payment of extra work that is not covered by written agreement (change order or supplemental agreement) shall be rejected by the OWNER.

50-05 MAINTENANCE OF COMMERCE

It is the explicit intention of the Contract that the safety of workers and vessels, as well as the Contractor's equipment and personnel, is the most important consideration.

It is understood and agreed that the Contractor shall provide for the free and unobstructed movement of vessels in the waterfront areas of the port with respect to his own operations and the operations of all his Subcontractors as specified in the paragraph titled LIMITATION OF OPERATIONS of Subsection 90.

With respect to his own operations and the operations of all his Subcontractors, the Contractor shall provide marking, lighting, and other acceptable means of identifying: personnel; equipment; vehicles; storage areas; and any work area or condition that may be hazardous to the operation of fire rescue equipment, or maintenance vehicles at the port.

When the Contract requires the maintenance of vehicular traffic on an existing road, street, or highway during the Contractor's performance of work that is otherwise provided for in the Contract, plans, and specifications, the Contractor shall keep such road, street, or highway open to all traffic and shall provide such maintenance as may be required to accommodate traffic. The Contractor shall furnish, erect, and maintain barricades, warning signs, flagmen, and other traffic control devices in reasonable conformity with the manual of Uniform Traffic Control Devices for Streets and Highway (published by the United States Government Printing Office), unless otherwise specified herein. The Contractor shall also construct and maintain in a safe condition any temporary connections necessary for ingress to and egress from abutting property or intersecting roads, streets or highways.

The Contractor shall make his own estimate of all labor, materials, equipment, and incidentals necessary for providing the maintenance of commerce and vehicular traffic as specified in this subsection.

The cost of maintaining the commerce and vehicular traffic specified in this subsection shall not be measured or paid for directly, but shall be included in the various Contract items.

50-06 REMOVAL OF EXISTING STRUCTURES

All existing structures encountered within the established lines, grades, or grading sections shall be removed by the Contractor, unless such existing structures are otherwise specified to be relocated, adjusted up or down, salvaged, abandoned in place, reused in the work or to remain in place. The cost of removing such existing structures shall not be measured or paid for directly, but shall be included in the various Contract items.

Should the Contractor encounter an existing structure (above or below ground) in the work for which the disposition is not indicated on the plan, the Engineer shall be notified prior to disturbing such structure. The disposition of existing structures so encountered shall be immediately determined by the Engineer in accordance with the provisions of the Contract.

Except as provided in the subsection titled RIGHTS IN AND USE OF MATERIALS FOUND IN THE WORK of this subsection, it is intended that all existing materials or structures that may be encountered (within the lines, grades, or grading sections established for completion of the work)

shall be utilized in the work as otherwise provided for in the Contract and shall remain the property of the OWNER when so utilized in the work.

50-07 RIGHTS IN AND USE OF MATERIALS FOUND IN THE WORK

Should the Contractor encounter any material such as (but not restricted to) sand, stone, gravel, slag, or concrete slabs within the established lines, grades, or grading sections, the use of which is intended by the terms of the Contract to be either embankment or waste, he may at his option either:

- (a) Use such material in another Contract item, providing such use is approved by the OWNER and Engineer and is in conformance with the Contract specifications applicable to such use; or
- (b) Remove such material from the site, upon written approval of the Engineer; or
- (c) Use such material for his own temporary construction on site; or
- (d) Use such material as intended by the terms of the Contract.

Should the Engineer approve the Contractor's wish to exercise option (a), (b), or (c), the Contractor shall be paid for the excavation or removal of such material at the applicable Contract price. The Contractor shall replace, at his own expense, such removed or excavated material with an agreed equal volume of material that is acceptable for use in constructing embankment, backfills, or otherwise to the extent that such replacement material is needed to complete the Contract work. The Contractor shall not be charged for his use of such material so used in the work or removed from the site.

Should the Engineer approve the Contractor's exercise of option (a), the Contractor be paid, at the applicable contract price, for furnishing and installing such material in accordance with requirements of the Contract item in which the material is used.

It is understood and agreed that the Contractor shall make no claim for delays by reason of his exercise of option (a), (b), or (c).

The Contractor shall not excavate, remove, or otherwise disturb any material, structure, or part of a structure which is located outside the lines, grades, or grading sections established for the work, except where such excavation or removal is provided for in the Contract, plans, or specifications.

50-08 FINAL CLEANING UP

Upon completion of the work and before acceptance and final payment will be made, the Contractor shall remove from the site all machinery, equipment, surplus and discarded materials, rubbish, temporary structures, and stumps or portions of trees. He shall cut all brush and woods within the limits indicated and shall leave the site in a neat and presentable condition. Material cleared from the site and deposited on adjacent property will not be considered as having been disposed of satisfactorily, unless the Contractor has obtained the written permission of such property OWNER.

SECTION 60

CONTROL OF WORK

60-01 AUTHORITY OF THE ENGINEER

The Engineer shall decide any and all questions which may arise as to the quality and acceptability of materials furnished, work performed, and as to the manner of performance and rate of progress of the work. He shall decide all questions which may arise as to the interpretation of the specifications or plans relating to the work, the fulfillment of the Contract on the part of the Contractor, and the rights of different Contractors on the project. The Engineer shall determine the amount and quality of the several kinds of work performed and materials furnished which are to be paid for under the Contract.

60-02 CONFORMITY WITH PLANS AND SPECIFICATIONS

All work and all materials furnished shall be in reasonably close conformity with the lines, grades, grading sections, cross sections, dimensions, material requirements, and testing requirements that are specified (including specified tolerances) in the Contract, plans, or specifications.

If the Engineer finds the materials furnished, work performed, or the finished product not within reasonably close conformity with the plans and specifications but that the portion of the work affected will, in his opinion, result in a finished product having a level of economy, durability, and workmanship acceptable to the OWNER, he will advise the OWNER of his determination that the affected work be accepted and remain in place.

In this event, the Engineer will document his determination and recommend to the OWNER a basis of acceptance which will provide for an adjustment in the Contract price for the affected portion of the work. The Engineer's determination and recommended Contract price adjustments will be based on good Engineering judgment and such tests or retests of the affected work as are, in his opinion, needed. Changes in the Contract price shall be covered by Contract modifications (change order or supplemental agreement) as applicable.

If the Engineer finds the materials furnished, work performed, or the finished product are not in reasonably close conformity with the plans and specifications and have resulted in an unacceptable finished product, the affected work or materials shall be removed and replaced or otherwise corrected by any at the expense of the Contractor in accordance with the Engineer's written orders.

For the purpose of this subsection, the term "reasonably close conformity" shall not be construed as waiving the Contractor's responsibility to complete the work in accordance with the Contract, plans and specifications. The term shall not be construed as waiving the Engineer's right to insist on strict compliance with the requirements of the Contract, plans, and specifications during the Contractor prosecution of the work, when, in the Engineer's opinion, such compliance is essential to provide an acceptable finished portion of the work.

For the purpose of this subsection, the term "reasonably close conformity" is also intended to provide the Engineer with the authority to use good Engineering judgment in his determinations as to acceptance of work that is not in strict conformity but will provide a finished product equal to or better than that intended by the requirements of the Contract, plans and specifications.

60-03 COORDINATION OF CONTRACT, PLANS AND SPECIFICATIONS

The Contract, plans, specifications, and all referenced standards cited are essential parts of the Contract requirements. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work. In case of discrepancy, calculated dimensions will govern over scaled dimensions; special provisions shall govern over plans, Contract construction specifications, Contract general provisions, cited specifications, and cited testing standards; plans shall govern over Contract construction

specifications, Contract general provisions, and cited testing standards; Contract construction specification shall govern over Contract general provisions, and cited testing standards; Contract general provisions shall govern over cited testing standards. The Contractor shall not take advantage of any apparent error or omission on the plans or specifications. In the event the Contractor discovers any apparent error or discrepancy, he shall immediately call upon the Engineer for his interpretation and decision, and such decision shall be final.

60-04 COOPERATION OF THE CONTRACTOR

The Contractor will be supplied with five (5) copies each of the plans and specifications. He shall have available on the work at all times, one copy each of the plans and specifications. Additional copies of plans and specifications may be obtained by the Contractor for the cost of reproduction.

The Contractor will give constant attention to the work to facilitate the progress thereof, and he shall cooperate with the Engineer and his inspectors and with other Contractors in every way possible. The Engineer shall allocate the work and designate the sequence of construction in case of controversy between Contractors. The Contractor shall have a competent superintendent on the work at all times who is fully authorized as his agent on the work. The superintendent shall be capable of reading and thoroughly understanding the plans and specifications and shall receive and fulfill instructions from the Engineer or his authorized representative.

60-05 COOPERATION BETWEEN CONTRACTORS

The OWNER reserves the right to Contract for and perform other or additional work on or near the work covered by this Contract.

When separate Contracts are let within the limits of any one project, Each Contractor shall conduct his work so as not to interfere with or hinder the progress or completion of the work being performed by other Contractors. Contractors working on the same project shall cooperate with each other as directed.

Each Contractor involved shall assume all liability, financial or otherwise, in connection with his Contract and shall protect and save harmless the OWNER from any and all damages or claims that may arise because of inconvenience, delays, or loss experienced by him because of the presence and operations or other Contractors working within the limits of the same project.

The Contractor shall arrange his work and shall place and dispose of the materials being used so as not to interfere with the operations of the other Contractors within the limits of the same project. He shall join his work with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.

60-06 CONSTRUCTION LAYOUT AND STAKES

The Engineer will establish horizontal and vertical control only and the Contractor must furnish all additional stakes for the layout and construction of the work. The Engineer will also furnish any additional information, upon request of the Contractor, needed to layout and construct the work. The Contractor shall satisfy himself as to the accuracy of all measurements before constructing any permanent structure and shall not take advantage of any errors which may have been made in laying out the work. Such stakes and markings as the Engineer may set for either his own or the Contractor's guidance shall be scrupulously preserved by the Contractor. In case of negligence on the part of the Contractor, or his employees, resulting in the destruction of such stakes or markings, an amount equal to the cost of replacing the same may be deducted from subsequent estimates due to the Contractor at the discretion of the OWNER.

60-07 AUTOMATICALLY CONTROLLED EQUIPMENT

Whenever batching or mixing plant equipment is required to be operated automatically under the Contract and a breakdown or malfunction of the automatic controls occurs, the equipment may be operated manually or by other methods for a period of 48 hours following the breakdown or malfunction, provided this method of operations will produce results which conform to all other requirements of the Contract.

60-08 AUTHORITY AND DUTIES OF INSPECTORS

Inspectors employed by the OWNER shall be authorized to inspect work done and all materials furnished. Such inspection may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials to be used. Inspectors are not authorized to revoke, alter, or waive any provision of the Contract. Inspectors are not authorized to issue instructions contrary to the plans and specifications or to act as foreman for the Contractor.

Inspectors employed by the OWNER are authorized to notify the Contractor or his representatives of any failure of the work or materials to conform to the requirements of the Contract, plans, or specifications and to reject such nonconforming materials in question until such issues can be referred to the Engineer for his decision.

60-09 INSPECTION OF THE WORK

All materials and each part or detail of the work shall be subject to review by the Engineer. The Engineer shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection.

If the Engineer requests it, the Contractor, at any time before acceptance of the work, shall remove or uncover such portions of the finished work as may be directed.

After examination, the Contractor shall restore said portions of the work to the standard required by the specifications. Should the work thus exposed or examined prove acceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be paid for as extra work; but should the work so exposed or examined prove unacceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be at the Contractor's expense.

Any work done or materials used without supervision or inspection by an authorized representative of the OWNER may be ordered removed and replaced at the Contractor's expense unless the OWNER's representative failed to inspect after having been given reasonable notice in writing that the work was to be performed.

Should the Contract work include relocation, adjustment, or any other modification to existing facilities, not the property of the (Contract) OWNER, authorized representatives of the owners of such facilities shall have the right to inspect such work. Such inspection shall in no sense make any facility owner a party to the Contract, and shall in no way interfere with the rights of the parties to this Contract.

60-10 REMOVAL OF UNACCEPTABLE AND UNAUTHORIZED WORK

All work which does not conform to the requirements of the Contract, plans, and specifications will be considered unacceptable, unless otherwise determined acceptable by the OWNER as provided in the paragraph titled CONFORMITY WITH PLANS AND SPECIFICATIONS of this subsection.

Unacceptable work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause found to exist prior to the final acceptance of the work, shall be removed immediately and replaced in an acceptable manner in accordance with the provisions of the paragraph titled CONTRACTOR'S RESPONSIBILITY FOR WORK of Subsection 80.

No work shall be done without lines and grades having been established by the Contractor and subsequently approved by the Engineer. Work done contrary to the instructions of the Engineer, work done beyond the lines shown on the plans or as given, except as herein specified, or any extra work done without authority, will be considered as unauthorized and will not be paid for under the provisions of the Contract. Work so done may be ordered removed or replaced at the Contractor's expense.

Upon failure on the part of the Contractor to comply forthwith with any order of the Engineer made under the provisions of this subsection, the Engineer will have authority to cause unacceptable work to be remedied, or removed and replaced, and unauthorized work to be removed, and to deduct the costs (incurred by the OWNER) from any monies due or to become due the Contractor.

60-11 LOAD RESTRICTIONS

The Contractor shall comply with all legal load restrictions in the hauling of materials on public roads beyond the limits of the work. A special permit will not relieve the Contractor of liability for damage which may result from the moving of material or equipment.

The operation of equipment of such weight or so loaded as to cause damage to structures or to any other type of construction will not be permitted. Hauling of materials over the base course or surface course under construction shall be limited as directed. No loads will be permitted on a concrete pavement, base, or structure before the expiration of the curing period. The Contractor shall be responsible for all damage done by his hauling equipment and shall correct such damage at his own expense.

60-12 MAINTENANCE DURING CONSTRUCTION

The Contractor shall maintain the work during construction and until the work is accepted. This maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces so that the work is maintained in satisfactory condition at all times.

All costs of maintenance work during construction and before the project is accepted shall be included in the unit prices bid on the various Contract items, and the Contractor will not be paid an additional amount for such work.

60-13 FAILURE TO MAINTAIN THE WORK

Should the Contractor at any time fail to maintain the work as provided in the paragraph titled MAINTENANCE DURING CONSTRUCTION of this subsection, the Engineer shall immediately notify the Contractor of such noncompliance. Such notification shall specify a reasonable time within which the Contractor shall be required to remedy such unsatisfactory maintenance condition. The time specified will give due consideration to the urgency that exists.

Should the Contractor fail to respond to the OWNER's notification, the OWNER may suspend any work necessary for the OWNER to correct such unsatisfactory maintenance condition, depending on the urgency that exists. Any maintenance cost incurred by the OWNER, shall be deducted from monies due or to become due the Contractor.

60-14 PARTIAL ACCEPTANCE

If at any time during the prosecution of the project the Contractor substantially completes a usable unit or portion of the work, the occupancy of which will benefit the OWNER, he may request the

Engineer to make final inspection of that unit. If the Engineer finds upon inspection that the unit has been satisfactorily completed in compliance with the Contract, he may accept it as being completed, and the Contractor may be relieved of further responsibility for that unit. Such partial acceptance and beneficial occupancy by the OWNER shall not void or alter any provision of the Contract or warranty.

60-15 FINAL CONSTRUCTION INSPECTION

Whenever the Engineer considers the work provided and contemplated by the Contract is nearing completion, or within ten (10) days after being notified by the Contractor that the work is completed, the Engineer will inspect all the work included in the Contract. If the Engineer finds that the work has not been satisfactorily completed at the time of such inspection, he shall inform the Contractor in writing as to the work to be done or the particular defects to be remedied to place the work in condition satisfactory for Final Construction Inspection. After the work has been satisfactorily completed the Engineer shall make the Final Construction Inspection.

60-16 FINAL ACCEPTANCE

Upon due notice from the Contractor of presumptive completion of the entire project, the Engineer and OWNER will make an inspection. If all construction provided for and contemplated by the Contract is found to be completed in accordance with the Contract, plans and specifications, such inspection shall constitute the final inspection. The Engineer shall notify the Contractor in writing of final acceptance as of the date of the final inspection.

If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the Engineer will give the Contractor the necessary instructions for correction of same, and the Contractor shall immediately comply with and execute such instructions. Upon correction of the work, another inspection will be made which shall constitute the final inspection, provided the work has been satisfactorily completed. In such event, the OWNER will make the final acceptance and notify the Contractor in writing of this acceptance as of the date of final inspection.

60-17 CLAIMS FOR ADJUSTMENT AND DISPUTES

If for any reason the Contractor deems that additional compensation is due him for work or materials not clearly provided for in the Contract, plans, or specifications or previously authorized as extra work, he shall notify the Engineer in writing of his intention to claim such additional compensation before he begins the work on which he bases the claim. If such notification is not given or the Engineer is not afforded proper opportunity by the Contractor for keeping strict account of actual cost as required, then the Contractor hereby agrees to waive any claim for such additional compensation. Such notice by the Contractor and the fact that the OWNER has kept account of the cost of the work shall not in any way be construed as proving or substantiating the validity of the claim. When the work on which the claim for additional compensation is based has been completed, the Contractor shall, within 10 calendar days, submit his written claim to the Engineer, who will present it to the OWNER for consideration.

Nothing in this subsection shall be construed as a waiver of the Contractor's right to dispute the final payment based on differences in measurements or computations.

SECTION 70 CONTROL OF MATERIALS

70-01 SOURCE OF SUPPLY AND QUALITY REQUIREMENTS

The materials used on the work shall conform to the requirements of the Contract, plans, and specifications. Unless otherwise specified, such materials that are manufactured or processed shall be new (as compared to used or reprocessed).

In order to expedite the inspection and testing of materials, the Contractor shall furnish complete statements to the OWNER as to the origin, composition, and manufacture of all materials to be used in the work. Such statements shall be furnished promptly after execution of the Contract, but, in all cases, prior to delivery of such materials.

At the OWNER's option, materials may be approved at the source of supply before delivery is started. If it is found after trial sources of supply for previously approved materials do not produce specified products, the Contractor shall furnish materials from other sources.

70-02 SAMPLES, TESTS, AND CITED SPECIFICATIONS

All materials used in the work shall be inspected, tested, and approved by the Engineer before incorporation in the work. Any work in which untested materials are used without approval or written permission of the Engineer shall be performed at the Contractor's risk. Materials found to be unacceptable and unauthorized will not be paid for and, if directed by the Engineer, shall be removed at the Contractor's expense. Unless otherwise designated, tests in accordance with the cited standard methods of AASHTO or ASTM which are current on the date of advertisement for bids will be made by and at the expense of the OWNER. Samples will be taken by a qualified representative of the OWNER. All materials being used are subject to inspection, test, or rejection at any time prior to or during incorporation into the work. Copies of all tests will be furnished to the Contractor's representative at his request.

70-03 CERTIFICATION OF COMPLIANCE

The Engineer may permit the use, prior to sampling and testing, of certain materials or assemblies when accompanied by manufacturer's certificates of compliance stating that such materials or assemblies fully comply with the requirements of the Contract. The certificate shall be signed by the manufacturer. Each lot of such materials or assemblies delivered to the work must be accompanied by a certificate of compliance in which the lot is clearly identified.

Materials or assemblies used on the basis of certificates of compliance may be sampled and tested at any time and if found not to be in conformity with Contract requirements will be subject to rejection whether in place or not.

The form and distribution of certificates of compliance shall be as approved by the Engineer.

When a material or assembly is specified by "brand name or equal" and the Contractor elects to furnish the specified "brand name", the Contractor shall be required to furnish the manufacturer's certificate of compliance for each lot of such material or assembly delivered to the work. Such certificate of compliance shall clearly identify Each lot delivered and shall certify as to:

- (a) Conformance to the specified performance, testing, quality or dimensional requirements; and
- (b) Suitability of the material or assembly for the use intended in the Contract work.

Should the Contractor propose to furnish an "or equal" material or assembly, he shall furnish the manufacturer's certificates of compliance as hereinbefore described for the specified brand name material or assembly. However, the Engineer shall be the sole judge as to whether the proposed "or equal" is suitable for use in the work.

70-04 PLANT INSPECTION

The Engineer or his authorized representative may inspect, at its source, any specified material or assembly to be used in the work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the work and to obtain samples required for his acceptance of the material or assembly.

Should the Engineer conduct plant inspections, the following conditions shall exist:

- (a) The Engineer shall have the cooperation and assistance of the Contractor and the producer with whom he has contracted the materials.
- (b) The Engineer shall have full entry at all reasonable times to such parts of the plant that concern the manufacture or production of the materials being furnished.
- (c) If required by the Engineer, the Contractor shall arrange for adequate office or working space that may be reasonably needed for conducting plant inspections. Office or working space should be conveniently located with respect to the plant.

It is understood and agreed that the OWNER shall have the right to retest any material which has been tested and approved at the source of supply after it has been delivered to the site. The Engineer shall have the right to reject only material which, when retested, does not meet the requirements of the Contract, plans, or specifications.

70-05 ENGINEER'S FIELD OFFICE AND LABORATORY

When specified and provided for as a Contract item, the Contractor shall furnish a building for the exclusive use of the Engineer as a field office and field testing laboratory. The building shall be furnished and maintained by the Contractor, as specified herein, and shall become property of the Contractor when the Contract work is completed.

70-06 STORAGE OF MATERIALS

Materials shall be stored as to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be located so as to facilitate their prompt inspection. The Contractor shall coordinate the storage of all materials with the Engineer. Materials to be stored on OWNER's property shall not create an obstruction to commerce nor shall they interfere with the free and unobstructed movement of traffic. Unless otherwise shown on the plans, the storage of materials and the location of the Contractor's plant and parked equipment or vehicles shall be as directed by the Engineer. Private property shall not be used for storage purposes without written permission of the owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses for the storage of materials on private property. Upon request, the Contractor shall furnish the Engineer a copy of the property owner's permission.

All storage sites on private or owner's property shall be restored to their original condition by the Contractor at his entire expense, except as otherwise agreed to (in writing) by the owner or lessee of the property.

70-07 UNACCEPTABLE MATERIALS

Any material or assembly that does not conform to the requirements of the Contract, plans, or specifications shall be considered unacceptable and shall be rejected. The Contractor shall remove any rejected material or assembly from the site of the work, unless otherwise instructed by the Engineer.

No rejected material or assembly, the defects of which have been corrected by the Contractor, shall be returned to the site of the work until such time as the Engineer has approved its use in the work.

70-08 OWNER-FURNISHED MATERIAL

The Contractor shall furnish all materials required to complete the work, except those specified herein (if any) to be furnished by the OWNER. OWNER-furnished materials shall be made available to the Contractor at the location specified herein.

All cost of handling, transportation from the specified location to the site of work, storage, and installing OWNER-furnished materials shall be included in the unit price bid for the Contract item in which such OWNER-furnished material is used.

After any OWNER-furnished material has been delivered to the location specified, the Contractor shall be responsible for any demurrage, damage, loss, or other deficiencies which may occur during the Contractor's handling, storage, or use of such OWNER-furnished material. The OWNER will deduct from any monies due or to become due the Contractor any cost incurred by the OWNER in making good such loss due to the Contractor's handling, storage, or use of OWNER-furnished materials.

70-09 RECEIVING MATERIALS AND EQUIPMENT

The Contractor shall be responsible for clerical salaries, office space and equipment rental, incidentals to receiving incoming shipments and deliveries of all materials and equipment. All material which must be protected from the elements will be properly and orderly stored in shelters provided by the Contractor. All goods and materials stored out of doors will be properly and orderly supported. The Contractor will be responsible for safeguarding all such goods and materials against loss due to damage and theft.

SECTION 80 LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

80-01 LAWS TO BE OBSERVED

The Contractor shall keep fully informed of all Federal and State laws, and local ordinances, and regulations and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work, or which in any way affect the conduct of the work. He shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the OWNER and all his officers, agents, or servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by himself or his employees.

80-02 PERMITS, LICENSES, AND TAXES

The Contractor shall procure all permits and licenses, pay all charges, fees and taxes, and give all notices necessary and incidental to the due and lawful prosecution of the work.

80-03 PATENTED DEVICES, MATERIALS AND PROCESSES

If the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, he shall provide for such use by suitable legal agreement with the patentee or owner, or a third party, from any and all claims for infringement by reason of the use of any such patented design, device, materials or process, or any trademark or copyright, and shall indemnify the OWNER for such costs, expenses, and damages which it may be obliged to pay by reason of an infringement, at any time during the prosecution or after the completion of the work.

80-04 RESTORATION OF SURFACES DISTURBED BY OTHERS

The OWNER reserves the right to authorize the construction, reconstruction, or maintenance of any public or private utility service, or a utility service of another government agency at any time during the process of the work. To the extent that such construction, reconstruction, or maintenance has been coordinated with the OWNER, such authorized work (by others) is noted in the plans.

Except as noted on the plans, the Contractor shall not permit any individual, firm, or corporation to excavate or otherwise disturb such utility services or facilities located within the limits of the work without the written permission of the Engineer.

Should the owner of public or private utility service, or a utility service of another government agency be authorized to construct, reconstruct, or maintain such utility service or facility during the process of the work, the Contractor shall cooperate with such owners by arranging and performing the work in this Contract so as to facilitate such construction, reconstruction or maintenance by others whether or not such work by others is noted on the plans. When ordered as extra work by the Engineer, the Contractor shall make all necessary repairs to the work which are due to such authorized work by others, unless otherwise provided for in the Contract, plans, or specifications. It is understood and agreed that the Contractor shall not be entitled to make any claim for damages due to such authorized work by others or for any delay to the work resulting from such authorized work.

80-05 SANITARY, HEALTH, AND SAFETY PROVISIONS

The Contractor shall provide and maintain in a neat, sanitary condition such accommodations for the use of his employees as may be necessary to comply with the requirements of the State and Local Board of Health, or of other bodies or tribunals having jurisdiction.

Attention is directed to Federal, State, and local laws, rules and regulations concerning construction safety and health standards. The Contractor shall not require any worker to work in surroundings or under conditions which are unsanitary, hazardous, or dangerous to his health or safety.

80-06 PUBLIC CONVENIENCE AND SAFETY

The Contractor shall control his operations and those of his Subcontractors and all suppliers, to assure the least inconvenience to the public. Under all circumstances, safety shall be the most important consideration.

The Contractor shall maintain the free and unobstructed movement of commerce and vehicular traffic with respect to his own operations and those of his Subcontractors and all suppliers in accordance with the paragraph titled MAINTENANCE OF COMMERCE of subsection 50, hereinbefore specified and shall limit such operations for the convenience and safety of the public, as specified in the paragraph titled LIMITATION OF OPERATIONS of subsection 90, hereinafter.

80-07 BARRICADES, WARNING SIGNS, AND HAZARD MARKINGS

The Contractor shall furnish, erect, and maintain all barricades, warning signs, and markings for hazards necessary to protect the public and the work. When used during periods of darkness, such barricades, warning signs and hazard markings shall be suitably illuminated.

For vehicular and pedestrian traffic, the Contractor shall furnish, erect, and maintain barricades, warning signs, lights and other traffic control devices in reasonable conformity with the Manual of Uniform Traffic Control Devices for Streets and Highways (published by the United States Government Printing Office).

The Contractor shall furnish, erect, and maintain markings and associated lighting of open trenches, excavations, temporary stockpiles, and his parked construction equipment that may be hazardous to the operation of emergency fire rescue or maintenance vehicles.

The Contractor shall furnish and erect all barricades, warning signs, and markings for hazards prior to commencing work which requires such erection and shall maintain the barricades, warning signs, and markings for hazards until their dismantling is directed by the Engineer.

Open-flame type lights shall not be permitted.

80-08 USE OF EXPLOSIVES

When the use of explosives is necessary for the prosecution of the work, the Contractor shall exercise the utmost care not to endanger life or property, including new work. The Contractor shall be responsible for all damage resulting from the use of explosives.

All explosives shall be stored in a secure manner in compliance with all laws and ordinances, and all such storage places shall be clearly marked. Where no local laws or ordinances apply, storage shall be provided satisfactory to the Engineer and, in general, not closer than 1,000 feet from the work or from any building, road, or other place of human occupancy.

The Contractor shall notify Each property owner and public utility company having structures or facilities in proximity to the site of the work of his intention to use explosives. Such notice shall be given sufficiently in advance to enable them to take such steps as they may deem necessary to protect their property from injury.

80-09 PROTECTION AND RESTORATION OF PROPERTY AND LANDSCAPE

The Contractor shall be responsible for the preservation of all public and private property, and shall protect carefully from disturbance or damage all land monuments and property marks until the Engineer has witnessed or otherwise referenced their location and shall not move them until directed.

The Contractor shall be responsible for all damage or injury to property of any character, during the prosecution of the work, resulting from any act, omission, neglect, or misconduct in his manner or method of executing the work, or at any time due to defective work or materials, and said responsibility will not be released until the project shall have been completed and accepted.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work or in consequence of the nonexecution thereof by the Contractor, he shall restore, at his own expense, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, rebuilding, or otherwise restoring as may be directed, or he shall make good such damage or injury in any acceptable manner.

80-10 RESPONSIBILITY FOR DAMAGE CLAIMS

The Contractor shall indemnify and save harmless the Engineer and the OWNER and their officers, and employees from all suits, actions, or claims of any character brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the Contractor; or on account of or in consequence of any neglect in safeguarding the work; or because of any act or through use of unacceptable materials in constructing the work; or because of any claims or amount recovered from any infringements of patent, trademark, or copyright; or from any claims or amount arising or recovered under the "Workman's Compensation Act" or any other law, ordinance, order or decree.

Money due the Contractor under and by virtue of his Contract as may be considered necessary by the OWNER for such purpose may be retained for the use of the OWNER or, in case no money is due, his surety may be held until such suit or suits, action or actions, claim or claims for injuries or damages as aforesaid shall have been settled and suitable evidence to that effect furnished to the OWNER, except that money due the Contractor will not be withheld when the Contractor produces satisfactory evidence that he is adequately protected by public liability and property damage insurance.

80-11 THIRD PARTY BENEFICIARY CLAUSE

It is specifically agreed between the parties executing the Contract that it is not intended by any of the provisions of any part of the Contract to create the public or any member thereof a third party beneficiary or to authorize anyone not a party to the Contract to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of the Contract.

80-12 OPENING SECTIONS OF THE WORK FOR OCCUPANCY

Should it be necessary for the Contractor to complete portions of the Contract work for the beneficial occupancy of the OWNER prior to completion of the entire Contract, such "phasing" of the work shall be as specified herein, and indicated on the plans. When so specified, the Contractor shall complete such portions of the work on or before the date specified or as otherwise specified. The Contractor shall make his own estimate of the difficulties involved in arranging his work to permit such beneficial occupancy by the OWNER as described elsewhere in these specifications.

Upon completion of any portion of the work so described, such portion shall be accepted by the OWNER in accordance with the paragraph titled PARTIAL ACCEPTANCE of Subsection 60.

No portion of the work may be opened by the Contractor for use until ordered by the Engineer in writing. Should it become necessary to open a portion of the work to Docks traffic on a temporary or intermittent basis, such openings shall be made when, in the opinion of the Engineer, such portion of the work is in an acceptable condition to support the intended traffic. Temporary or intermittent openings are considered to be inherent in the work and shall not constitute either acceptance of the portion of the work so opened or a waiver of any provision of the Contract. Any damage to the portion of the work so opened that is not attributable to traffic which is permitted by the OWNER shall be repaired by the Contractor at his expense.

The Contractor shall make his own estimate of the inherent difficulties involved in completing the work under the conditions herein described and shall not claim any added compensation by reason of delay or increased cost due to opening a portion of the Contract work.

80-13 CONTRACTOR'S RESPONSIBILITY FOR WORK

Until the Engineer's final written acceptance of the entire completed work excepting only those portions of the work accepted in accordance with the paragraph titled PARTIAL ACCEPTANCE of Subsection 60, the Contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part due to the action of the elements or from any other cause, whether arising from the execution or from the nonexecution of the work. The Contractor shall rebuild, repair, store, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof.

If the work is suspended for any cause whatever, the Contractor shall be responsible for the work and shall take such precautions necessary to prevent damage to the work. The Contractor shall provide for normal drainage and shall erect necessary temporary structures, signs, or other facilities at his expense. During such period of suspension of work, the Contractor shall properly and continuously maintain in an acceptable growing condition all living material in newly established planting, seeding, and sodding, furnished under his Contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

80-14 CONTRACTOR'S RESPONSIBILITY FOR UTILITY SERVICE AND FACILITIES OF OTHERS

As provided in the paragraph titled RESTORATION OF SURFACES DISTURBED BY OTHERS of this subsection, the Contractor shall cooperate with the owner of any public or private utility service, or a utility service of another government agency that may be authorized by the OWNER to construct, reconstruct or maintain such utility services or facilities during the progress of the work. In addition, the Contractor shall control his operations to prevent the unscheduled interruption of such utility services and facilities.

To the extent that such public or private utility services, or utility services of another governmental agency are known to exist within the limits of the Contract work, the approximate locations have been indicated on the plans.

It is understood and agreed that the OWNER does not guarantee the accuracy or the completeness of the location information relating to existing utility services, facilities, or structures that may be shown on the plans or encountered in the work. Any inaccuracy or omission in such information shall not relieve the Contractor of his responsibility to protect such existing features from damage or unscheduled interruption of service.

It is further understood and agreed that the Contractor shall, upon execution of the Contract, notify the owners of all utility services or other facilities of his plan of operations. Such notification shall be in writing. In addition to the general written notifications hereinbefore provided, it shall be the responsibility of the Contractor to keep such individual owners advised of changes in his plan of operations that would affect such owners.

Prior to commencing the work in the general vicinity of an existing utility service or facility, the Contractor shall again notify Each such owner of his plan or operation. If, in the Contractor's opinion, the owner's assistance is needed to locate the utility service or facility or the presence of a representative of the owner is desirable to observe the work, such advice should be included in the notification. Such notification shall be given by the most expeditious means to reach the utility owner no later than two normal business days prior to the Contractor's commencement of operations in such general vicinity. The Contractor shall furnish a written summary of the notification to the Engineer.

The Contractor's failure to give the two days' notice hereinabove provided shall be cause for the Engineer to suspend the Contractor's operations in the general vicinity of a utility service or facility.

Where the outside limits of an underground utility service have been located and staked on the ground, the Contractor shall be required to use excavation methods acceptable to the Engineer within three (3) feet of such outside limits at such points as may be required to insure protection from damage due to the Contractor's operations.

Should the Contractor damage or interrupt the operations of a utility service or facility by accident or otherwise, he shall immediately notify the proper authority and the Engineer and shall take all reasonable measures to prevent further damage or interruption of service. The Contractor, in such events, shall cooperate with the utility service or facility owner and the Engineer continuously until such damage has been repaired and service restored to the satisfaction of the utility or facility owner.

The Contractor shall bear all costs of damage and restoration of service to any utility service or facility due to his operations whether or not due to negligence or accident. The OWNER reserves the right to deduct such costs from any monies due or which may become due the Contractor, or his surety.

80-15 FURNISHING RIGHTS-OF-WAY

The OWNER will be responsible for furnishing all right-of-ways upon which the work is to be constructed in advance of the Contractor's operations.

80-16 PERSONAL LIABILITY OF PUBLIC OFFICIALS

In carrying out any of the Contract provisions or in exercising any power or authority granted to him by this Contract, there shall be no liability upon the Engineer, his authorized representatives, or any official of the OWNER either personally or as an official of the OWNER. It is understood that in such manner they act solely as agents and representatives of the OWNER.

80-17 NO WAIVER OF LEGAL RIGHTS

Upon completion of the work, the OWNER will expeditiously make final inspection and notify the Contractor of final acceptance. Such final acceptance, however, shall not preclude or stop the OWNER from correcting any measurement, estimate or certificate made before or after completion of the work, nor shall the OWNER be precluded or stopped from recovering from the Contractor or his surety, or both, such overpayment as may be sustained, or by failure on the part of the Contractor to fulfill his obligations under the Contract. A waiver on the part of the OWNER of any breach of any part of the Contract shall not be held to be a waiver of any other or subsequent breach.

The Contractor, without prejudice to the terms of the Contract, shall be liable to the OWNER for latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the OWNER's rights under any warranty or guaranty.

80-18 ENVIRONMENTAL PROTECTION

The Contractor shall comply with all Federal, State and local laws and regulations controlling pollution of the environment. He shall take necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with silt runoff, fuels, oils, bitumens, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter.

80-19 ARCHAEOLOGICAL AND HISTORICAL FINDINGS

Unless otherwise specified in this subsection, the Contractor is advised that the site of the work is not within any property, district, or site, and does not contain any building, structure, or object listed in the current National Register of Historic Places published by the United States Department of Interior.

Should the Contractor encounter, during his operations, any building, part of a building, structure, or object which is incongruous with its surroundings, he shall immediately cease operations in that location and notify the Engineer. The Engineer will immediately investigate the Contractor's finding and will direct the Contractor to either resume his operations or to suspend operations as directed.

Should the Engineer order suspension of the Contractor's operations in order to protect an archaeological or historical finding, or order the Contractor to perform extra work, such shall be covered by an appropriate Contract modification (change order or supplemental agreement) as provided in the paragraph titled EXTRA WORK AND FORCE ACCOUNT WORK of Subsection 100. If appropriate, the Contract modification shall include an extension of Contract time in accordance with the paragraph titled DETERMINATION AND EXTENSION OF CONTRACT TIME of Subsection 90.

SECTION 90 PROSECUTION AND PROGRESS

90-01 SUBLETTING OF CONTRACT

The OWNER will not recognize any Subcontractor on the work. The Contractor shall at all times when work is in progress be represented either in person, by a qualified superintendent, or by other designated, qualified representative who is duly authorized to receive and execute orders of the Engineer.

Should the Contractor elect to assign his Contract, said assignment shall be concurred in by the surety, shall be presented for the consideration and approval of the OWNER. In case of approval, the Contractor shall file copies of all Subcontractors with the Engineer.

90-02 NOTICE TO PROCEED

The notice to proceed shall state the date on which it is expected the Contractor begin the construction and from which date Contract time will be charged. If no such date is stated in the notice to proceed, Contract time will start on the date the notice to proceed is issued. The Contractor shall begin the work to be performed under the Contract within ten (10) days of the date set by the Engineer in the written notice to proceed, but in any event the Contractor shall notify the Engineer at least 24 hours in advance of the time actual construction operations will begin.

90-03 PROSECUTION AND PROGRESS

Unless otherwise specified, the Contractor shall submit his progress schedule for the Engineer's approval within 10 days after the effective day of the notice to proceed. The Contractor's progress schedule, when approved by the Engineer, may be used to establish major construction operations and to check on the progress of the work. The Contractor shall provide sufficient materials, equipment, and labor to guarantee the completion of the project in accordance with the plans and specifications within the time set forth in the contract.

If the Contractor falls significantly behind the submitted schedule, the Contractor shall, upon the Engineer's request, submit a revised schedule for completion of the work within the Contract time and modify his operations to provide such additional materials, equipment, and labor necessary to meet the revised schedule. Should the prosecution of the work be discontinued for any reason, the Contractor shall notify the Engineer at least 24 hours in advance of resuming operations.

90-04 LIMITATION OF OPERATIONS

The Contractor shall control his operations and the operations of his Subcontractors and all suppliers so as to provide for the free and unobstructed movement of commerce in those areas adjacent to the work.

90-05 CHARACTER OF WORKERS, METHODS AND EQUIPMENT

The Contractor shall, at all times, employ sufficient labor and equipment for prosecuting the work to full completion in the manner and time required by the Contract, plans, and specifications.

All workers shall have sufficient skill and experience to perform properly the work assigned to them. Workers engaged in special work or skilled work shall have sufficient experience in such work and in the operation of the equipment required to perform the work satisfactorily.

Any persons employed by the Contractor or by any Subcontractor who, in the opinion of the Engineer, does not perform his work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the Engineer, be removed forthwith by the Contractor or Subcontractor employing such person, and shall not be employed again in any portion of the work without the approval of the Engineer.

Should the Contractor fail to remove such person or persons or fail to furnish suitable and sufficient personnel for the proper prosecution of the work, the Engineer may suspend the work by written notice until compliance with such orders is ascertained.

All equipment which is proposed to be used on the work shall be of sufficient size and in such mechanical condition as to meet the requirements of the work and to produce a satisfactory quality of work. Equipment used on any portion of the work shall be such that no injury to previously completed work, adjacent property, or existing facilities will result from its use.

When the methods and equipment to be used by the Contractor in accomplishing the work are not prescribed in the Contract, the Contractor is free to use any methods or equipment that will accomplish the work in conformity with the requirements of the Contract, plans and specifications.

When the Contract specifies the use of certain methods and equipment, such methods and equipment shall be used unless others are authorized by the Engineer. If the Contractor desires to use a method or type of equipment other than specified in the Contract, he may request authority from the Engineer to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed and of the reasons for desiring to make the change. If approval is given, it will be on the condition that the Contractor will be fully responsible for producing the work in conformity with Contract requirements. If, after trial use on the substituted methods or equipment, the Engineer determines that the work produced does not meet Contract requirements, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining work with the specified methods and equipment. The Contractor shall remove any deficient work and replace it with work of specified quality or take such other corrective action as the Engineer may direct. No change will be made in basis of payment for the Contract items involved or in Contract time as a result of authorizing a change in methods or equipment under this subsection.

90-06 TEMPORARY SUSPENSION OF THE WORK

The Engineer shall have the authority to suspend the work wholly, or in part, for such period or periods as he may deem necessary, due to unsuitable weather, or such other conditions as are considered unfavorable for the prosecution of the work, or for such time as is necessary due to the failure on the part of the Contractor to carry out orders given or perform any or all provisions of the Contract.

In the event that the Contractor is ordered by the Engineer, in writing, to suspend work for some unforeseen cause not otherwise provided for in the Contract and over which the Contractor has no control, the Contractor may be reimbursed for actual money expended on the work during the period of shutdown. No allowance will be made for anticipated profits. The period of shutdown shall be computed from the effective date of the Engineer's order to suspend work to the effective date of the Engineer's order to resume the work. Claims for such compensation shall be filed with the Engineer within the time period stated in the Engineer's order to resume work. The Contractor shall submit with his claim information substantiating the amount shown on the claim. The Engineer will forward the Contractor's claim to the OWNER for consideration. No provision of this article shall be construed as entitling the Contractor to compensation for delays due to inclement weather, for suspensions made at the request of the Contractor, or for any other delay provided for in the Contract, plans, or specifications.

If it should become necessary to suspend work for an indefinite period, the Contractor shall store all materials in such manner that they will not become an obstruction nor become damaged in any way. He shall take every precaution to prevent damage or deterioration of the work performed and provide for normal drainage of the work. The Contractor shall erect temporary structures where necessary to provide for traffic on, to, or from the site.

90-07 DETERMINATION AND EXTENSION OF CONTRACT TIME

The number of calendar or working days allowed for completion of the work shall be stated in the proposal and Contract and shall be known as the CONTRACT TIME.

Should the CONTRACT TIME require extension for reasons beyond the Contractor's control, it shall be adjusted as follows:

- (a) CONTRACT TIME based on WORKING DAYS shall be calculated weekly by the Engineer. The Engineer will furnish the Contractor a copy of his weekly statement of the number of working days charged against the CONTRACT TIME during the week and the number of working days currently specified for completion of the Contract (the original CONTRACT TIME plus the number of working days, if any, that have been included in approved CHANGE ORDERS, or SUPPLEMENTAL AGREEMENTS covering EXTRA WORK).

The Engineer shall base his weekly statement of CONTRACT TIME charges on the following considerations:

- (1) No time shall be charged for days on which the Contractor is unable to proceed with the principal item of work under construction at the time for at least 6 hours with the normal work force employed on such principal item. Should the normal work force be on a triple shift, 18 hours shall apply. Conditions beyond the Contractor's control such as strikes, lockouts, unusual delays in transportation, temporary suspension of the principal item of work under construction or temporary suspension of the entire work which have been ordered by the Engineer for reasons not the fault of the Contractor, shall not be charged against the CONTRACT TIME.
 - (2) The Engineer will not make charges against the CONTRACT TIME prior to the effective date of the notice to proceed.
 - (3) The Engineer will begin charges against the CONTRACT TIME on the first working day after the effective date of the notice to proceed.
 - (4) The Engineer will not make charges against the CONTRACT TIME after the date of final acceptance as defined in the paragraph titled FINAL ACCEPTANCE of Subsection 60.
 - (5) The Contractor will be allowed one week in which to file a written protest setting forth his objections to the Engineer's weekly statement. If no objection is filed within such specified time, the weekly statement shall be considered as acceptable to the Contractor.
 - (6) The CONTRACT TIME (state in the proposal) is based on the originally estimated quantities as described in the paragraph titled INTERPRETATION OF ESTIMATED PROPOSAL QUANTITIES of Subsection 20. Should the satisfactory completion of the Contract require performance of work in greater quantities than those estimated in the proposal, the CONTRACT TIME shall be increased in the same proportion as the cost of the actually completed quantities bears to the cost of the originally estimated quantities in the proposal. Such increase in CONTRACT TIME shall not consider either the cost of work or the extension of CONTRACT TIME that has been covered by change order or supplemental agreement and shall be made at the time of final payment.
- (b) CONTRACT TIME based on CALENDAR DAYS shall consist of the number of calendar days stated in the Contract counting from the effective date of the notice to proceed and including all Saturdays, Sundays, holidays, and no work days. All calendar days elapsing between the effective dates of the Engineer's orders to suspend and resume all work, due to causes not the fault of the Contract, shall be excluded.

At the time of final payment, the CONTRACT TIME shall be increased in the same proportion as the cost that the actually completed quantities bear to the cost of the originally estimated quantities in the proposal. Such increase in the CONTRACT TIME shall not consider either

the cost of work of the extension of CONTRACT TIME that has been covered by a change order or supplemental agreement. Charges against the CONTRACT TIME will cease as of the date of final agreement.

- (c) When the CONTRACT TIME is a specified completion date, it shall be the date on which all Contract work shall be substantially completed.

If the Contractor finds it impossible for reasons beyond his control to complete the work within the Contract time as specified, or as extended in accordance with the provisions of this subsection, he may, at any time prior to the expiration of the CONTRACT TIME as extended, make a written request to the Engineer for an extension of time setting forth the reasons which he believes will justify the granting of his request. The Contractor's plea that insufficient time was specified is not a valid reason for extension of time. If the Engineer finds that the work was delayed because of conditions beyond the control and without the fault of the Contractor, he may extend the time for completion in such amount as the conditions justify. The extended time for completion shall then be in full force and effect, the same as though it were the original time for completion.

90-08 FAILURE TO COMPLETE ON TIME

For Each calendar day or working day, as specified in the Contract, that any work remains incomplete after the CONTRACT TIME (including all extensions and adjustments as provided in the paragraph titled DETERMINATION AND EXTENSION OF CONTRACT TIME of this Subsection) the sum specified in the Contract and proposal as liquidated damages will be deducted from any money due or to become due the Contractor or his surety. Such deducted sums shall not be deducted as a penalty but shall be considered as liquidation of a reasonable portion of damages that will be incurred by the OWNER should the Contractor fail to complete the work in the time provided in his Contract.

The Contractor will not be charged with liquidated damages when delay in completion of the work is due to acts of the public enemy, acts of the OWNER, acts of another Contractor in the performance of a Contract with the OWNER, fires, floods, epidemics, quarantine restrictions, strikes, or freight embargoes.

Permitting the Contractor to continue and finish the work or any part of it after the time fixed for its completion, or after the date to which the time for completion may have been extended, will in no way operate as a waiver on the part of the OWNER of any rights under the Contract.

90-09 CONTRACT DEFAULT

The Contractor shall be considered in default of his Contract and such default will be considered as cause for the OWNER to terminate the Contract for any of the following reasons if the Contractor:

- (a) Fails to begin the work under the Contract within the time specified in the "Notice to Proceed";
or
- (b) Fails to perform the work or fails to provide sufficient workers, equipment or materials to assure completion of work in accordance with the terms of the Contract; or
- (c) Performs the work unsuitably or neglects or refuses to remove materials or to perform anew such work as may be rejected as unacceptable and unsuitable; or
- (d) Discontinues the prosecution of the work; or
- (e) Fails to resume work which has been discontinued within a reasonable time after notice to do so; or
- (f) Becomes insolvent or is declared bankrupt, or commits an act of bankruptcy or insolvency;
or

- (g) Allows any final judgment to stand against him unsatisfied for a period of 10 days; or
- (h) Makes an assignment for the benefit of creditors; or
- (i) For any other cause whatsoever, fails to carry on the work in an acceptable manner.

Should the Engineer consider the Contractor in default of the Contract for any reason hereinbefore, he shall immediately give written notice to the Contractor and the Contractor's surety as to the reasons for considering the construction in default and the OWNER's intentions to terminate the Contract.

If the Contractor or surety, within a period of 10 days after such notice, does not proceed in accordance therewith, then the OWNER will, upon written notification from the Engineer of the facts of such delay, neglect, or default and the Contractor's failure to comply with such notice, have full power and authority without violating the Contract, to take the prosecution of the work out of the hands of the Contractor. The OWNER may appropriate or use any or all materials and equipment that have been mobilized for use in the work and are acceptable and may enter into an agreement for the completion of said Contract according to the terms and provisions thereof, or use such other methods as in the opinion of the Engineer will be required for the completion of said Contract in an acceptable manner.

All costs and charges incurred by the OWNER, together with the cost of completing the work under Contract, will be deducted from any monies due or which may become due the Contractor. If such expense exceeds the sum which would have been payable under the Contract, then the Contractor and the surety shall be liable and shall pay to the OWNER the amount of such excess.

90-10 CONTRACT TERMINATION

The Owner may terminate the Contract, or any portion hereof, for just cause by written notice to the Contractor.

When the Contract, or any portion thereof, is terminated before completion of all items of work in the Contract, payment will be made for the actual number of units or items of work completed or started. No claims for loss of anticipated profits shall be considered.

Acceptable materials both in quantity and quality obtained or ordered by the Contractor that are not incorporated into the work shall, at the option of the Contractor, be purchased by the Owner at actual cost as shown by receipted bills and actual cost records. Delivery of the materials will be performed as designated by the Engineer.

Termination of the Contract, or a portion thereof, shall neither relieve the Contractor of his responsibilities for the completed work nor relieve his surety of its obligation for and concerning any just claim arising out of the work performed.

The costs incurred by the Contractor for mobilization, if applicable, shall be itemized and presented to the Owner. Rebates and refunds that are applicable shall be itemized, and the amount paid the Contractor shall be adjusted to reflect actual cost as shown by receipted bills and actual cost records.

The cost of demobilization of Contractor's equipment and other items pertaining to the expense of moving off the job site shall be itemized and supported by actual cost records and presented for payment. Demobilization as a percentage of the Contract amount, or portion thereof, shall not be paid.

Reimbursement for organization of the work and overhead expenses (when not otherwise included in the Contract) will be considered, the intent being that an equitable settlement will be made with the Contractor.

All of the above are subject to audit as specified by the Right to Audit, Paragraph 100-11.

SECTION 100 MEASUREMENT AND PAYMENT

100-01 MEASUREMENT OF QUANTITIES

All work completed under the Contract will be measured by the Engineer, or his authorized representatives, using United States Customary Units of Measurement.

The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the Contract will be those methods generally recognized as conforming to good Engineering practice.

Unless otherwise specified, longitudinal measurements for area computations will be made horizontally, and no deductions will be made for individual fixtures (or leave-outs) having an area of 9 square feet or less. Unless otherwise specified, transverse measurements for area computations will be the near dimensions shown on the plans or ordered in writing by the Engineer.

Structures will be measured according to neat lines shown on the plans or as altered to fit field conditions.

Unless otherwise specified, all Contract items which are measured by the Linear Foot such as electrical ducts, conduits, pipe culverts, underdrains, and similar items shall be measured parallel to the base or foundation upon which such items are placed.

In computing volumes of excavation the average end area method or other acceptable methods will be used. Acceptability of another method will be decided by the Engineer.

The thickness of plates and galvanized sheet used in the manufacture of corrugated metal pipe, metal plate pipe culverts and arches, and metal cribbing will be specified and measured in decimal fractions of inches.

The term "ton" will mean the short ton consisting of 2,000 pounds avoirdupois. All materials which are measured or proportioned by weights shall be weighed on accurate, approved scales by competent, qualified personnel at locations designated by the Engineer. If material is shipped by rail, the car weight may be accepted provided that only the actual weight of material is paid for. However, car weights will not be acceptable for materials to be passed through mixing plants. Trucks used to haul materials being paid for by weight shall be weighed empty daily at such times as the Engineer directs, and each truck shall bear the plainly legible identification mark.

Materials to be measured by volume in the hauling vehicle shall be hauled in approved vehicles and measured therein at the point of delivery. Vehicles for this purpose may be of any size or type acceptable to the Engineer, provided that the body is of such shape that the actual contents may be readily and accurately determined. All vehicles shall be loaded to at least their water level capacity and all loads shall be leveled when the vehicles arrive at the point of delivery.

When requested by the Contractor and approved by the OWNER in writing, material specified to be measured by the Cubic Yard may be weighed and such weights will be converted to Cubic Yards for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the Engineer and shall be agreed to by the Contractor before such method of measurement of pay quantities is used.

Bituminous materials will be measured by the gallon or ton. When measured by volume, such volumes will be measured at 60 degrees F, or will be corrected to the volume at 60 degrees F using ASTM D 1250 for asphalt or ASTM D 633 for tars.

Net certified scale weights or weights based on certified volumes in the case of rail shipments will be used as a basis of measurement, subject to correction when bituminous material has been lost from the car or the distributor, wasted, or otherwise not incorporated in the work.

When bituminous materials are shipped by truck or transport, net certified weights by volume, subject to correction for loss or foaming, may be used for computing quantities.

Lumber will be measured by the thousand feet board measure (M.F.B.M.) actually incorporated in the structure. Measurement will be based on nominal widths and thicknesses and the extreme length of each piece.

The term "Lump Sum" when used as an item of payment will mean complete payment for the work described in the Contract.

When a complete structure or structural unit (in effect, "Lump Sum" work) is specified as the unit of measurement, the unit will be construed to include all necessary fittings and accessories.

Rental of equipment will be measured by time in hours of actual working time and necessary traveling time of the equipment within the limits of the work. Special equipment ordered by the Engineer in connection with force account work will be measured as agreed in the change order or supplemental agreement authorizing such force account work as provided in the paragraph titled PAYMENT FOR EXTRA AND FORCE ACCOUNT WORK of this section.

When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by gage, unit weight, section dimensions, etc., such identification will be considered to be nominal weights or dimensions. Unless more stringently controlled by tolerances in cited specifications, manufacturing tolerances established by the industries involved will be accepted.

Scales for weighing materials which are required to be proportioned or measured and paid for by weight shall be furnished, erected, and maintained by the Contractor, or by certified permanently installed commercial scales.

Scales shall be accurate within one-half percent of the correct weight throughout the range of use. The Contractor shall have the scales checked under the observation of the inspector before beginning work and at such other times as requested. The intervals shall be uniform in spacing throughout the graduated or marked length of the beam or dial and shall not exceed one tenth of one percent of the nominal rated capacity of the scale, but not less than one pound. The use of spring balances will not be permitted.

Beams, dials, platforms, and other scale equipment shall be so arranged that the operator and inspector can safely and conveniently view them.

Scale installation shall have available, ten standard fifty pound weights for testing the weighing equipment or suitable weights and devices for other approved equipment.

Scales must be tested for accuracy and serviced before use at a new site. Platform scales shall be installed and maintained with the platform level and rigid bulkheads at each end.

Scales "overweighing" (indicating more than correct weight) will not be permitted to operate, and all materials received subsequent to the last previous correct weighing-accuracy-test will be reduced by the percentage of error in excess of one-half of one percent.

In the event inspection reveals the scales have been "underweighing" (indicating less than correct weight) they shall be adjusted and no additional payment to the Contractor will be allowed for materials previously weighed and recorded.

All costs in connection with furnishing, installing, certifying, testing, and maintaining scales; for furnishing check weights and scale house; and for all other items specified in this subsection, for the weighing of materials for proportioning, or payment, shall be included in the unit Contract prices for the various items of the project.

When the estimated quantities for a specific portion of the work are designated as the pay quantities in the Contract, they shall be the final quantities for which payment for such specific

portion of the work will be made, unless the dimensions of said portion of the work shown on the plans are revised by the Engineer. If revised dimensions result in an increase or decrease in the quantities of such work, the final quantities for payment will be revised in the amount represented by the authorized changes in the dimensions.

100-02 SCOPE OF PAYMENT

The Contractor shall receive and accept compensation provided for in the Contract as full payment for furnishing all materials, for performing all work under the Contract in a complete and acceptable manner, and for all risk, loss, damage, or expense of whatever character arising out of the nature of the work or the prosecution thereof, subject to the provisions of the paragraph titled NO WAIVER OF LEGAL RIGHTS of Subsection 80.

When the "basis of payment" subsection of a technical specification requires that the Contract price (price bid) include compensation for certain work or material essential to the item, this same work or material will not also be measured for payment under any other Contract item which may appear elsewhere in the Contract, plans, or specifications.

100-03 COMPENSATION FOR ALTERED QUANTITIES

When the accepted quantities of work vary from the quantities in the proposal, the Contractor shall accept as payment in full, so far as Contract items are concerned, payment at the original Contract price for the accepted quantities of work actually completed and accepted. No allowance, except as provided for in the paragraph titled ALTERATION OF WORK AND QUANTITIES of Subsection 50 will be made for any increased expense, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor which results directly from such alterations or indirectly from his unbalanced allocation of overhead and profit among the Contract items, or from any other cause.

100-04 PAYMENT FOR OMITTED ITEMS

As specified in the paragraph titled OMITTED ITEMS of Subsection 50, the Engineer shall have the right to omit from the work (order nonperformance) any Contract item, except major Contract items, in the best interest of the OWNER.

Should the Engineer omit or order nonperformance of a Contract item or portion of such item from the work, the Contractor shall accept payment in full at the Contract prices for any work actually completed and acceptable prior to the Engineer's order to omit or not perform such Contract item.

Acceptable materials ordered by the Contractor or delivered on the work prior to the date of the OWNER's order will be paid for at the actual cost to the Contractor and shall thereupon become the property of the OWNER.

In addition to the reimbursement hereinbefore provided, the Contractor shall be reimbursed for all actual costs incurred for the purpose of performing the omitted Contract item prior to the date of the Engineer's order. Such additional costs incurred by the Contractor must be directly related to the deleted Contract item and shall be supported by certified statements by the Contractor as to the nature and amount of such costs.

100-05 PAYMENT FOR EXTRA AND FORCE ACCOUNT WORK

Extra work, performed in accordance with the paragraph titled EXTRA WORK of Subsection 50, will be paid for at the Contract prices or agreed prices specified in the change order or supplemental agreement authorizing such extra work. When the change order or supplemental agreement authorizing the extra work requires that it be done by force account, such force account shall be measured and paid for as follows:

- (a) Labor: For all labor (skilled and unskilled) and foremen in direct charge of a specific force account item, the Contractor shall receive the rate of wage (or scale) for every hour that such laborer or foreman is actually engaged in the specified force account work. Such wage (or scale) shall be agreed upon in writing before beginning the work.

The Contractor shall receive the actual costs paid to, or in behalf of, workers by reason of subsistence and travel allowances, health and welfare benefits, pension funds benefits or other benefits, when such amounts are required by collective bargaining agreement or other employment Contract generally applicable to the classes of labor employed on the work.

An amount equal to fifteen percent (15%) of the sum of the above items will also be paid the Contractor.

- (b) Insurance and Taxes: For property damage, liability, and workmen's compensation insurance premiums, unemployment insurance contributions, and social security taxes on the force account work, the Contractor shall receive the actual cost, and to this cost (sum) 5 percent will be added. The Contractor shall furnish satisfactory evidence of the rate or rates paid for such insurance and taxes.
- (c) Materials: For materials accepted by the Engineer and used, the Contractor shall receive the actual cost of such materials delivered on the work, including transportation charges paid by him (exclusive of machinery rentals as hereinafter set forth), to which cost (sum) 10 percent will be added.
- (d) Equipment: For any machinery or special equipment (other than small tools) including fuel and lubricants, plus transportation costs, the use of which has been authorized by the Engineer, the Contractor shall receive the rental rates agreed upon in writing before such work is begun for the actual time that such equipment is committed to the work.
- (e) Miscellaneous: No additional allowance will be made for general superintendence, the use of small tools, or other costs for which no specific allowance is herein provided.
- (f) Comparison of Records: The Contractor and the Engineer shall compare records of the cost of force account work at the end of each day. Agreement shall be indicated by signature of the Contractor and Engineer or their duly authorized representatives.
- (g) Statements: No payment will be made for work performing on a force account basis until the Contractor has furnished the Engineer with the duplicate itemized statements of the cost of such force account work detailed as follows:
- (1) Name, classification, date, daily hours, total hours, rate and extension for each laborer and foreman.
 - (2) Designation, dates, daily hours, total hours, rental rate, and extension for each unit of machinery and equipment.
 - (3) Quantities of materials, prices, and extensions.
 - (4) Transportation of materials.
 - (5) Cost of property damage, liability and workmen's compensation insurance premiums, unemployment insurance contributions, and social security tax.

Statements shall be accompanied and supported by receipted invoice for all materials used and transportation charges. However, if materials used on the force account work are not specifically purchased for such work but are taken from the Contractor's stock, then in lieu of the invoices the Contractor shall furnish an affidavit certifying that such materials were taken from his stock, that the quantity claimed, was actually used, and that the price and transportation claimed represent the actual cost provided above shall constitute full compensation for such work.

100-06 PARTIAL PAYMENT

Partial payments will be made once each month as the work progresses. Said payments will be based upon estimates prepared by the Engineer of the value of the work performed and materials complete in place in accordance with the Contract, plans, and specifications. Such partial payments may also include the delivered actual cost of those materials stockpiled and stored in accordance with the subsection titled PAYMENT FOR MATERIALS ON HAND of this subsection.

No partial payment will be made when the amount due the Contractor since the last estimate is less than five hundred dollars.

From the total of the amount determined to be payable on a partial payment, 10 percent of such total amount will be deducted and retained by the OWNER until the final payment is made. The balance (90 percent) of the amount payable, less all previous payments, shall be certified for payment.

When not less than 95% of the work has been completed the Engineer may, at his discretion and without the consent of the surety, prepare an estimate from which will be retained an amount not less than twice the Contract value or estimated cost, whichever is greater, of the work remaining to be done. The remainder, less all previous payments and deductions, will then be certified for payment to the Contractor.

It is understood and agreed that the Contractor shall not be entitled to demand or receive partial payment based on quantities or work in excess of those provided in the proposal or covered by approved change orders or supplemental agreements, except when such excess quantities have been determined by the Engineer to be a part of the final quantity for the item of work in question.

No partial payment shall bind the OWNER to the acceptance of any materials or work in place as to quality or quantity. All partial payments are subject to correction at the time of final payment as provided in the paragraph titled FINAL PAYMENT of this subsection.

100-07 PAYMENT FOR MATERIALS ON HAND

Partial payments, for projects which do not utilize the OWNER'S tax exempt status, may be made to the extent of the delivered cost of materials to be incorporated in the work, provided that such materials meet the requirements of the Contract, plans, and specifications and are delivered to acceptable sites on the OWNER's property or at other sites in the vicinity that are acceptable to the OWNER. Such delivered costs of stored or stockpiled materials may be included in the next partial payment after the following conditions are met:

- (a) The material has been stored or stockpiled in a manner acceptable to the Engineer at or on an approved site.
- (b) The Contractor has furnished the Engineer with acceptable evidence of the quantity and quality of such stored or stockpiled materials.
- (c) The Contractor has furnished the Engineer with satisfactory evidence that the material and transportation costs have been paid.
- (d) The Contractor has furnished the OWNER legal title (free of liens or encumbrances of any kind) to the material so stored or stockpiled.
- (e) The Contractor has furnished the OWNER evidence that the material so stored or stockpiled is insured against loss by damage to or disappearance of such materials at any time prior to use in the work.

It is understood and agreed that the transfer of title and the OWNER's payment for such stored or stockpiled materials shall in no way relieve the Contractor of his responsibility for furnishing and placing such materials in accordance with the requirements of the Contract, plans, and specifications.

In no case will the amount of partial payments for materials on hand exceed the Contract price for such materials or the Contract price for the Contract item in which the material is intended to be used.

No partial payment will be made for stored or stockpiled living or perishable plant materials.

The Contractor shall bear all costs associated with the partial payment of stored or stockpiled materials in accordance with the provisions of this subsection.

100-08 CONTRACT CLOSE-OUT

Subsequent to the final acceptance of this project by the Engineer, the following requirements must be satisfied by the Contractor before final payment can be made.

- (a) The Contractor must publicly advertise the NOTICE OF COMPLETION furnished by the Engineer in accordance with Title 39, Code of Alabama, 1975.
- (b) The Contractor must execute copies of CONTRACTOR'S AFFIDAVIT OF PAYMENT OF CLAIMS AND DEBTS on the form furnished by the Engineer.
- (c) The Contractor must have his surety execute copies of CONSENT OF SURETY TO FINAL PAYMENT on the form furnished by the Engineer.
- (d) The Contractor must furnish a letter on his letterhead acknowledging that acceptance of final payment by the Contractor constitutes a waiver of all claims, present or future, in connection with this project.
- (e) The Contractor must furnish a written guarantee on his letterhead covering all defects in material and workmanship for a period of one (1) year commencing on the date of final acceptance.
- (f) If any purchased items have been incorporated in the work, the Contractor must furnish a letter on his letterhead assigning those warranties to the OWNER. Copies of said warranties shall be bound in one binder and submitted along with the letter assignment.
- (g) The Contractor must keep track of "as built" information and at the contract closeout provide one complete set of reproducible "as built" covering all earthwork, utility routing, structural, mechanical, and electrical aspects of the work, including wiring schematics.

100-09 WITHHOLDING FOR CLAIMS AND LITIGATION

If at the time of Contract close-out, the project is subject to a claim or the Contractor is involved in litigation concerning the project, the OWNER reserves the right to:

- (a) Refuse to close out the Contract retaining all monies unpaid until such time as all claims are dropped and litigation is resolved, or
- (b) Refuse to close out the Contract, retaining enough money to cover the total of all outstanding claims and amounts claimed by litigation until such time as all claims are dropped and litigation is resolved, or
- (c) Require the Contractor to post a letter of credit to each individual claimant or litigant and satisfactory to the claimant or litigant. Once such letters of credit have been posted and the OWNER is in receipt of written agreement from each individual claimant or litigant, the OWNER will proceed with Contract close-out and release of retainage in the normal manner.

100-10 FINAL PAYMENT

When the Contract work has been accepted in accordance with the requirements of the paragraph titled FINAL ACCEPTANCE of Subsection 60, and the paragraph titled Contract CLOSE-OUT above, the Engineer will prepare the final estimate of the items of work actually performed. The

Contractor shall approve the Engineer's final estimate or advise the Engineer of his objections to the final estimate, which are based on disputes in measurements or computations of the final quantities to be paid under the Contract, as amended by change order or supplemental agreement. The Contractor and Engineer shall resolve all disputes (if any) in the measurement and computation of final quantities to be paid within 30 calendar days of the Contractor's receipt of the Engineer's final estimate. If, after such 30-day period, a dispute still exists, the Contractor may approve the Engineer's estimate under protest of the quantities in dispute and such disputed quantities shall be considered by the OWNER as a claim in accordance with the paragraph titled CLAIMS FOR ADJUSTMENT AND DISPUTES of Subsection 60.

After the Contractor has approved, or approved under protest, the Engineer's final estimate, final payment will be processed based on the entire sum, or the undisputed sum in case of approval under protest, determined to be due the Contractor less all previous payments and all amounts to be deducted under the provisions of the Contract.

If the Contractor has filed a claim for additional compensation under the provisions of the paragraph titled CLAIMS FOR ADJUSTMENTS AND DISPUTES of Subsection 60 or under the provisions of this subsection, such claims will be considered by the OWNER in accordance with State laws or ordinances. Upon final adjudication of such claims, any additional payment determined to be due the Contractor will be paid pursuant to a supplemental final estimate.

100-11 RIGHT OF AUDIT

Contractor's records which shall include but not be limited to accounting records (hard copy, as well as computer readable data if it can be made available), written policies and procedures; subcontract files (including proposals of successful and unsuccessful bidders, bid recaps, etc.); original estimates; estimating work sheets; correspondence; change order files (including documentation covering negotiated settlements); backcharge logs and supporting documentation; general ledger entries detailing cash and trade discounts earned, insurance policies, rebates and dividends; and any other supporting evidence deemed necessary by the Owner to substantiate charges related to this Contract (all foregoing hereinafter referred to as "records") shall be open to inspection and subject to audit and/or reproduction by Owner's agent or its authorized representative to the extent necessary to adequately permit evaluation and verification of (a) Contractor compliance with Contract requirements, (b) compliance with Owner's business ethics policies, and (c) compliance with provisions for pricing change orders, payment or claims submitted by the Contractor or any of their payees.

Such audits may require inspection and copying from time to time and at reasonable times and places of any and all information, materials and data of every kind and character, including without limitation, records, books, papers, documents, subscriptions, recordings, agreements, purchase orders, leases, Contracts, commitments, arrangements, notes, daily diaries, superintendent reports, drawings, receipts, vouchers and memoranda, and any and all other agreements, sources of information and matters that may in Owner's judgment have any bearing on or pertain to any matters, rights, duties or obligations under or covered by any Contract Document. Such records subject to audit shall also include, but not be limited to, those records necessary to evaluate and verify direct and indirect costs, (including overhead allocations) as they may apply to costs associated with this Contract.

The Owner or its designee shall be afforded access to all of the Contractor's records, and shall be allowed to interview any of the Contractor's employees, pursuant to the provisions of this article throughout the term of this Contract and for a period of three (3) years after final payment or longer if required by law.

Contractor shall require all subcontractors, insurance agents, and material suppliers (payees) to comply with the provisions of this article by insertion of the requirements hereof in a written Contract agreement between Contractor and payee. Such requirements will also apply to

Subcontractors and Sub-Subcontractors, etc. Contractor will cooperate fully and will cause all Related Parties and all of Contractor's subcontractors (including those entering into Lump Sum subcontracts) to cooperate fully in furnishing or in making available to Owner from time to time, whenever requested, in an expeditious manner, any and all such information, materials and data.

Owner's agent or its authorized representative shall have access to the Contractor facilities, shall have access to the Subcontractor's facilities, shall have access to all necessary records, and shall be provided adequate and appropriate work space, in order to conduct audits in compliance with this article.

If an audit inspection or examination in accordance with this article, discloses overcharges (of any nature) by the Contractor to the Owner in excess of one percent (1%) of the total Contract billings, the actual cost of the Owner's audit shall be reimbursed to the Owner by the Contractor. Any adjustments and/or payments which must be made as a result of any such audit or inspection of the Contractor's invoices and/or records shall be made within a reasonable amount of time (not to exceed 90 days) from presentation of Owner's findings to Contractor.



Alabama State Port Authority
Specification Booklet

Project Name McDuffie Unloaders 1 and 3 Dual Barge Shifter Systems Marine
Construction/Equipment Installation

Location Mobile, AL

Project # 10873

Task # 3

October 2023

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DIVISION V

CONSTRUCTION SPECIFICATIONS

SECTION 1 - GENERAL PROVISIONS

01000 – GENERAL

- 1.0 The work consists of, but is not limited to, furnishing of all labor, tools, equipment, materials, services, transportation and supervision necessary to complete the following items: demolition, concrete piling, concrete breasting/sheave support dolphins, steelpile dolphins, piling, concrete, fender element installation, structural steel walkway fabrication and installation, installation of all Richmond Engineering Works (REW) supplied equipment, hardware, winches, cable reels, sheaves, wire ropes appurtenances and all other incidentals as shown on the respective design drawings and as further specified herein. The contractor will be required to coordinate with the electrical contractor (separate contract) for the installation of electrical and commissioning of equipment.
- 2.0 The following detail Specifications, taken in conjunction with the Drawings and the General Clauses and applicable Material Specifications describe the work to be performed by the Contractor. They amplify and explain most items in connection with the work, but do not alter the scope of same as described in the General Clauses of the Specifications and Contract form.
- 3.0 All materials used in the work, which are not described specifically, shall be of the best quality that it is customary to employ in construction of the character involved. The following details are not necessarily complete in the description of all items entering into the work, but are intended to furnish a basis for acceptance of the more important items. Other details shall be consistent with them.
- 4.0 Any detail which may be incomplete or lacking in the plans and specifications shall not constitute claim for extra compensation. Such detail shall be supplied by the Contractor and submitted to the Engineer in advance of its requirement on the job. The true intent of the plans and specifications is to produce a complete working facility and incomplete detail will not abrogate this intent.
- 5.0 It is the intent to follow the Drawings and Specifications closely in all details, elevations, dimensions, etc., but it is understood that alterations may be required to conform to local conditions and that such alterations must be of the same character of construction as that specified. Workmanship shall be of the best quality in each class of work. Current (latest) editions of all codes specified shall apply.

01010 - SCOPE OF WORK

- 1.0 The Alabama Port Authority is modernizing the Barge Unloader 1 and Barge Unloader 3 dolphins, fendering, haul equipment, and electrical systems to increase the barge unloading capacity at the McDuffie Terminal and to enhance operation by providing for more efficient handling and unloading of barges.
- 2.0 New structures, concrete breasting/sheave support dolphins and single pile dolphins will be installed at Barge Unloader 3 (BU3). The work on BU3 will be performed first. Barge Unloader 1 (BU1) will remain in operation until BU3 is commissioned and “reliably” operational, i.e. after a 48 hour commissioning endurance test.

- 3.0 Modifications will be made to the existing pier to accommodate the new winch equipment, new barge hauling system, new cable reel equipment and electrical upgrade.
- 4.0 New equipment will be provided by the Owner, see REW reference drawings and specifications. Existing fenders and structures will be or replaced. The system equipment will include new wenchers, new cable/, sheaves, steel supports, shifter barge and cable reel.
- 5.0 Work associated with Barge Unloader 1 (BU1) will be similar to work performed on BU3.
- 6.0 In addition, the project will include electrical upgrades and modifications to be performed under separate contract. For equipment descriptions see Richmond Engineering Works (REW) reference drawings and specifications.

- 7.0 Demolition
 - 7.1 BU3
 - 7.1.1 Existing cell to be removed. Existing concrete sheave support dolphin to be removed.
 - 7.1.2 Existing ship fendering piles/structures, elements and tires to be removed.
 - 7.1.3 Camel system, winches, cables, sheaves, and appurtenances to be removed.
 - 7.1.4 Existing power supply and appurtenances to the camel system to be removed.
 - 7.2 BU1
 - 7.2.1 Existing concrete sheave support dolphins (2) to be removed.
 - 7.2.2 Existing cell to be removed. Existing concrete sheave support dolphin to be removed.
 - 7.2.3 Camel system, winches, cables, sheaves and appurtenances to be removed.
 - 7.2.4 Existing power supply and appurtenances to the camel system to be removed.
- 8.0 Modifications of Existing Structures and Installation of New Structures
 - 8.1 Remove and replace steel sheetpile cell BU3 with a new 5 pile concrete breasting/sheave support dolphin.
 - 8.2 Remove and replace concrete sheave support dolphin (BU3) with a new 5 pile concrete breasting/sheave support dolphin.
 - 8.3 Furnish and install new mono pile dolphins with donut fenders at existing 3-pile dolphins.

- 8.4 Remove existing fender systems and furnish and install new fender panels and elements along length of concrete dock face within the unloading slip.
- 8.5 The modifications of existing structures and addition of new structures for BU1 will be similar to BU3.
- 9.0 New Equipment – See Richmond Engineering Works (REW) drawings and specifications for complete list.
 - 9.1 Install REW furnished winches.
 - 9.2 Install REW furnished cable reel.
 - 9.3 Install REW furnished cable, sheaves, shackles, etc.
 - 9.4 Install REW furnished barges.
 - 9.5 Furnish and install all miscellaneous appurtenances for a complete and operational system.

The following detail Specifications, taken in conjunction with the Drawings and the General Clauses and applicable Material Specifications describe the work to be performed by the Contractor. They amplify and explain certain items in connection with the work, but do not alter the scope of same as described in the General Conditions of the Specifications and Contract form.

All materials used in the work, which are not described specifically, shall be of the best quality that it is customary to employ in construction of the character involved. The following details are not necessarily complete in the description of all items entering into the work, but are intended to furnish a basis for acceptance of more important items. Other details shall be consistent with them.

It is the intent to follow the Drawings and Specifications closely in all details, elevations, dimensions, etc., but it is understood that alterations may be required to conform to local conditions and that such alterations must be of the same character of construction as that specified. Workmanship shall be of the best quality in each class of work.

Since some of the work consists of new construction which is supported by and joins to existing construction, it is necessary that the Contractor verify all existing conditions affecting the work whether shown on the drawings or not. All elevations and dimensions shall be verified prior to fabrication as it is the contractor's responsibility to ensure proper fit up. The Engineer shall be notified of any discrepancies that the Contractor discovers in the drawings.

Current (latest) editions of all codes specified shall apply.

01011 - CONSTRUCTION SEQUENCE

1.0 **SCOPE**

1.1 This section describes the work to be performed under this Contract and provides a construction sequence to be followed in prosecution of the work.

2.0 **WORK UNDER OTHER CONTRACTS**

2.1 Other contracts for McDuffie will be concurrently performed with the work under this Contract. The Contractor shall cooperate with other contractors as necessary for an orderly progression of all work. The contractor shall coordinate the work with McDuffie operations personnel to limit downtime of coal unloading operations. McDuffie personnel along with subcontractors will be performing upgrades to the Unloaders (BU3 and BU1) during the down time associated with the implementation of the new dual barge supplier haul systems.

2.2 The major area of coordination will need to be with the subcontractor performing modification to the existing unloader, which will affect the installation of winches/cable reel and the work are on the dock, structures and fenders.

3.0 **DESCRIPTION OF WORK**

3.1 The work included in this Contract consists of, but is not limited to, providing all labor, materials, equipment, and supervision necessary for construction of the dolphins and installed dual barge shifter equipment together with all associated structures, mechanical equipment required for a complete operational system. The Contractor shall perform all tasks associated with the commissioning of each dual barge shifter systems under the direction of Richmond Engineering Works (REW) and McDuffie personnel.

4.0 **CONSTRUCTION SEQUENCE**

4.1 A suggested construction sequence is outlined below. The Contractor may submit to the owner/engineer an alternate sequence for approval. Any alternate sequence shall provide for completion of all items within the time specified in the contract documents.

4.2 **Phase I (BU3)**

4.2.1 Phase I shall consist of all work associated with BU3. The work shall include preparation of the barge loading area at the ship of BU3 dock in order to allow for the installation of winches, cable reel, haul equipment, shifter barge and fenders. This work shall be complete by the end of April 2024. The existing barge unloader slip (BU3) is scheduled to be operational July 2024. The dual barge shifter shall be fully commissioned

by the contractor and shall have successfully performed a 48 hour endurance test.

4.2.2 Phase I will also include all related electrical work performed by the electrical contractor under separate contract. Phase I will also include work performed by McDuffie personnel and their subcontractors.

4.3 Phase II

4.3.1 Phase II shall consist of all work associated with BU1. The work shall include preparation of the barge loading area at the ship of BU1 dock in order to allow for the installation of winches, cable reel, haul equipment, shifter barge and fenders. This work shall be complete by the end of September 2024. The existing barge unloader slip (BU1) is scheduled to be operational November 2024. The dual barge shifter shall be fully commissioned by the contractor and shall have successfully performed a 48 hour endurance test.

4.3.2 Phase II will also include all related electrician work performed by the electrical contractor under separate contract. Phase I will also include work performed by McDuffie personnel and their subcontractors.

4.4 Operations at McDuffie

McDuffie Terminal is an operating material handling facility and the Contractor shall inspect the site adequately enough to familiarize himself with these operations so as to be able to plan his construction with as little interference to existing operations as possible. All anticipated interferences shall be thoroughly coordinated with the Owner.

01035 – CHANGED CONDITIONS

- 1.0 The Contractor shall promptly, and before such conditions are disturbed, notify the Owner in writing of: (1) Subsurface or latent physical conditions at the site differing materially from those indicated in the Contract; or (2) previously unknown physical or other conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the work of the character provided for in this Contract. The Engineer shall promptly investigate the conditions, and if he finds that such conditions do so materially differ and cause an increase or decrease in the cost of, or the time required for, performance of this Contract, an equitable adjustment shall be made and the Contract modified in writing accordingly. Any claim of the Contractor for adjustment hereunder shall not be allowed unless he has given notice as above required; provided that the Engineer may, if he determines the facts to justify, consider and adjust any such claims asserted before the date of final settlement of the Contract. If the parties fail to agree upon the adjustment to be made, the dispute shall be determined as provided in these specifications.
- 2.0 The Owner may make changes in the Drawings and Specifications or scheduling of the Contract within the general scope at any time by a written order. If such changes add to or deduct from the Contractor's cost of the work, the Contract shall be adjusted accordingly. All such work shall be executed under the conditions of the original Contract except that any claim for extension of time caused thereby shall be adjusted at the time or ordering such change.
- 3.0 In giving instructions, the Engineer shall have authority to make minor changes in the work not involving extra cost, and not inconsistent with the purposes of the work, but otherwise, except in an emergency endangering life or property, no extra work or change shall be made unless in pursuance of a written order by the Engineer, and no claim for an addition to the Contract Sum shall be valid unless the additional work was so ordered.
- 4.0 The Contractor shall proceed with the work as changed and the value of any such extra work or change shall be determined as provided in the Agreement.

01500 – CONSTRUCTION FACILITIES

Electrical power, water, toilet facilities and trash removal may not be available at the site for construction use. Therefore, the Contractor shall plan to provide his own utility services during construction.

01600 – QUALITY OF LABOR AND MATERIAL

- 1.0 The entire work shall be done in every particular in a good, substantial and workmanlike manner, fully up to the standards of first class work of this type and according to the intent of the plans and specifications as interpreted by the Engineer, whose decision, as to the true intent of the plans and specifications, shall be final.
- 2.0 Any and all material, necessary for the construction of any part of the improvements specifically specified, shall be of good quality and acceptable to the Engineer. All workmen employed must be skilled in the performance of the special work to which they are assigned and whenever, in the judgment of the Engineer, any workman is deemed unskillful or incompetent, disorderly or unsatisfactory, he shall, at once, be removed from the project upon request of the Engineer. Such removal shall not be made the basis of any claim for compensation against Owner, or any of its officers or agents.

01700 – ACCEPTANCE AND FINAL PAYMENT

- 1.0 Upon receipt of written notice that the work is substantially completed or ready for final inspection and acceptance, the Engineer will promptly make such inspection, and when he finds the work acceptable under the Contract and the Contract fully performed or substantially completed he shall promptly issue a certificate, over his own signature, stating that the work required by this Contract has been completed or substantially completed and is accepted by him under the terms and conditions thereof, and the entire balance found to be due the Contractor, including the retained percentage, less a retention based on the Engineer's estimate of the fair value of the claims against the Contractor and the cost of completing the incomplete or unsatisfactory items of work with specified amounts for each incomplete or defective item or work, is due and payable. The date of substantial completion of a project or specified area of a project is the date when the construction is sufficiently complete in accordance with the Contract Documents as modified by any change orders agreed to by the parties so that the Owner can occupy the project or specified area of the project for the use for which it was intended.
- 2.0 Before issuance of final payment, the Contractor, if required, shall certify in writing to the Engineer that all payrolls, material bills, and other indebtedness connected with the work have been paid, or otherwise satisfied, except that in case of disputed indebtedness or liens, if the Contract does not include a payment bond, the Contractor may submit in lieu of certification of payment a surety bond in the amount of the disputed indebtedness or liens, guaranteeing payment of all such disputed amounts, including all related costs and

interest in connection with said disputed indebtedness or liens which the Owner may be compelled to pay upon adjudication.

- 3.0 The making and acceptance of the final payment shall constitute a waiver of all claims by the Owner, other than those arising from unsettled liens, from faulty work appearing within the guarantee period provided in the Special Conditions, from the requirements of the Drawings and Specifications, or from manufacturer's guarantees. It shall also constitute a waiver of all claims by the Contractor, except those preciously made and still unsettled.
- 4.0 If after the work has been substantially completed, full completion thereof is materially delayed through no fault of the Contractor, and the Engineer so certifies, the Owner shall, upon certificate of the Engineer, and without terminating the Contract, make payment of the balance due for that portion of the work fully completed and accepted. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.
- 5.0 If the Owner fails to make payments as herein provided, there shall be added to each such payment daily interest at the rate of 6 percent per annum commencing on the first day after said payment is due and continuing until the payment is delivered or mailed to the Contractor.

01710 – FINAL CLEANUP

Upon completion of the work and before final inspection, the Contractor shall clean the work site, material sites, and all grounds occupied by him in connection with the work, of all rubbish, surplus, and discard material, false work, temporary structures, equipment and debris which accumulated during the work. All parts of the work shall be left in a neat and presentable condition. The Contractor shall not remove warning, regulatory and guide signs prior to final acceptance, except as requested by the Engineer.

01720 – AS-BUILT DRAWINGS

The Contractor shall be responsible to provide during construction, a set of drawings marked in red for as-builts and returned to Owner representative within 30 working days of satisfactory completion as a condition of final payment.

01740 – GUARANTEE

- 1.0 The Contractor shall guarantee to the Owner the satisfactory operation of all materials and equipment installed or furnished under this contract, and shall repair or replace, to the satisfaction of Owner, any defective materials, equipment or workmanship which may show itself within one (1) year from the date of formal acceptance by Owner. In the event that any piece of equipment, installed under this contract, carries a manufacturer's warranty or guarantee period of longer than the one-year specified, said guarantee or warranty shall be passed on to Owner. Any such guarantee or warranty, over the one-year period, shall be stated in writing.
- 2.0 This guarantee means Owner may procure replacements or repairs from the most available source to eliminate or hold the downtime to a minimum. All costs of replacements or repairs, under the guarantee, to be borne by the Contractor.
- 3.0 Owner will deal only with the prime Contractor, and not with second or third parties supplying to the prime Contractor, insofar as guarantees are concerned.

SECTION 2-SITE CONSTRUCTION

02070 – SELECTIVE DEMOLITION

1.0 See Demolition Drawing 4224M-D1.

02457 – PRESTRESSED CONCRETE PILING

1.0 SCOPE OF WORK

This section covers furnishing and installing prestressed concrete piles.

2.0 MANUFACTURE

2.1 General. Except as otherwise specified herein, the piles shall be manufactured, handled, and driven in accordance with the Joint Committee of the American Association of State Highway and Transportation Officials and the Prestressed Concrete Institute for Prestressed Concrete Piles. The piles shall be cast of concrete controlled, made, placed, and cured in accordance with Section 6, Concrete Work, unless otherwise specified.

2.2 Composition and Quality. The concrete shall be composed of portland cement, air-entraining admixture, water and fine and coarse aggregate. The concrete mixture shall be designed by the Contractor for a compressive strength of 5,000 psi at 28 days. The design mix shall be submitted to the Engineer for approval prior to casting.

2.3 Materials

2.3.1 Portland Cement. Portland cement shall conform to ASTM C150, "Portland Cement", Type II or IIA. Type I cement conforming to ASTM C150 may be used in lieu of Type II cement providing the tricalcium aluminate content does not exceed 8%.

2.3.2 Prestressing Reinforcement. Prestressing reinforcement shall conform to ASTM A416, "Uncoated Seven-Wire Stress-Relieved Strand for Prestressed Concrete".

2.3.3 Aggregate, Bar Reinforcement, Water, and Air Entraining Admixture. Aggregate, bar reinforcement, water, and air-entraining admixture shall conform to the applicable provisions of Section 6, Concrete Work.

2.4 Reinforcing. The reinforcing system shall be rigidly wired or fastened at all intersections and held to true position in the forms by approved devices and methods.

2.5 Forms. Forms shall be arranged to provide ample working room and easy access for carrying out all operations required for the proper placing, consolidation, and finishing of

the concrete for the piles. The design of the forms shall be such that their removal can be accomplished without damage to the completed piles. Forms shall be steel founded on concrete bases capable of supporting the full load without settlement. Side forms shall be aligned and held rigid in alignment within a tolerance of $\frac{1}{4}$ ". Outer forms shall enclose all except the top horizontal surface. Forms shall remain in place until the concrete has reached a compressive strength of 4,000 psi.

- 2.6 Casting. Piles shall be cast on level, tight, platforms, constructed to prevent settlement during the casting and curing operations. Piling shall be cast in a horizontal position. Casting in tiers will not be permitted. When casting is once started it shall be carried on as a continuous operation until pile is completed. All concrete shall be thoroughly compacted by internally vibrating, spading, and rodding during the placing operation and it shall be thoroughly worked around the reinforcement and into the corners of the forms. The intensity of vibration shall be sufficient to cause the concrete to flow and settle into place. Vibration shall be applied uniformly over the length of the pile and shall be of sufficient duration to insure thorough compaction of the concrete. Spading and rodding during the placing operation shall supplement the vibration. Surfaces shall be free from detrimental porosity or honeycomb. Each pile shall be marked with the date of its casting and pick up points shall be marked on each pile. Concrete test cylinders shall be taken during the time of casting by the Contractor.
- 2.7 Stressing Requirements. The stress induced in the reinforcing members shall be measured by both jacking gages and by elongations of the reinforcement and the results shall check within close limits. All jacks shall be equipped with accurate and calibrated gages for registering jacking pressures. Means shall be provided for measuring the elongation of reinforcement at least to the nearest $\frac{1}{32}$ ". Before beginning work, the Contractor shall have all jacks to be used, together with their gages, calibrated by a reputable laboratory approved by the Engineer. Copies of the calibration data shall be furnished to the Engineer. During progress of the work, any gage which appears to be giving erratic results or if gage pressure and elongations indicate materially differing stresses, recalibration will be required. It is expected that there will be a possible difference in indicated stress between jack pressure and elongation of about 5%. If so, the error shall be so placed that the discrepancy shall be on the side of a slight overstress rather than understress. If the apparent discrepancy between gage pressure and elongation is as much as 10%, the entire operation shall be carefully checked and the source of error determined and corrected before proceeding further. Elongation and jacking pressures shall be measured after the reinforcing has been suitably anchored and all possible slippage at the anchorages has been eliminated. Independent references shall be established adjacent to each anchorage to indicate any yielding or slippage that may occur between the time of initial stressing and final release of the cables.
- 2.8 Stressing Procedure. The amount of stress to be given each cable shall be shown on the drawings. All cables shall be prestressed in a group and shall be brought to a uniform initial tension prior to being given their full pretensioning. This uniform initial tension of approximately 500 to 1000 pounds shall be measured by some suitable means so that this amount can be used as a check against elongation computed and measured. After this initial tensioning, the group shall be stressed until the required

elongation and jacking pressure are attained and reconciled within the limits specified in Paragraph 2.7, Stressing Requirements. Individual tensioning of the cables will be acceptable in lieu of the group tensioning specified above provided the required accuracy is maintained. With the cables stressed in accordance with the requirements of the drawings and the foregoing specifications and with all other reinforcing in place, the concrete shall be cast to the lengths desired. Cable stress shall be maintained between anchorages until the concrete has reached a compressive strength of 4,000 psi, after which the cables shall be cut. The force in the prestressing steel shall be transferred to the concrete gradually and simultaneously. Sequence of release shall be as approved by the Engineer.

2.9 Curing. Concrete piles shall be carefully cured until the concrete has reached a compressive strength of 4,000 psi in accordance with the provisions of Section 6, Concrete Work. The proposed method of curing shall be approved by the Engineer prior to the start of pile casting. Piling may be steam cured in accordance with Article 2.4.33(E) of AASHTO Standards Specifications for Highway Bridges. Concrete test cylinders shall be cured at the same location, under identical conditions, and by the identical method used to cure the piles cast of the same concrete pours from which the samples were taken.

2.10 Storage and Handling. The methods used for storage and handling of the piles shall be such that the piling will not be subjected to overstress, spalling, or other injury. Piling shall remain undisturbed after casting and shall not be subjected to handling until concrete has developed a strength of 4,000 psi as indicated by the test cylinders and until the force in the prestressed steel has been transferred to the concrete. In general, piles shall be lifted by means of a suitable bridle or slings attached to the pile at the marked pick-up points. Piles which are crushed or otherwise injured during curing, handling, or driving shall be removed from the site of the work by the Contractor and replaced at no cost to the Owner.

3.0 LENGTHS OF PILES

The Engineer will determine from the results of probe pile driving and test pile loading, the actual quantities and lengths required to be driven below cut-off elevations for the various locations in the work and will furnish the Contractor a list of such quantities, lengths, and locations. The Contractor shall base his bid on the quantities and lengths as shown on the Contract drawings with the understanding that these quantities are subject to change as a result of the test pile program. Also, if for installation requirements it is required to utilize longer than specified pile lengths, the Contractor shall allow for the additional lengths in his bid package.

4.0 PRECONSTRUCTION WAVE EQUATION ANALYSES

A minimum of ten days prior to driving the piles, the Contractor shall submit the complete driving equipment data to the Project Engineer. The Engineer shall use the submitted information to perform wave equation analyses and shall prepare a summary report of

the wave equation results. The wave equation analyses shall be used to assess the ability of the proposed driving system to install the pile to the required capacity and desired penetration depth within the allowable driving stresses.

Approval of the proposed driving system by the Project Engineer shall be based upon the wave equation analyses indicating that the proposed driving system can develop a pile capacity of at least 2.5 times the pile design load at a driving resistance not greater than 20 blows per inch within allowable driving stress limits. The hammer should also be sized such that the penetration per blow at the required ultimate capacity does not exceed 0.5 inches.

A new pile driving system, modifications to existing system, or new pile installation procedures shall be proposed by the Contractor if the pile installation stresses predicted by wave equation analysis exceed the following maximum values:

Compression Stresses – $0.85f'_c - f_{pe}$

Tension Stresses – $3(f'_c)^{1/2} + f_{pe}$

Notes: f'_c = Concrete Compressive Strength in psi

f_{pe} = Effective Prestress After Losses in psi

5.0 PILE TEST - “**NOT REQUIRED FOR THIS PROJECT**”

- 5.1 General. The Contractor shall furnish all loading platforms and applied loads, reaction frames, and hydraulic jacks for applying test loads to the piles, calibrated hydraulic gages for connection to the jacks, Contractor quality control measuring instruments and any other special equipment required for determining the reaction of the test piles; as well as all materials, labor, and the use of any construction equipment to be regularly employed on the job which, in the opinion of the Engineer, is necessary for the satisfactory prosecution of the pile tests as herein specified. Test loads shall be applied by hydraulic jacks reacting against a loaded platform or reaction frame in such a manner as to insure concentric loading and to permit developing and holding the required test loads for periods of time as directed. The loading equipment shall be of sufficient capacity to apply a compression test load of not less than 312 tons. The Contractor shall submit his proposed test methods to the Engineer no later than seven (7) days prior to testing of the selected probe piling.
- 5.2 Test Loads. The Contractor shall test the compression pile to a test load of 250 tons in accordance with the following sections.
- 5.3 Test Loading of Piles. The load test will be performed as described herein and in general conformance with ASTM D1143, cyclic method. Loading frames and equipment shall be ready to place in operation as soon as the test piles have been driven. Loading of the test pile shall be initiated when directed by the Engineer. In general, the pile will be required to remain in place for a period of approximately 72 hours before loading. The test load shall be applied in increments and at intervals of time as directed by the Engineer and as specified herein. Each increment of load shall be maintained constant until progressive settlement has nominally stopped in accordance with ASTM D1143. The

normal test procedure will be to apply units of load and obtain settlement or uplift readings over a period of time at each load increment until a total load equal to that specified herein is reached. This hold period load shall be maintained for a period of not less than 48 hours and for such additional time as may be necessary until there is no observed settlement or uplift of the pile (or until such minimal magnitudes, acceptable to the Engineer, has been achieved) for the last 12 hours of the period, after which the load shall be removed in the prescribed units and intervals of time. After observations have confirmed that rebound has ceased, the test will be considered completed. The Engineer reserves the right to vary the procedures from those prescribed herein, if, in his opinion, the action of the piles so warrant. All tests will be continuous operations.

The loading criteria for the pile test shall be as follows, unless as indicated above variations there from are determined by the Engineer to be warranted:

250 Ton Load Test

<u>Test Load</u>	<u>Loading Period</u>
31.5 Tons	1 Hour or Less
62.5 Tons	1 Hour or Less
93.5 Tons	1 Hour or Less
125.0 Tons	1 Hour or Less
62.5 Tons	0.5 Hours
0.0 Tons	0.5 Hours
62.5 Tons	0.5 Hours
125.0 Tons	0.5 Hours
156.0 Tons	1 Hour or Less
187.5 Tons	1 Hour or Less
218.5 Tons	1 Hour or Less
250.0 Tons	48 Hours Hold
187.5 Tons	0.5 Hours
125.0 Tons	0.5 Hours
62.5 Tons	0.5 Hours
0.0 Tons	1 Hour Minimum

6.0 PLACING

Piles shall be driven accurately in correct locations, true to line both laterally and longitudinally, and to vertical, batter, and skew lines as indicated on the drawings. A lateral deviation from correct location at the cut-off elevation shall not exceed 2" without pulling. A variation in slope from that specified of not more than ¼" per foot will be permitted. The correct position of piles as to location, plumbness, batter, and skew shall be maintained by the use of templates and jigs to support piles without damage; the details of which shall be submitted to the Engineer for review prior to driving piles. In addition to driving templates, placing and maintaining piles within acceptable limits shall be the Contractor's complete responsibility. Any pile out of position shall be pulled and redriven as directed at no additional cost to the Owner.

7.0 DRIVING

7.1 The Contractor shall use a hammer of a size and type suitable for the driving conditions to be encountered but in no case shall the ram weight be less than 5,000 lbs. or have a rated energy of less than 48,000 ft. lbs. The hammer shall be operated at all times at the pressure and speed recommended by the manufacturer. Boiler or compressor capacity shall be sufficient to operate the hammer continuously at full rated speed. Piles shall be protected during driving by a cushion and cap of approved design. Pile drivers shall have firmly supported leads extending to the lowest point the hammer must reach to drive the piles to cut-off elevation without the use of a follower. A pile shall not be driven until it is approved for driving. Approval will be based upon the condition of curing and on a minimum of 5,000 psi compressive strength as indicated by the test cylinders. No pile shall be driven that is less than 14 days old. Each pile shall be driven continuously and without voluntary interruption until the required depth of penetration rate per blow has been attained. Deviation from this procedure will be permitted only in case the driving is stopped by causes which could not reasonably have been anticipated. A pile which cannot be driven to the required depth because of an underground obstruction shall be pulled and redriven if the obstruction can be removed or penetrated or the pile shall be cut-off, whichever is directed by the Engineer. A pile which has not reached the required penetration rate per blow when the tip has been driven to the cut-off elevation shall be spliced as specified and driven to a depth sufficient to develop the required penetration rate per blow. A pile which has reached the required penetration rate per blow and the top is below the cut-off elevation shall be spliced and extended to the cut-off elevation. The penetration per blow which is used as an indication of the bearing capacity of the pile is dependent upon the type of driving equipment used and other factors, and it will in every case be determined by the Engineer. For water-based piles, the Engineer shall determine if jetting is required for proper installation of the piles. If jetting is required the jetting equipment shall be of a type and capacity acceptable to the Engineer. All jetted piles shall be seated by driving not less than 15 ft. after jetting has been stopped or as otherwise directed by the Engineer. Piles which have uplifted after driving shall be redriven to grade after conclusion of other driving activity in that general area. Auger size shall be 16" diameter or 18" diameter. Unless otherwise authorized by the Engineer, no pile shall be driven within 100 ft. of concrete less than 7 days old.

8.0 HEAD ADAPTER

If the Contractor elects to use the Alternate End Detail to cast piles with ends of strands exposed, a suitable adapter shall be used to protect strands during driving.

9.0 DAMAGED AND MISPLACED PILES

Any pile which is cracked or broken by 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, or, at the option of the Engineer, a second pile may be driven adjacent thereto. All work of removal and cost of replacement shall be borne by the Contractor at no additional expense to the Owner. The Engineer may require the Contractor to pull certain selected piles after driving for test and inspection to determine the condition of the piles. Any piles so pulled and found to be damaged to such extent

as, in the opinion of the Engineer, would impair its usefulness in the completed structure, shall be removed from the site of the work and the Contractor shall furnish and drive a new pile to replace the damaged pile. Piles pulled and found to be sound and in a satisfactory condition shall be redriven.

10.0 CUT-OFFS

Piles shall be cut off at the elevations as shown on the drawings. The piles shall be cut off perpendicular to the axis of the pile at the cut-off elevation. Cutting methods shall be used which will not damage the portion of the pile to be left in place nor the pile reinforcement. Pile reinforcement and/or strands shall be left extended above the cut-off elevations as shown on the drawings and shall be cleaned and protected from damage until embedded in the concrete caps, beams, or slab above.

11.0 SPLICING

When specified herein or directed by the Engineer, the Contractor will be required to lengthen piles by splicing in accordance with the details on the Drawings. The concrete shall be cut away to the extent shown leaving the prestressing reinforcement exposed. Should the Contractor elect to cast the pile with extended exposed prestressing reinforcement, the pile will require cutting off only that amount necessary for making the splice. Reinforcing bars of the size shown and of sufficient length for the required extension shall be fastened to the exposed bars, and transverse reinforcement as shown on the drawings shall be placed. Concrete cuts shall be made perpendicular to the axis of the pile and all concrete shall be removed above the dimension indicated. Bars shall be lapped for the full length of the exposed prestressing reinforcement. When the reinforcing has been placed, the tip of the pile shall be roughened and the necessary form work placed. Immediately prior to placing the concrete, the top of the pile shall be prepared and coated with a bonding agent as provided by Section 6B, Paragraph 3.7. Concrete of the same quality as that used to cast the original pile shall then be placed, furnished, and moist cured as specified in Section 6, Concrete Work, for poured-in-place concrete except that the forms shall remain in place for at least 72 hours after placing the concrete. Driving of a spliced pile shall not be resumed until it is approved for driving by the Engineer.

12.0 MEASUREMENT

Prestressed concrete piles will be measured for payment on the basis of lengths along the axis of the pile in place below the specified cut-off elevation. If the Engineer authorizes driving to stop before a pile reaches the specified penetration depth, the excess cut-off shall be measured for payment as the difference between the specified length and the actual length of pile driven below cut-off. Measurements shall be to the nearest 0.1 ft.

13.0 PAYMENT

- 13.1 Payment Piles. Payment for each permanent pile acceptably driven will be made at the Contract price per linear foot, which price shall include all items incidental to furnishing and driving the piles, redriving uplifted piles, 2-ft. pile cut-offs or alternate 2-ft. exposed reinforcement section, cutting pile at cut-off elevation, but which price shall not include authorized splices unless the splice is made for the convenience of the Contractor. Payment for permanent piles driven in place below the cut-off elevation, will be made at the applicable contract unit price per linear foot.
- 13.2 Pile Cut-Offs. Payment for authorized excess cut-off will be made for the measured cut-off portion of the pile at the rate of 75% of the contract unit price for the pile and no other payment will be made for such cut-off. No payment will be made for the required 2-ft. cut-offs or the alternate 2-ft. exposed reinforcement section which will be a subsidiary obligation of the Contractor covered under the unit prices for the in-place piles.
- 13.3 Splices. Each splice will be paid for at the Contract unit price for "Concrete Piling Splices", when such splice is required by the Engineer to extend the piling to a length greater than the length specified for the piling in the lists furnished to the Contractor. Such payment shall constitute full compensation for furnishing all plant, labor, material, and equipment, and performing all work required to complete the splice as specified, and will be in addition to payment for the extended length of the pile which will be made at the applicable contract unit price for furnishing and driving the respective piles. Splices made necessary by the Contractor's method of casting or operation will be considered for his convenience and will not be paid for.
- 13.4 Pulled Piles. Piles which are pulled, at the direction of the Engineer, and found to be in good condition will be paid for at the Contract unit price for the pile in its original position plus 25% of the applicable contract unit price for furnishing and driving the piles. This price constitutes payment for redriving only; the cost of furnishing, original driving, and pulling the piles is to be paid for as specified above. Where piles are pulled and found to be damaged, no payment will be made for originally furnishing and driving such piles nor for the operation of pulling, and they shall be replaced by new piles, which will be paid for at the Contract unit price for lengths driven.

02462 – STEEL PILES

1.0 WORK COVERED

This section covers the steel pipe piles for the dolphin associated with the dual barge shifter hauling system.

2.0 MATERIALS

Pipe piles shall be the size shown on the Drawings and shall conform with ASTM A252, Grade 3, Welded and Seamless Steel Pipe Piles. Welds shall be full penetration butt welds to fully develop the pile section.

3.0 PROTECTIVE COATING

3.1 General Requirements. The Contractor shall provide the protective coating to the exterior surfaces of the new pipe pile from elevation at top of pile jackets in their entirety and on the pipe piles to elevation -20.0.

3.2 Material

3.2.1 Protective coating shall be Bitumastic No. 300M coal tar epoxy manufactured by U.S.S. Chemicals Division of United States Steel Corporation, or an approved equal. All protective coating material shall be new stock.

3.2.2 Prior to application of any protective coating material, certified data shall be submitted by the Contractor to the Engineer stipulating the material proposed for use and certifying that said material complies fully with all requirements of this section.

3.3 Surface Preparation

3.3.1 All surfaces to be coated shall first be blast cleaned to a condition equivalent to that required by Specification No. 10, "Near White Blast Cleaning", SSPC-SP10-63T, of the Steel Structures Painting Council. All oil, grease, dirt, mill, scale, rust corrosion products, oxides, paint, or other foreign material shall be removed from the surface.

3.3.2 All work blasted in one day must be coated that day. Any blasted areas, not coated, which are exposed overnight or subject to moisture during the working day, shall be whip-blasted before the application of the coating.

3.3.3 Any areas of the surfaces to be blasted which show traces of oil or grease shall be degreased before blasting. Degreasing may be performed using Xylol or other solvents approved by the coating manufacturer.

3.3.4 All surfaces to be coated must be completely dry, free of moisture, soil, dust, and grit at the time the coating is applied.

3.4 Application of Coating

3.4.1 The coating shall be applied in two coats by brush or spray to an average dry film thickness of 20 mils, and the thickness at any point shall not be less than 16 mils. The specified film thickness shall be attained in any event and any additional coats needed to do so shall be applied at no additional cost to the Owner. The two components of the coal tar epoxy coating shall be thoroughly mixed together

with a heavy-duty mechanical stirrer just prior to use, and the mixed material shall be used before unreasonable increases in viscosity take place. The use of not more than one pint Xylene thinner per gallon of coal tar epoxy paint will be permitted in order to improve application properties and extend pot life. The pot life of the mixed paint, extended by permissible thinning, may vary from two hours in very warm weather to five or more hours in cool weather. Spray guns shall be of the conventional type, with 0.086" diameter fluid tip orifice and external atomization, 7-hole air cap. Material shall be supplied to the spray gun from a bottom-withdrawal pot or by means of a fluid pump. Hose shall be ½" inside diameter. The drying time between coats shall not be less than 12 hours. In no case shall more than 72 hours elapse between coal tar epoxy paint coats. Coal tar epoxy paint shall not be applied below 50°F nor shall it be applied unless it can be reasonably anticipated that the average ambient temperature will be 50°F or higher for the 5-day period subsequent to application of any coat. In addition to normal safety precautions, workmen shall take extra care to avoid inhaling fumes from atomized particles of the coal tar epoxy paint and to avoid contact of the paint with skin.

- 3.4.2 The coating shall be applied in a plant, field, or shop, under roof, unless otherwise approved by the Engineer, in writing, to assure uniformly high quality and avoid moisture and contamination problems.

4.0 LENGTHS OF PILES

The Contractor shall base his bid on the quantities and lengths as shown on the Contract Drawings. Also, if for installation requirements it is required to utilize longer than specified pile lengths, the Contractor shall allow for the additional lengths in his bid package.

5.0 PLACING

- 5.1 Piles shall be driven accurately in correct locations, true to line both laterally and longitudinally and to vertical, batter, and skew lines as indicated in the drawings. A lateral deviation from correct location at the cut-off elevation shall not exceed 2" without pulling. A variation in slope from that specified of not more than ¼" per foot will be permitted. The correct position of piles as to location, plumbness, batter, and skew shall be maintained by the use of templates and jigs to support piles without damage; the details of which shall be submitted to the Engineer for review prior to driving piles.
- 5.2 In addition to driving templates, placing and maintaining piles within acceptable limits shall be the Contractor's complete responsibility. Any pile out of position shall be pulled and redriven as directed at no additional cost to the Owner.

6.0 DRIVING

Piles shall be driven open ended and shall be protected during driving by an approved cap. Unless otherwise approved, piles shall be driven with the same type hammer as specified in Section 5A. It is not anticipated that water jets will be required for this project. Water jets may be used only when specifically authorized or required by the Engineer. When jetting is authorized or required, the jet shall be withdrawn a minimum of 15 ft. before the specified depth is reached and the pile is driven to final penetration. The pile driving equipment and the methods employed shall be subject to approval by the Engineer. Each pile shall be driven continuously and without voluntary interruption until the required depth of penetration rate per blow has been attained. Deviation from this procedure will be permitted only in case the driving is stopped by causes which could not reasonably have been anticipated. A pile which cannot be driven to the required depth because of underground obstruction shall be pulled and redriven if the obstruction can be removed or penetrated or the pile shall be cut off, whichever is directed by the Engineer. A pile which has not reached the required penetration rate per blow when the top has been driven to the cut-off elevation shall be spliced as specified and driven to a depth sufficient to develop the required penetration rate per blow. A pile which has reached the required penetration rate per blow and the top is below the cut-off elevation shall be spliced and extended to the cut-off elevation. The penetration per blow which is used as an indication of the bearing capacity of the pile is dependent upon the type of driving equipment used and other factors and it will in every case be determined by the Engineer. Piles which have uplifted after driving shall be redriven to grade after conclusion of other driving activity in that general area. Unless otherwise authorized by the Engineer, no pile shall be driven within 20 ft. of concrete less than 7 days old. After driving is completed, the piles shall be accurately cut off and prepared for welding.

7.0 SPLICING

Splicing shall be made by welding as shown on the drawings.

8.0 MEASUREMENT

Piles will be measured for payment on the basis of lengths along the axis of the pile in place below the cut-off elevation. If the Engineer authorized driving to stop before a pile reaches the specified penetration depth, the excess cut-off shall be measured for payment as the difference between the specified length and the actual length of pile driven below cut-off. Measurements shall be to the nearest 0.1 ft.

9.0 PAYMENT

9.1 Payment Piles. Payment for each permanent pile acceptably driven will be made at the Contract Price per linear foot, which price shall include all items incidental to furnishing and driving the piles and redriving uplifted piles. Payment for permanent piles driven in place below the cut-off elevation will be made at the applicable Contract unit price per linear foot.

- 9.2 Pile Cut-Offs. Payment for authorized excess cut-off will be made for the measured cut-off portion of the pile at the rate of 50% of the Contract unit price for the pile and no other payment will be made for such cut-off.
- 9.3 Pulled Piles. Piles which are pulled, at the direction of the Engineer, and found to be in good condition will be paid for at the Contract unit price for the pile in its original position plus 25% of the applicable Contract unit price for furnishing and driving the piles. This price constitutes payment for redriving only; the cost of furnishing, original driving, and pulling the piles is to be paid for as specified above. Where piles are pulled and found to be damaged, no payment will be made for originally furnishing and driving such piles nor for the operation of pulling, and they shall be replaced by new piles, which will be paid for at the Contract unit price for lengths driven.

SECTION 3 - CONCRETE

03120 – CAST-IN-PLACE CONCRETE FORMWORK1.0 SCOPE OF THE WORK

The work included under this Section shall consist of furnishing all labor, tools, equipment, materials, and supervision necessary for the complete installation of all concrete formwork, all as specified herein and indicated on the drawings.

2.0 APPLICABLE SPECIFICATION

The Contractor shall follow the practices and standards described in the latest editions of the following specifications which are made a part of this Specification.

American Concrete Institute (ACI) 347 Recommended Practice for Concrete Formwork

3.0 FORM MATERIALS3.1 Exposed Concrete

3.1.1 Form material for all exposed vertical surfaces shall be plywood forms, form lining, or steel forms with Owner approval, each as defined below. Steel forms shall not be used for wall forms.

3.1.1.1 Plywood forms shall be minimum $\frac{3}{4}$ " thickness and not less than 5-ply, and especially cured moisture-resistant.

3.1.1.2 Form lining shall be fiberboard, not less than $\frac{3}{16}$ " thickness, or especially cured moisture resistant exterior plywood, not less than 3-ply or $\frac{1}{4}$ " thickness, or plywood, minimum 5-ply, and minimum $\frac{3}{4}$ " thickness for steel forms.

3.1.2 An attempt shall be made to eliminate as many small sections as possible. If steel forms are used, they shall not contain more than 6.0 linear feet of form joint per square yard of concrete.

3.2 Unexposed Concrete

3.2.1 Forms for concealed concrete shall be smooth and round undressed square-edge lumber of plywood, or other material that will produce equivalent finish.

3.3 Coatings

- 3.3.1 All contact surfaces shall be coated before the placement of any reinforcement with non-staining colorless mineral oil, form lacquer, or other Owner-approved non-staining form oil. The form oil shall be applied per manufacturer's specifications and shall be applied with a brush or spray so as to cover the form evenly without excess drip. Form coating material used to coat form work to facilitate the removal thereof shall not bond with, or cause softening or permanent staining of, the concrete surface.
- 3.3.2 Reused forms shall have nails withdrawn and contact surfaces thoroughly cleaned before re-use. Those which have been coated shall be given an additional application of the coating.
- 3.3.3 Plywood, previously mill-oiled, need not be re-oiled unless required by the Owner.
- 3.3.4 Pressed wood fiberboard shall not be oiled.

4.0 SPECIAL MEMBERS

- 4.1 Wood strip, blocking, molded members, etc., shall be placed in forms as required to produce finished surfaces shown on drawings or specified herein.
- 4.2 All exposed corners, vertical or horizontal, in concrete work shall be chamfered 1" x 1" unless otherwise shown on the drawings. Horizontal surfaces to be chamfered may be rounded with a steel concrete trowel at time of concrete placement if approved by Owner.
- 4.3 Form ties shall be factory-fabricated, removable or snap-off metal ties of design that will not allow deflection and will not spall concrete upon removal. Solid backing shall be provided for each tie. Ties shall be fitted with devices that will leave holes in the concrete surface not less than ¼", no more than 1" in diameter, and not less than 1" in depth.
- 4.4 Provide for installation of inserts, hangers, ties, anchor devices, anchor bolts, dowels, conduit, or other embedded items required for other work. Properly locate in cooperation with other trades and secure in position before placement of concrete.

5.0 DESIGN

- 5.1 Forms shall be designed, constructed, and maintained so as to insure that after removal of forms the finished concrete will have true surfaces free of offset, waviness, or bulges and will conform accurately to the indicated shapes, dimensions, lines, elevations, and positions on the drawings.
- 5.2 Studs and wales shall be placed to prevent deflection of form material. Forms and joints shall be sufficiently tight to prevent leakage of grout and cement paste during placement of concrete. Joints in forms shall be arranged vertically and horizontally to conform to

the pattern of the design. Juncture of formwork panels shall occur at architectural lines, vertical control joints, including alignment with masonry control joints, and construction joints. Forms placed on successive units for continuous surfaces shall be fitted to accurate alignment to assure smooth completed surfaces free from irregularities. Temporary openings shall be arranged in wall forms and where otherwise required to facilitate cleaning and inspection.

5.3 Wall forms shall extend a minimum of 6" above top of wall concrete to assist in water curing walls. Bulkheads at construction joints shall extend to same height.

6.0 REMOVAL

6.1 Removal of forms shall be in a manner to insure the complete safety of the structure and the concrete has had time to adequately harden.

6.2 Supporting forms or shoring shall not be removed until structural members have acquired sufficient strength to support safely their own weight and any construction and storage load to which they may be subjected. If a testing laboratory is involved, then forms shall be removed in accordance with requirements of the testing laboratory as regards to time and strength of concrete.

6.3 Forms used for curing shall not be removed before expiration of curing period unless specified otherwise.

6.4 Care shall be taken to avoid spalling the concrete surface or damaging concrete edges. Wedges or bars must not be inserted between forms and finished surfaces.

6.5 Tie-rods to be entirely removed from the wall shall be loosened 24 hours after concrete is placed, and form ties, except for a sufficient number to hold form in place, may be removed at that time. Ties wholly withdrawn from wall shall be pulled toward the face that will be concealed from view in the permanent work. Cutting ties back from face of wall will not be permitted.

6.6 Wood forms shall be completely removed in order that no material will be left for termite infestation.

6.7 Under normal conditions, the minimum period elapsing before forms may be removed shall be governed by the following schedule. Its use will not operate to relieve the Contractor of responsibility for the safety of the structure.

	<u>Elapsed Time (Days)</u>
Side Forms: Footings, Beams, Pump Foundations	1
Side Forms: Walls under 8 feet	5
Side Forms: Walls over 8 feet	5
Side Forms: Piers and Columns	5
Bottom Forms: Elevated Slabs and Beams	5
Bottom Forms: Girders	5

Note: When temperature drops below 40°F, supports shall remain in place an additional time equal to period structure has been exposed to the low temperature.

03300 – CAST-IN-PLACE CONCRETE

1.0 SCOPE OF THE WORK

- 1.1 The work included under this section shall consist of furnishing all labor, tools, equipment, materials, services, and supervision necessary for the complete installation of all reinforced cast-in-place concrete, all specified herein and indicated on the drawings.
- 1.1.1 The placing, curing, and finishing of all cast-in-place concrete, as indicated on the drawings and specified herein.
- 1.1.2 The setting of all reinforcing, inserts, anchor bolts, sleeves, blocks, and miscellaneous embedded items as indicated on the drawings, and specified herein.

2.0 APPLICABLE SPECIFICATIONS

- 2.1 The Contractor shall follow the practices and standards described in the latest edition of the following specifications which are made a part of this Specification:

2.1.1 American Concrete Institute:

ACI 211	Recommended Practice for Selecting Proportions for Nominal Weight Concrete.
ACI 214	Recommended Practice for Evaluation of Compression Test Results of Field Concrete.
ACI 304	Recommended Practice for Measuring, Mixing, and Placing Concrete.
ACI 305	Recommended Practice for Cold Weather Concreting.
ACI 306	Recommended Practice for Hot Weather Concreting.
ACI 315	Manual of Standard Practice for Detailing Reinforced Concrete Structures.
ACI 318	Building Code Requirements for Reinforced Concrete.
ACI 347	Recommended Practice for Concrete Formwork.

- 2.1.2 Refer to ACI 318 - "Building Code Requirements for Reinforced Concrete" for a complete listing of applicable specifications of the American Society for Testing and Materials (ASTM).

2.1.3 All applicable local and state codes and regulations.

2.1.4 Latest edition of OSHA Safety and Health Regulations.

2.1.5 In case of conflict between the referenced standards, the more stringent requirements shall govern.

3.0 CONCRETE MATERIALS

3.1 Standards of the American Society for Testing and Materials indicated in the following paragraphs shall be the latest editions.

3.2 Cement - Cement shall be portland cement conforming to the requirements of ASTM C150, Type I, and be free from dirt and damp set. In the event field conditions require and the Owner approves, high early strength portland cement ASTM C150, Type III, may be used.

3.3 Fine Aggregate

Fine aggregate for normal weight concrete shall be clean sand, conforming to the requirements of ASTM C33.

3.4 Coarse Aggregate

Coarse aggregate for normal weight concrete and for gravel blanket under ground slabs shall be crushed stone, gravel, or a combination of crushed stone and gravel, conforming to ASTM C33, size number 67, ¾ inch to No. 4. Aggregate for lightweight concrete shall conform to ASTM C330.

3.5 Water

Water shall be fresh, clean, clear, and free from oil, acid, alkali, organic material, and any other deleterious matter in injurious quantities.

3.6 Admixtures

3.6.1 Air-entraining materials shall conform to ASTM C260 and shall be used in accordance with the manufacturer's recommendation. The Contractor shall submit the manufacturer's certificate of the chloride content of the admixture and whether or not chloride was added during its manufacture.

3.6.2 Water-reducing admixture, if used, shall be "Pozzolith, Normal Admixture", by Master Builders Company, Cleveland, Ohio, or Owner-approved equal, and shall be used in accordance with ASTM C494. Testing for air content shall be in accordance with ASTM C231.

- 3.6.3 Any other admixtures proposed shall be approved by the Owner in writing before using and shall conform to ASTM C494. Calcium chloride shall not be used.
- 3.7 Bonding Material - "Sikadur Hi-Mod", as manufactured by Sika Corporation, Lyndhurst, New Jersey, or Owner-approved equal shall be used as an epoxy bonding material to adhere new concrete to concrete having its initial set. Bonding material shall be used on all construction joints and to join equipment and column foundations to the base slab and the dropped slab areas to the pile caps.
- 3.8 Expansion Joint Filler - Preformed expansion joint filler, ½" thick, unless otherwise indicated, shall be non-extruding, and resilient type conforming to ASTM D994, ASTM D1751, or ASTM D1752, unless noted otherwise.
- 3.8.1 All expansion joints in base slabs on grade shall be fiber expansion joints as deep as the slab thickness and flush with the top of the slab meeting the requirements of ASTM D1751. In joints exposed to the weather the joint filler shall be depressed ½" below the top of the slab and the depression filled with joint sealant.
- 3.9 Joint Sealer - Joint sealer shall be cold applied, elastomeric sealant, conforming to ASTM D1850. Sealant shall be applied per manufacturer's specifications using their recommended primer. "Sikaflex-1a", "Sikaflex-12SL", or "Sikaflex Polysulfide Sealants" as manufactured by Sika Corporation, Lyndhurst, New Jersey, or Owner-approved equal is recommended.
- 3.10 Curing Compound - Liquid membrane-forming curing compound shall conform to ASTM C309, Type 1-D (clear or translucent with fugitive dye), or Owner-approved equal, and to the testing requirements of ASTM C156.
- 3.11 Membrane Waterproofing or Vapor Barrier - Membrane waterproofing shall be polyethylene sheeting conforming to Commercial Standard CS-238, or ASTM C171 Type 1, regular, not less than 0.006" (6 mils) nominal thickness. The sheeting is to be lapped not less than 12" with the top lap placed in the direction of the placing of the concrete and sealed in accordance with manufacturer's recommendations. The membrane shall be placed on all earth surfaces that are to receive concrete.
- 3.12 Curing-Sealing (Hardening) Compound - This compound shall be "Demicon Cur-Hard", as manufactured by Hausman Corporation, Chemical Division, P.O. Box 416, Toledo, Ohio, 43601, or Owner-approved equal solution of magnesium fluosilicate or sodium silicate (minimum of 35% of 42° Baume Sodium Silicate).
- 3.13 Grout
- 3.13.1 Epoxy grout shall be high strength epoxy grout, installed in strict accordance with manufacturer's recommendations. "Five Star Epoxy Grout", manufactured by U.S. Grout Corporation, or "BRUTEM MP" as manufactured by Master Builders, or equal.

3.13.2 Non-shrink grout shall be ready-to-use non-metallic aggregate product requiring addition of only water at site, and shall attain a minimum compressive strength of 5000 psi. "Five Star Grout", manufactured by U.S. Grout Corporation, or "Master Flow 928" as manufactured by Masterbuilders Company, or Owner-approved equal, is recommended.

3.14 Waterstops - Waterstops, except where otherwise indicated, shall be 6" polyvinylchloride (PVC) with a center bulb and two end bulbs, or ribbed type with a center bulb. All PVC waterstops shall be manufactured from virgin materials. Dimensions of the waterstops shall not be less than 6" for web thickness and ¾" for bulb diameter. Splicing of the PVC waterstops shall be done with a special thermostatically controlled splicer, furnished by the manufacturer, and shall be done strictly in accordance with the manufacturer's instructions.

4.0 CONCRETE MIX

Mix Design - The mix design shall produce concrete having a slump of not more than 4" and a minimum 28-day compressive strength of 4,000 psi. Outside concrete shall have an air content of 6% ±1%. The minimum content shall be 6.5 sacks of cement per cubic yard of concrete. The maximum water content shall not exceed 5 gallons per bag of cement.

5.0 PROPORTIONING CONCRETE

5.1 Control: The proportion of all materials entering into the concrete shall be determined from a design mix by an approved commercial testing laboratory. The Contractor shall provide all necessary equipment and plant to determine and control the actual amounts of material entering into each batch. The proportions will be changed whenever, in the opinion of the Engineer, such change is necessary in order to maintain the standard of quality required by these specifications.

5.2 Properties of Concrete: All concrete placed under this contract shall meet all of the requirements hereinafter specified.

Class: AA

Maximum water per bag cement: 5.0 gallons.

Minimum bags of cement per cubic yard: 6.5 bags.

Cement: Type II.

Minimum compressive strength at 28 days: 4000 psi.

Range in slump: 2" to 4".

Class AA concrete shall be "air entrained concrete" and the concrete shall have air content of 3.0% with a 0.5% tolerance as determined in accordance with specifications of ASTM C231. The testing for air content will be performed by an independent laboratory paid by the Owner. Class AA concrete shall be used for all building construction and for all major structures in the project.

6.0 CONCRETE PLACEMENT

- 6.1 The placing of all concrete shall be in accordance with the requirements of ACI Standard 304.
- 6.2 Concrete shall not be placed until all reinforcing bars, pipes, conduits, anchor bolts, and other embedded work has been inspected, approved, and definite instructions given by the Owner to proceed with the work.
- 6.3 Excessive water and debris shall be removed from forms and excavations before concrete is placed therein.
- 6.4 Before placing the concrete and reinforcing steel, the contact surfaces of all forms, unless otherwise directed, shall be thoroughly wetted with water or coated with an approved form oil. The form oil shall be applied with a brush or spray so as to cover the form evenly without excess drip. Form coating material used to coat form work to facilitate the removal thereof shall not cause softening or permanent staining of the concrete surface. Reused forms shall have the contact surfaces cleaned thoroughly; those which have been coated shall be given an additional application of the coating.
- 6.5 Unless otherwise noted on the drawings all vertical surfaces of the concrete work must be formed except that sides of spread footings may be neat cut in the soil if the soil conditions are acceptable to the Owner.
- 6.6 All concrete materials, reinforcement, forms, fillers, vapor barrier, and ground with which concrete is to come in contact shall be free from frost. No concrete shall be laid on frozen soil. When concrete is poured during freezing weather, adequate protection against frost action shall be approved by the Owner before any concreting is done.
- 6.7 Dropping of the concrete in excess of 4 ft., depositing in large quantities at any point and running or working it along the forms, or any method tending to cause loss or segregation of the aggregates or separation or distortion of the forms will not be permitted. A tremie or other approved means shall be used for pouring where depth is in excess of 4 ft. Concrete shall be placed monolithically between construction joints indicated.
- 6.8 Between construction joints concreting shall be a continuous operation such that concrete is plastic at all times and flows readily into spaces between reinforcement. Fresh concrete shall not be placed on poured concrete sufficiently hardened to cause formation of seams or places of weakness. No concrete that has partially hardened or been contaminated by foreign material shall be used. If a section cannot be placed

continuously or monolithically, construction joints shall be located at points indicated on the drawings or approved by the Owner. A minimum of 24 hours shall elapse between placement of concrete in adjacent pours.

- 6.9 Immediately after placing, concrete shall be consolidated by vibrating equipment supplemented by hand spading and rodding where vibrating is not feasible. Concrete shall be thoroughly worked around reinforcement and embedded fixtures and into corners of forms. Vibrators must be capable of maintaining a speed of not less than 8000 impulses per minute when submerged in concrete. Use of external form vibrators or tapping forms is not acceptable. Vibrators shall be inserted vertically (not dragged horizontally) at such intervals as to insure uniform consolidation throughout the entire section of concrete being placed. The number of vibrators used shall be sufficient to consolidate the concrete properly. At least one standby vibrator shall be on hand at all times.
- 6.10 The methods and recommended practices described in ACI Standard 305 shall be followed for cold weather concreting and ACI Standard 306 shall be followed for hot weather concreting.
- 6.11 All concrete shall finish to the lines and elevations shown on the drawings. All construction joints shall be keyed as indicated on the drawings. If the Contractor desires additional construction joints or different locations for the joints, he shall obtain written approval from the Owner for such changes.
- 6.12 Concrete shall not be carried in or transported through any aluminum items.

7.0 JOINTS

- 7.1 Construction joints shall be formed as indicated on the drawings and as directed by the Owner. Joints shall be made and located as to least impair the strength of the structure. The rate and method of placing concrete and the arrangement of joint bulkheads shall be such that the concrete between construction joints shall be placed in a continuous operation. When concreting is resumed, the surface of the concrete at all joints shall be thoroughly cleaned and all laitance removed. In addition, vertical joints shall be thoroughly wetted, but not saturated, and slushed with a coat of neat cement grout before placing new concrete. Reinforcing shall continue across joints unless otherwise shown. Keys and dowels shall be provided as indicated or as directed by the Owner.
- 7.2 In general, formed construction joints or keys shall be: in width one-third of the thickness of the concrete and in depth one-sixth the thickness of the concrete. All keys shall be continuous and none smaller than 2" in width and 2" in depth shall be used.

8.0 EMBEDDED ITEMS

- 8.1 The Contractor shall examine the drawings and specifications for other work to ascertain any conditions that may affect his work. In laying out his work, the Contractor shall

make provisions for installation of all drains, conduits, electrical boxes, and pipes supplied by and installed by their respective Contractors.

- 8.2 The Contractor shall furnish and install all embedded items to include but not limited to inserts, anchors, pipe sleeves, anchor bolts for structural steel, gratings for pits and trenches and any other miscellaneous metal as may be required for the installation and attachment of other work. Such miscellaneous items shall be set accurately to template, built into the concrete plumb and maintained so during the pour by securely wiring as may be necessary. Bolts shall project from the face of the concrete the distance called for on the details or a sufficient distance to allow for the proper attachment intended. All threads shall be oiled and protected by waterproofing caps.
- 8.3 The Contractor shall provide such openings as are required for the passing of work through the concrete.
- 8.4 Great care shall be taken to keep such items embedded in the concrete and openings provided through the concrete at the proper locations. The concrete shall be thoroughly spaded and worked around and under such items so that there will be no voids.
- 9.0 GROUT
- 9.1 Cement grout, if required, shall be field mixed combination of cement, concrete sand and water approved by the Owner prior to placing. Minimum cement shall be 8 bags of cement per cubic yard of finished mixture.
- 9.2 All column bases shall be grouted solid with high strength non-shrink grout, ready-mixed material requiring only mixing water at the jobsite. Non-shrink grout shall contain non-metallic aggregate as specified.
- 9.3 Before placing grout the surface shall be cleaned of all dirt, oil, grease, concrete laitance, and all loose material shall be removed.
- 9.4 The grout shall be placed by whatever means is most practicable, depending on the type of equipment to be grouted. The grout shall completely fill the space to be grouted, be thoroughly compacted, and free of air pockets.
- 9.5 Unconfined areas of non-shrink grout surfaces shall be cut back flush with the base plate and coated with a plastic mortar consisting of one part portland cement and two parts concrete sand.
- 10.0 CURING
- 10.1 All concrete shall be maintained above 50°F in a moist condition and cured for a period of at least the first 7 days after placing by one of the approved methods listed herein. If high-early strength concrete has been used, the curing period shall continue for

minimum of 3 days. During the curing period no part of the concrete shall be permitted to become dry.

- 10.2 All concrete shall be cured by keeping continuously wet by either method of Paragraph 10.2.1 or 10.2.2. Where sprinkling is used, it shall be used in conjunction with Paragraph 10.2.2. Water shall be introduced in the formed spaces above the top of wall concrete in sufficient quantity to keep both surfaces of the wall continuously wet. Other methods listed below also may be used for curing concrete.
- 10.2.1 Ponding or continuous sprinkling with water. Wet sand or absorptive burlap kept continuously wet.
- 10.2.2 Waterproof paper conforming to ASTM C171, or polyethylene film with edges lapped and sealed in such a manner as to prevent moisture escaping from the concrete.
- 10.2.3 Liquid curing compounds sprayed uniformly in a single coat on all surfaces immediately following the final finishing operation. Liquid curing compounds shall not be used on any surface against which additional concrete or other cementitious finishing materials are to be bonded nor on floor surfaces which receive liquid surface-hardening treatment.
- 10.2.4 Steel forms heated by the sun and all wood forms in contact with the concrete during the curing period shall be kept wet. If forms are to be removed during the curing period, one of the above curing materials or methods shall be employed immediately. Such curing shall be continued for the remainder of the curing period.
- 10.2.5 The methods and recommended practice for protecting and curing concrete as described in ACI 305, and ACI 306 shall be followed when the temperature of the surrounding air is below 40°F or 90°F. Air and concrete temperatures at times of placing are to be taken and reported on cylinder break forms. No dependence shall be placed on salt or other chemicals for the prevention of freezing.
- 10.2.6 Methods should be taken to protect the concrete from mechanical injury or by action of the elements until such time as the concrete is thoroughly set.
- 10.2.7 Projecting inserts, anchor bolts, etc., shall be protected from disturbances until the concrete has sufficiently set to hold such items immovable.

03305 - REINFORCING STEEL

1.0 SCOPE OF THE WORK

The work included under this section shall consist of furnishing all labor, tools, equipment, materials, services, and supervision necessary for the complete installation of all reinforcing steel work, as indicated on the drawings and specified herein.

2.0 APPLICABLE SPECIFICATIONS

2.1 The Contractor shall follow the practices and standards described in the latest editions of the following specifications which are made a part of this Specification.

2.1.1 American Concrete Institute:

ACI 318 - Building Code Requirements for Reinforced Concrete.

2.1.2 Refer to ACI 318 - "Building Code Requirements for Reinforced Concrete" for a complete listing of applicable specifications of the American Society for Testing and Materials (ASTM).

2.1.3 All applicable local and state codes and regulations.

2.1.4 Latest edition of OSHA Safety and Health Regulations.

2.1.5 In cases of conflict between the referenced standards, the more stringent requirements shall govern.

3.0 REINFORCING MATERIALS

3.1 Standards of the ASTM indicated in the following paragraphs shall be the current editions.

3.2 All reinforcing steel shall be new, deformed billet-steel bars conforming to ASTM A615. Grade of reinforcing steel shall be 60 ksi.

3.3 The Contractor shall include all spacers, chairs, bolsters, ties, and other devices necessary for proper placing, spacing, supporting, and fastening reinforcement in place. When the legs of any support devices rest directly on formwork, which, after stripping, will expose the concrete to permanent view, these devices shall be zinc-coated after fabrication or provided with plastic button tips at the wire ends to prevent staining of the concrete by rust. Sand chairs shall be used to support reinforcing on earth surfaces.

4.0 SHOP DRAWINGS & SUBMITTALS

4.1 Shop drawings, including placement diagrams shall be prepared by the fabricator, in accordance with the drawings and the standards in ACI 315, "Manual of Standard Practice for Detailing Reinforced Concrete". All dimensions and sizes of reinforcement on the drawings shall be strictly adhered to and shall not be changed without written approval of the Owner.

4.2 The Contractor shall submit to the Owner one sepia and three blue-line copies of the steel lists and placing plans of all reinforcing steel used in the job.

5.0 INSTALLATION

- 5.1 Reinforcing steel bars stored at job shall be placed in racks or blocked up at least 18" above ground and kept dry by suitable cover.
- 5.2 Reinforcing steel bars shall be shop-bent as indicated on the fabrication drawings. Metal reinforcements shall not be bent or straightened in a manner that will injure or defect material. Reinforcement shall be cold bent to shapes shown on the drawings. The heating of reinforcement for bending will not be permitted. Bars with kinks or bends not shown on the drawings shall not be used. Minimum pin bending diameter will be as follows:

Minimum Pin Bending Diameters

<u>Bar Size</u>	<u>Minimum Pin Diameter (inches)</u>
#3	1.1253
#4	1.5
#5	1.875
#6	2.25
#7	2.625
#8	3.0
#9	4.5
#10	5.0
#11	5.5
#14	8.75
#18	11.25

- 5.3 All reinforcement at the time concrete is placed shall be clean new stock, free from defects, mill or rust scale, dirt, oil, dried concrete, or coatings that will reduce bond.
- 5.4 No heating, welding, or tack welding of reinforcing steel will be permitted.
- 5.5 Bars of single length shall be used in all cases, except where the length required is greater than stock length or where the Owner gives permission for shorter lengths. Necessary splices shown on the drawings shall be lapped sufficiently to develop the strength of the bars by bond. Splices shall not be made in beams, girders, and slabs at points of maximum bending moment nor shall adjacent bars be spliced at the same point, but staggered.

- 5.5.1 Wherever field conditions make it necessary to splice principal reinforcement otherwise than as shown on the drawings, character of splice shall be decided by the Owner on basis of allowable bond stress and stress in reinforcement at splice.

The minimum lap splice shall be 12".

Minimum Lap Splice (inches)

<u>Bar Size</u>	<u>Top Bars*</u>	<u>Other Bars</u>
#3	13	12
#4	17	12
#5	21	15
#6	27	20
#7	37	27
#8	49	35
#9	62	44
#10	78	56
#11	96	69

* Top bars are defined as horizontal bars so placed that more than 12" to concrete is cast below the bar.

- 5.6 Reinforcement shall be accurately placed and secured against displacement by firmly wiring at all intersections and splices with not less than No. 18 U.S. Standard Gauge annealed wire, or by use of acceptable clipping devices.
- 5.7 Reinforcing in pile caps, footings, and slabs on earth shall be supported at proper level with pre-cast concrete blocks at no greater than 24" O.C.
- 5.8 Reinforcing other than that mentioned in Paragraph 5.7 shall be securely positioned at required distances from forms by means of metal spacers and chairs, or other accessories spaced in accordance with recommendation of the Concrete Reinforcing Steel Institute.
- 5.9 Unless otherwise indicated on drawings, steel reinforcement shall have a minimum protection of concrete as follows:

Minimum Cover Criteria and Requirements

- (a) Concrete cast against and permanently

exposed to earth	3"
(b) Concrete exposed to earth or weather:	
#6 through #18 bars	2"
#5 bar & smaller, welded wire fabric	2"
(c) Concrete not exposed to weather or in contact with ground:	
Slab, walls, joists:	
· #14 and #18 bars	1½"
· #11 and smaller	¾"
· Beams, columns, primary reinforcement, ties, stirrups, spirals	1½"

In all cases, thickness of concrete over reinforcement shall not be less than diameter of bars.

- 5.10 Exposed bars intended for bonding with future work shall be protected from corrosion by concrete or other adequate covering.
- 5.11 No reinforcing bars shall be forced or driven into concrete after the concrete has attained its initial set.
- 5.12 Corner bars shall be required at all corner intersections, unless noted otherwise on the drawings. These bars shall be #4 with a length of 2'-6" placed at 45° to the corner.
- 6.0 INSPECTIONS AND TESTING
- 6.1 The materials and workmanship to be furnished under this specification shall be subject to inspection in the mill, shop, and field by the Owner.
- 6.2 Inspection and acceptance, or failure to inspect, shall in no way relieve the Contractor or the mill and shops from their responsibility to furnish materials and workmanship in accordance with contract requirements. When materials and/or workmanship do not conform to the specification requirements the Owner reserves the right to reject such material and/or workmanship at any time before final acceptance of the concrete work.
- 6.3 The Contractor shall make the necessary arrangements with the Owner-approved testing laboratory to facilitate concrete sampling and test.
- 6.4 An independent testing laboratory shall perform compressive strength tests, air entrainment tests and slump tests for each 50 cubic yards of concrete poured but not less than once for each day of concrete pouring. All tests shall be made at the expense of the Owner.
- 6.5 Compressive strength tests shall be conducted in accordance with ACI 318, "Concrete Quality". Tests shall be made on four field specimens: one for testing at 7 days and two for testing at 28 days. If the 28-day breaks are good, the fourth cylinder may be

discarded. If the 28-day breaks are deficient, the fourth cylinder shall be broken as instructed.

- 6.6 Slump tests shall be made in accordance with ASTM C143 for each set of cylinders submitted to the laboratory.
- 6.7 Air entrainment tests shall be made in accordance with ASTM C138, C173, or C231 for each set of cylinders.
- 6.8 If the ultimate compressive strength of any cylinder falls below specified strength, an investigation shall be made to determine cause of decrease. If it is attributed to a change in materials, a new design of mix shall be made. If low strength and the quality of the structure is in question, the Owner may require, at no additional cost to the Owner, tests to be made on portions of the structure containing questionable concrete. Such tests shall include one or more of the following: (1) impact (Swiss) hammer tests, (2) cored cylinder test per ASTM C42, or (3) load actual structure per ACI 318. In that portion of the structure which contains defective concrete, the defective concrete shall be removed and replaced, or reinforced as directed by the Owner, at Contractor's expense, including cost of tests. If cored tests indicate that the concrete adequately meets the specified strength, the test results of test cylinders will be waived.
- 6.9 Reports of all test and control measures shall be submitted to the Owner in triplicate. Reports shall show the in-place location of concrete.
- 6.10 The minimum compressive strength of test cylinders shall be 4000 psi, unless noted otherwise.
- 6.11 Record the atmospheric and concrete temperatures on all test reports.

7.0 CONCRETE DISPOSAL

The Contractor is prohibited from dumping, wasting, or discarding unacceptable or excess concrete or washing out concrete trucks within the property limits of the Owner except at an approved dumping site.

03355-CONCRETE FINISHES

- 1.0 Standard Finish for Exposed Concrete Surfaces (Excluding Floors)
- 1.1 As soon as the forms have been removed, the concrete surfaces to be left exposed shall be carefully examined and cavities, stone pockets, irregularities, honeycombing, tie holes, and other defects which in the opinion of the Owner do not justify rejection of the work shall be pointed with mortar before the concrete is thoroughly dry. The mortar mix for patching shall be determined by trial – usually one part cement and two parts coarse sand to obtain a good color match with the concrete when both patch and concrete are

cured and dry. The amount of mixing water shall be as little as consistent with the requirements of handling and placing the mortar.

- 1.2 Concrete surfaces which are to be exposed in the finish construction shall receive a "rubbed" finish. After the mortar pointing has set, the entire area shall be thoroughly covered with water by means of brush and rubbed with carborundum brick or other approved method to remove all blemishes and to provide a uniform finished appearance to blend in with surrounding concrete surfaces. After rubbed surfaces have dried, wipe with burlap to remove any loose powder.

SECTION 5 - METALS

05120 – STRUCTURAL STEEL

1.0 SCOPE OF THE WORK

- 1.1 The work included under this section shall consist of furnishing all labor, tools, equipment, materials, services, and supervision necessary to fabricate, deliver, and erect complete, all structural steel indicated on the drawings as described in this Specification. Anchor bolts for structural steel shall be furnished and installed by the Contractor performing the concrete work as provided by Section 3, "Concrete".
- 1.2 The work includes, but is not limited to, the following:
 - 1.2.1 Fabrication, erection, shop painting, touch-up painting, and testing of all structural metal.
 - 1.2.2 The structural metal includes, but is not limited to, the following:
 - 1.2.2.1 Columns
 - 1.2.2.2 Beams
 - 1.2.2.3 Base Plates
 - 1.2.2.4 Insert Plates
 - 1.2.2.5 Connection Plates
 - 1.2.2.6 Anchor Bolts
 - 1.2.2.7 All connections and their component parts for the above items.
 - 1.2.2.8 Grouting of Base Plates

2.0 APPLICABLE SPECIFICATIONS

- 2.1 The Contractor shall follow the practices and standards described in the latest edition of the following specifications which are made a part of this Specification.
 - 2.1.1 American Institute of Steel Construction (AISC):
 - 2.1.1.1 Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings.

- 2.1.1.2 Code of Standard Practice for Steel Buildings and Specification for Structural Joints Using ASTM A325 Bolts or A490 Bolts.
- 2.1.2 American Iron and Steel Institute:
 - 2.1.2.1 Specification for the Design of Cold-Formed Steel Structural Members.
- 2.1.3 American National Standards Institute (ANSI):
 - 2.1.3.1 B18.22.1 Plain Washers
 - 2.1.3.2 B46.1 Surface Texture (Surface Roughness, Waviness, and Lay)
- 2.1.4 The American Society for Testing and Materials (ASTM):
 - 2.1.4.1 A6 General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use.
 - 2.1.4.2 A36 Standard Specification for Structural Steel.
 - 2.1.4.3 A572 High-strength, Low-alloy, Grade 50 Structural Steel.
 - 2.1.4.4 A307 Standard Specification for Low-Carbon Steel Externally & Internally Threaded Standard Fasteners
 - 2.1.4.5 A325 Standard Specification for High-Strength Bolts for Structural Steel Joints, including Suitable Nuts and Plain Hardened Washers.
 - 2.1.4.6 A500 Cold-Formed Welded and Seamless Carbon Steel Structural Tubing.
- 2.1.5 American Welding Society (AWS):
 - 2.1.5.1 D.1.1 Structural Welding Code
- 2.1.6 All applicable local and state codes and regulations.

3.0 SYSTEM DESCRIPTION

3.1 General

- 3.1.1 Furnish exact sections, weights, and kinds of material specified using details and dimensions shown.
- 3.1.2 Not all connections are detailed; similar details apply to similar conditions, unless otherwise indicated. Contact Owner to verify design of members or connections where design requirements are unclear.

4.0 SUBMITTALS

4.1.1 Certificates of Compliance

4.1.1.1 Submit producer's or manufacturer's data for products as follows, to show compliance with specified requirements:

- 1) Mill test reports for each type of structural steel furnished.
- 2) Test reports for high-strength bolts, nuts, and washers, including chemical analysis, tensile strength tests, and hardness tests.
- 3) Test reports for direct tension indicators.
- 4) Specifications for primer paint, including manufacturer's data on chemical composition and dry film thickness per applied coat.
- 5) Specifications for non-shrink grout.

4.1.2 Shop Drawings

4.1.2.1 Shop drawings shall be prepared by the fabricator. The Contractor shall submit shop drawings of structural steel to the Owner for approval prior to fabrication. Shop drawings shall be checked and initialed as checked by the Contractor prior to submitting to Owner for review.

4.1.2.2 Shop drawings for structural steel shall reflect information on location, type, and size of all bolts and welds, distinguishing between those made in the shop and those made in the field.

4.1.2.3 Indicate weld lengths and sizes, using standard AWS welding symbols.

4.1.2.4 Shop drawings shall show all shop and erection details, including, but not limited to, cuts, copes, cambers, connections, holes, bolts, and welds in structural steel. Shop drawings shall not be complete without specific notations about painting, cleaning, grade of steel, type of connecting bolts, and type of welding electrodes.

4.1.2.5 Include setting drawings and templates for anchorages to be installed as work of other sections, if required.

4.1.2.6 The fabricator is specifically responsible for the adequacy of any connections designed by the fabricator to performance standards established in the contract documents. Approval by the Owner, of shop drawings, shall not relieve the fabricator of this responsibility. The AISC Code is modified by this specification section to delete the following sentence: "This approval constitutes the Owner's acceptance of all responsibility for the design adequacy of any detail configuration of connections developed by the fabricator as part of his preparation of these shop drawings."

4.1.2.7 Material shall not be fabricated or delivered to the site before reviewed shop drawings have been returned to the Contractor.

4.1.2.8 One set of sepia full scale and one set of bluelines full scale of the shop drawings shall be submitted for all structural steel, grating, stairs, handrails, ladders, and any and all related items for approval prior to fabrication. This will be the only time allowed by the Owner for approval of shop drawings within the original scope of work. Rejection and resubmittal of shop drawings due to Contractor error will not extend the completion date of the work.

5.0 QUALITY ASSURANCE

5.1 The materials and workmanship to be furnished under this specification shall be subject to inspection in the mill, shop, and field by the Owner.

5.2 Inspection and acceptance, or failure to inspect, shall in no way relieve the Contractor or the mill and shops from their responsibility to furnish materials and workmanship in accordance with contract requirements. When materials and/or workmanship do not conform to the specification requirements, the Owner reserves the right to reject such material and/or workmanship at any time before final acceptance of the structure.

5.3 The Contractor shall guarantee free access to the fabrication shop and the construction site for the purpose of inspecting the steel work or field connections. The Owner shall be allowed to observe the performance of the erection crew while the work is in progress, and ladders or temporary scaffolding shall be made available upon the request of the Owner for the purpose of inspecting any connections which are difficult to reach.

5.4 Inspection of welding shall be in accordance with the AISC Specification for Buildings, and high-strength steel shall be marked in accordance with the AISC Specification for Buildings.

5.5 The Owner shall be notified well in advance of start of shop work in order to schedule inspections if desired.

5.6 Joint welding procedures shall be prequalified or tested in accordance with AWS qualification procedures.

5.7 Welders must be currently certified under American Welding Society qualification procedures.

5.8 Regulatory Requirements

5.8.1 Unless other requirements of governing authorities or particular requirements of this specification are more stringent, comply with provisions of the following:

5.8.1.1 AISC Code of Standard Practice for Steel Buildings and Bridges.

5.8.1.2 AISC Specification for Design, Fabrication, and Erection of Structural Steel for Buildings, with Commentary and Supplements.

5.8.1.3 AWS D1.1 Structural Welding Code - Steel.

5.9 Testing and Inspection Agency

- 5.9.1 The Owner will engage an independent testing and inspection agency to perform testing, to inspect and evaluate connections, and prepare test reports.
- 5.9.2 Deficiencies in the structural steel work identified by the testing and inspection agency will be corrected at no additional expense to the Owner. Subsequent tests to confirm the adequacy of corrected work will be at the Contractor's expense.

6.0 MATERIALS

- 6.1 All materials shall be new and shall conform to the respective specifications and other requirements listed below:
 - 6.1.1 Structural steel shapes and plates shall conform to ASTM A36.
 - 6.1.2 Hot-formed steel tubing shall conform to ASTM A501.
 - 6.1.3 Cold-formed steel tubing shall conform to ASTM A500, Grade B.
 - 6.1.4 Steel pipe shall conform to ASTM A53, Type E or S, Grade B.
 - 6.1.5 Steel castings shall conform to ASTM A27, Grade 65-35, medium strength carbon steel.
 - 6.1.6 Unfinished threaded fasteners shall conform to ASTM A307, Grade A, regular low carbon steel bolts and nuts. Provide either hexagonal or square heads and butts, except use only hexagonal units for exposed connections.
 - 6.1.7 High strength threaded fasteners shall conform to ASTM A325. Heavy hexagonal structural bolts, heavy hexagonal nuts, and plain hardened washers shall be quenched and tempered medium-carbon steel.
 - 6.1.8 Plain washers, other than those in contact with high-strength bolts, shall conform to ANSI B18.22.1, Type B.
 - 6.1.9 Welding Electrodes for manual shielded metal-arc welding shall conform to the #70XX series of the "Specification for Mild Steel Covered Arc-Welding Electrodes", AWS A5.1 or the "Specification for Low-Alloy Steel Covered Arc-Welding Electrodes".
 - 6.1.10 Non-Shrink Grout will be prepackaged material requiring only the addition of water and complying with CRD-C 621. It shall be natural aggregate (non-metallic) type, and high strength (minimum 10,000 psi at 28-day cure).

7.0 DELIVERY AND STORAGE

- 7.1 Deliver all material to the job site properly piece-marked for identification and corresponding to the markings indicated on the shop drawings.
- 7.2 Structural material, either plain or fabricated, shall be stored above the ground upon platforms, skids, or other supports. Material shall be kept free from dirt, grease, and other foreign matter and shall be protected from corrosion. Material shall be adequately supported and protected to avoid bending, twisting, or otherwise damaging the member.

8.0 FABRICATION

- 8.1 All structural steel shall be in accordance with the lines, dimensions, grades, details, and notes shown on the drawings and as specified herein.
- 8.2 Substitutions of sections or modifications of details, or both, and the reasons therefore, shall be submitted with the shop drawings for approval. Approved substitutions, modifications, and necessary changes in related portions or the work shall be coordinated by the Contractor and shall be accomplished at no additional cost to the Owner.
- 8.3 Structural steel sections shall be continuous in length. No splicing, welding, or joining pieces of short lengths shall be permitted without written approval of the Owner.
- 8.4 The Contractor shall be responsible for all errors of detailing, fabrication, and for the correct fitting of the structural members.
- 8.5 Fabrication shall be in accordance with Section 1.23 of the AISC Specifications for Buildings. Said Section 1.23 consists of the following headings:
- | | |
|--------|--|
| 1.23.1 | Straightening Material |
| 1.23.2 | Oxygen Cutting |
| 1.23.3 | Planing of Edges |
| 1.23.4 | Riveted and Bolted Construction Holes |
| 1.23.5 | Riveted and High Strength Bolted Construction - Assembling |
| 1.23.6 | Welded Construction |
| 1.23.7 | Finishing |
| 1.23.8 | Tolerances |
- 8.6 Generally, camber requirements shall be in accordance with Section 1.19 of the AISC Specification for Buildings. Special camber requirements, if any, are shown on the drawings.
- 8.7 In general, connections shall be shop welded and field bolted. All welded connections shall be made with E-70 electrodes. All bolted connections shall be made with ¾" dia. A325 H.S. bolts, unless otherwise noted on the design drawings.

- 8.8 Welds shall be made only by welders who have qualified by tests as prescribed in the "Code for Welding in Building Construction" of the American Welding Society, to perform the type of work required.
- 8.9 The design of connections for any part of the structure not indicated on the design drawings shall be completed by the Contractor. Unless otherwise shown, all beam connections shall be standard frame or seated connections as shown in Part 4 of the AISC Manual of Steel Construction. Unless greater reactions are indicated on the design drawings, connections shall develop the full "T" distance of the beam web. End connections for bracing shall develop the loads shown on the design drawings or one-half the strength of the member in tension, whichever is greater.
- 8.10 All ends of steel members with clip angle(s) attached shall be completely sealed using "Sikaflex-1a" as manufactured by Sika Corporation. Sealant shall be applied after application of top coat of paint.
- 8.11 All holes in steel members shall be made by means of cutting, drilling, or punching at right angles to surface of metal. Do not make or enlarge holes by burning.
- 8.12 All cut, sheared, sawed, or burned edges and shop generated vertical and horizontal corners of all structural members (beams, columns, clip angles, etc.) shall have the edges ground smooth so that a round corner exists.
- 8.13 All welds shall be uniform in size and shall be in accordance with the AISC Specification for Architecturally Exposed Structural Steel. Welds that do not represent a reasonably smooth surface will be ground.
- 8.14 No pinholes, slag, or burrs shall be left on welds or steel.
- 8.15 Copes of beams shall be rounded and not squared.
- 8.16 Identification of steel by piece-mark shall be by a removable external tag or other Owner-approved method and not by welding on steel.
- 8.17 All holes shall be flush with face of steel.
- 8.18 Stiffener, gusset plates, and like shall be coped to fit. No snipe corners will be allowed.
- 9.0 CONNECTIONS
- 9.1 Where structural joints are made using high-strength bolts, hardened washers, and nuts tightened to a high tension, the materials, methods of installation and tension control, type of wrenches to be used, and inspection methods shall conform to specifications for "Structural Joints using ASTM A325 Bolts" as approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation, latest edition.
- 9.2 The contact surfaces, when assembled with bearing type bolts, shall be painted and all connections shall be free of scale, except tight mill scale, and shall also be free of burrs, oil, pits, and other defects which would prevent solid seating of the parts. The contact surfaces within friction type joints shall be free of oil, paint, lacquer or galvanizing.

High-strength steel bolted connections, of the "friction type", will be called for on the drawings when required.

- 9.3 Primary field connections shall be bolted, using $\frac{3}{4}$ " dia. ASTM A325-X galvanized bolts, bearing type connection with threads excluded from shear plane, with one heavy hexagonal structural nut and one galvanized plain, hardened washer (U.N.O.).
- 9.4 Beam connections shall be furnished in accordance with Part 4 of the AISC Manual of Steel Construction, eighth edition, (U.N.O.). All material in the connection shall be sized to accommodate the shear values shown for ASTM A325 bolts, using values for bearing type bolts with threads excluded from shear plane.
- 9.5 Before erection of structural steel commences, the proposed method of tightening the high-strength steel bolts shall be submitted to the Owner for approval. Recommended method for tightening of all structural bolts shall be by the turn-of-nut method as specified in the AISC Steel Construction Manual under "Specification for Structural Joints Using ASTM A325 or A490 bolts".
- 9.6 Minimum field connections shall be two bolts at all diagonal angle bracing members, U.N.O., with the exception of angle bracing at pipe racks which shall be minimum three bolts. At all wide flange and channel members, the number of connectors shall be that which will develop the full "T" distance.
- 9.7 Open holes shall be $\frac{13}{16}$ " dia., (U.N.O.). All holes, both shop and field, shall be drilled, cut or punched, not burned.
- 9.8 Shop connections shall be welded, or high strength bolted connections may be substituted if approved by the Engineer. For manual ARC, welding electrodes shall conform with AWS A5.1 or A5.5, E70XX series.
- 9.9 All connections shall be sized to develop the load or number of bolts indicated on the drawings.
- 9.10 Erection bolts, clip angles, and temporary fastening required for erection shall be furnished by the steel fabricator.
- 9.11 Minimum clip angle thickness shall be $\frac{3}{8}$ " (U.N.O.).
- 9.12 Bracing members meeting at a point shall have their gravity axes meeting at one point if practical; if not, provisions shall be made for bending stresses due to eccentricity. Gusset plates shall be $\frac{3}{16}$ " thick, minimum (U.N.O.).
- 9.13 All cut, sheared, sawed, or burned edges and corners of all structural members (beams, columns, clip angles, etc.) shall have the edges ground smooth so that a round corner exists.
- 9.14 All welds shall be uniform in size and shall be in accordance with the AISC Specification for Architecturally Exposed Structural Steel. Welds that do not represent a reasonably smooth surface will be ground.

- 9.15 No pinholes, slag, or burrs shall be left on welds or steel.
- 9.16 Copes on beams shall be rounded and not squared. Identification of steel by piece-mark shall be by external tag and not by welding on steel.
- 9.17 All holes shall be flush with face of steel.
- 10.0 COLUMN BASES AND BEARING PLATES
- 10.1 Base plates or bearing plates shall be provided under columns, beams, girders, and any other steel members resting on concrete or masonry work. Base and bearing plates may be attached or loose as shown on the drawings. Loose base plates, leveling plates, and bearing plates shall be delivered to the job site along with detailed setting plans for placing and grouting by others.
- 10.2 Column bases shall be finished in accordance with Section 1.21.3 of the AISC Specification for Buildings.
- 10.3 Columns shall be milled or saw-cut to provide full bearing.
- 10.4 Base and cap plates shall be straight and true.
- 11.0 PAINTING (Where Designated)
- 11.1 Surface Preparation
- 11.1.1 Surfaces of all steel shall be thoroughly cleaned prior to painting, removing rust, loose mill scale, dirt, oil, and grease in accordance with the Steel Structure Painting Council Surface Preparation Specification.
- 11.1.2 Clean steel in accordance with SSPC procedures as follows: SSPC-SP10, Near-White Blast Cleaning.
- 11.1.3 Clean all gauge metals and equipment in accordance with SSPC-SP6 or a phosphate surface preparation rinse system sealed with a rust bond penetration sealer.
- 11.2 One or more shop coats of paint shall be applied to all steel surfaces within 8 hours of final cleaning. On encased steel in concrete or mortar the initial 2" of embedded steel shall be painted.
- 11.3 Unless instructed otherwise, all paint coats shall be applied in the shop with any touch-up paint applied after installation of steel is complete.
- 11.4 Steel that receives a yellow topcoat shall always have all paint coats applied in the shop with touch-up in the field after complete installation of steel.
- 11.5 Coating System

- 11.5.1 The coating materials specified are those manufactured by the Carboline Co., 350 Hanley Industrial Court, St. Louis, Mo., 63144. Coatings of different manufacture may be submitted for possible approval by the Engineer. Coatings proposed for use shall be included with the shop drawing submittals. Coatings shall be handled, mixed, and applied in strict accordance with the manufacturer's recommendations.
- 11.5.2 All surfaces, except galvanized, shall receive a total of three coats, with a total of 8 mils average build-up as follows:
- 11.5.2.1 1st Shop Coat - All surfaces, including surfaces inaccessible after fabrication, shall received one (1) coat of Carbo-Zinc 12 VOC inorganic zinc primer. Coverage shall be 2.5 - 3.0 mil minimum thickness.
- 11.5.2.2 2nd Shop Coat - A coat of Carboline 893 primer shall be applied as the second shop coat. Coverage shall be a 4 mil minimum thickness.
- 11.5.2.3 3rd Shop Coat - This coat shall be Carboline 134HS and the color shall be as designated by the Engineer. Coverage will be 1.5 - 2.0 mil thickness.
- 11.5.3 Galvanized Surfaces (where indicated) shall be coated as follows:
- 11.5.3.1 Prime Coat - Rust Bond Penetration Sealer - clear epoxy.
- 11.5.3.2 Final Coat - A final coat of paint shall be field applied. This coat shall be Carboline 134 polyurethane gloss and the colors shall be as designated by the Engineer. Coverage will by 1.5 - 2.0 mil thickness. All coating shall be applied only on surfaces that are completely dry. Coating shall not be applied at temperatures or humidity conditions outside the range specified by the manufacturer. Surfaces to be coated in damp weather shall be coated under cover and shall remain covered until dry. Drying time shall be as recommended by the manufacturer. Field welds and attachments installed in the field, such as bolts and nuts, shall be cleaned and coated as specified below for repairing field damage. All damaged surfaces or areas that are chipped or burned during fabrication shall be cleaned and coated as specified for the original surface. All surfaces or areas damaged in shipment or other handling or that are chipped or burned during erection shall be repaired by wire brushing steel surfaces and applying one coat of Carbomastic 15, approximately 7 mils thick, followed by the above specified finish (3rd) coat.
- 11.5.4 Holes drilled in the field shall have the surface inside the hole touched-up and repaired as required using the field repair procedure.
- 11.6 An inspection of surface preparation and dry film thickness of shop prime coat may be made prior to acceptance of steel. Steel members found to be deficient in these requirements will be brought to acceptable condition prior to acceptance.

- 11.7 All painting, shop and field touch-up, shall be done by a qualified painter.
- 11.8 All touch-up of paint will be after installation of steel is complete and all bolts have been torqued to required specifications.
- 11.9 Touch-up of all paint in the field shall be by an Owner-approved painting contractor.
- 11.10 All holes drilled in the field shall be cleaned and finished to specifications and a coat of paint primer applied directly into the hole so that all surfaces are coated. This may be applied by the structural steel erectors.
- 11.11 All field welding shall be cleaned and finished to specifications and a coat of paint primer and topcoat applied. This shall be applied only by an Owner-approved experienced and qualified painting contractor. Structural steel erectors will not be permitted to apply this paint.
- 11.12 Do not paint the following surfaces:
- 11.12.1 Machined or milled surfaces, unless noted otherwise.
 - 11.12.2 Surfaces adjacent to field welds.
 - 11.12.3 Faying surfaces of bolted connections.
 - 11.12.4 Other surfaces when specifically noted on drawings or schedules.
 - 11.12.5 Areas of friction type connections.
- 11.13 All connection bolts and nuts and all anchor bolt connections shall be cleaned, primed with the red touch-up primer paint and a topcoat of paint applied after final torquing of connections is completed.
- 12.0 GALVANIZING (Where Indicated)
- Galvanizing of conveyor support beams, bents, and towers shall be in conformance with ASTM A123 zinc (hot-galvanized) coatings on products fabricated from rolled, pressed, and forged steel shapes, plates, bars, and strips.
- 13.0 SHOP QUALITY CONTROL
- 13.1 Testing and Inspection
- 13.1.1 General. Provide access to the testing and inspection agency so that specified testing and inspection can be safely accomplished.
 - 13.1.2 Shop Bolted Connections Comply with testing and verification procedures in AISC Specification for Structural Joints, except test not less than 100 percent of bolts in each bolted connection.

13.1.3 Shop Welded Connections. Inspect and test shop-fabricated welds as follows:

13.1.3.1 Perform visual inspection of all welds.

13.1.3.2 Inspect 100% of full penetration welds, using test method as follows:

13.1.3.3 Ultrasonic Testing (ASTM E164).

13.1.3.4 Inspect 100% of fillet welds visually.

14.0 ERECTION

14.1 The work shall be erected square, straight, plumb, and accurately fitted. Adequate temporary bracing shall be provided to insure stability during the construction period.

14.2 Erection of the structural steel shall be in accordance with Section 1.25 of the AISC Specification for Buildings. Said Section 1.25 consists of the following headings, amended herewith as noted:

1.25.1 Bracing

1.25.2 Adequacy of Temporary Connections

1.25.3 Alignment

1.25.4 Field Welding

1.25.5 Field Painting (Touch-up only)

14.3 Errors or perforations resulting from handling and transportation or improper fabrication that prevent the proper assembly and fitting of the steel shall be reported to the Owner and approval of the method of correction shall be obtained. Approved corrections shall be made at no additional cost to the Owner.

14.4 Before commencing work, the Contractor shall check all governing measurements at the building and the levels of all footings on which the work is to be erected and shall notify the Owner of any discrepancies.

14.5 The Erector shall maintain a complete up-to-date set of erection drawings at the job site and shall keep a daily record by piece number of all material delivered to the job site and all material erected.

14.6 For holes that are improperly aligned, corrections shall be by machine drilling new holes. No burning of holes will be allowed.

14.7 Connection joints shall be cleaned of all dirt and dust before assembly.

14.8 Lifting of structural members shall be done in such a manner as to preclude damage to paint.

14.9 All base plates will be grouted by Contractor. Grout shall be applied by qualified person, experienced in the application of the "5-Star Grout", as manufactured by U.S. Grout Corporation.

14.10 Assembly

14.10.1 Set structural members accurately to locations and elevations indicated, within tolerances established in AISC Code, before making final connections.

14.10.2 Do not use thermal cutting to correct fabrication errors on any major structural member. Thermal cutting of secondary members may be permitted by Owner, upon request.

14.11 Columns and Bearing Surfaces

14.11.1 Clean bearing and contact surfaces before assembly. Slightly roughen concrete and masonry surfaces to improve bond.

14.11.2 Set base and bearing plates accurately, using metal wedges, shims, or setting nuts as required.

14.11.3 After tightening anchor bolts and assuring that structure is plumb, grout solidly between plates and bearing surfaces.

14.11.4 Comply with manufacturer's instructions for grout.

14.12 Bolting

14.12.1 Carbon Steel Bolts. Use only for temporary bracing during erection, unless otherwise specifically permitted by contract documents.

14.12.2 High-Strength Bolts. Comply with requirements of AISC Specification for Structural Joints Using ASTM A325 or A490 Bolts.

14.13 Welding

14.13.1 Do not perform field welding when ambient temperature is at 0°F or below, or when surfaces are wet, exposed to rain, snow, or high wind.

14.13.2 Perform field welding in accordance with AWS Code.

14.13.3 Tighten and leave in place erection bolts used in field welded construction.

14.14 Touch-Up Coatings. Immediately after erection of structural steel, clean coated areas which have been abraded or otherwise damaged by welding, bolting, or other field operations shall be touched up. Apply touch-up paint or galvanizing to match original on all damaged areas.

15.0 FIELD QUALITY CONTROL

15.1 Testing and Inspection

15.1.1 General. Provide access to testing and inspection agency so that specified testing and inspection can be safely accomplished.

15.1.2 Field Bolted Connections. Comply with testing and verification procedures in AISC Specification for Structural Joints, except test not less than 100% of bolts in each bolted connection.

15.1.3 Field Welded Connections Inspect and test field-fabricated welds as follows:

15.1.3.1 Perform visual inspection of all field welds.

15.1.3.2 Test field welds as follows if required:

1) Dye penetrant of all fillet welds.

2) UT of all full penetration welds.

05200 - MISCELLANEOUS METALS

1.0 SCOPE OF THE WORK

1.1 The work included under this Section shall consist of furnishing all labor, tools, equipment, materials, services, and supervision necessary to fabricate, deliver, and erect complete miscellaneous metal items including, but not necessarily limited to, the following:

Grating supported on structural framing.

Floor plate.

Hand rails.

Stairs.

Ladders.

Ladder cages.

Sheet metalwork.

Any other miscellaneous items not embedded in concrete.

Metal roofing and siding.

1.2 The following miscellaneous items are specified under this section but are to be furnished and installed by the Contractor performing the concrete work as provided by Section 3 - Concrete.

Pipe sleeves.

Inserts and anchors.

Anchor bolts.

Any other miscellaneous items embedded in concrete.

2.0 APPLICABLE SPECIFICATIONS

2.1 The Contractor shall follow the practices and standards described in the latest edition of the following specifications which are made a part of this Specification.

2.2 American Institute of Steel Construction (AISC): Manual of Steel Construction.

2.3 American National Standards Institute, Inc. (ANSI):

A14.3 Safety Requirement for Fixed Ladders.

2.4 American Society for Testing and Materials (ASTM):

A36 Structural Steel

A53 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

A123 Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strips.

A386 Zinc Coating (Hot-Dip) on Assembled Steel Products.

A475 Zinc-Coated Steel Wire Strand.

A525 Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements.

2.5 American Welding Society (AWS):

B3.0 Qualification Procedure.

D1.1 Structural Welding Code.

2.6 Occupational Safety and Health Standards (OSHA).

3.0 SHOP DRAWINGS

Shop drawings, along with catalog cuts, templates, and erection and installation details, as appropriate, for all miscellaneous metal items shall be submitted for approval in triplicate to the Owner. Submittals shall be complete in detail; shall indicate thickness, type, grade, class of metal, and dimensions; and shall show construction details, reinforcement, anchorage, and installation with relation to the building construction. All welds shall be indicated by standard welding symbols of the American Welding Society.

4.0 GENERAL

4.1 In addition to the items listed herein, all miscellaneous metal work required for proper completion of the project, except as specified under other sections, shall be provided in accordance with the drawings.

4.2 The Contractor shall coordinate the work under this section with that specified in other sections of these specifications in order that all necessary items be provided as required. Supplementary parts and materials necessary to complete each item, even though such work is not definitely shown or specified, shall be included. All miscellaneous bolts and anchors necessary for the completion of the work shall be furnished as part of this section of the specifications. Anchors not shown in detail on the drawings shall be such as to conform to the accepted practices of the trade and as approved by the Owner. All miscellaneous bolts and anchors, supporting members, braces, framing members, and

connections necessary for completion of the miscellaneous metal work shall be provided as part of the work under this section of the specifications.

- 4.3 Items specified to be galvanized, when practicable and not indicated otherwise, shall be hot-dipped processed after fabrication. Galvanizing shall be in accordance with ASTM A123, A386, or A525 as applicable.
- 4.4 Inserts of suitable and approved type shall be furnished and installed where necessary for the support of equipment, apparatus, or other work.
- 4.5 Miscellaneous metal work shall be well formed to shape and size, with sharp lines and angles. Shearing and punching shall produce clean, true lines and surfaces. Permanent connections shall be welded, bolted, or riveted. Exposed surfaces shall have a smooth finish and sharp, well-defined lines and arises. Work shall be evenly sprung to curves. Joints shall be milled to a close fit. The necessary rebates, lugs, and brackets shall be provided so that the work can be assembled in a neat and substantial manner. Holes for bolts and screws shall be drilled or punched. Poor matching of holes shall be cause for rejection. Fastenings shall be concealed where practicable. Exposed fastenings shall be compatible materials, shall generally match in color and finish, and shall harmonize with the material to which fastenings are applied. Thickness of metal and details of assembly supports shall give ample strength and stiffness. Joints exposed to the weather shall be formed to exclude water. Welding to or on structural steel shall be in accordance with the Structural Welding Code of the American Welding Society. Welding shall be continuous along entire area of contact, except where tack welding is permitted. Tack welding shall not be permitted on exposed surfaces. All exposed welds shall be ground smooth. Surfaces to be welded shall be properly prepared. Each deposited layer of weld material shall be thoroughly cleaned before additional weld material is applied. All welds shall have complete fusion with the base metal and shall be of uniform thickness free from cracks, oxides, slag inclusions, and gas pockets. Corner joints shall be coped or mitered, well formed, and in true alignment. Work shall be accurately set to establish lines and elevations and securely fastened in place. Work shall be executed and finished in accordance with approved drawings, cuts, details, and samples.

5.0 DISSIMILAR METALS

Contractor shall take every precaution to prevent the occurrence of electrolytic action between dissimilar metals on all exterior work and on interior work exposed to moisture or high humidity. Copper products shall not be used in connection with aluminum work, nor shall aluminum be used in locations subject to drainage of copper compounds on the bare aluminum. Surfaces of ferrous metals in contact with aluminum shall be painted one coat of zinc-chromate primer and one coat of aluminum-pigmented bituminous paint. Aluminum in contact with masonry or concrete shall be back painted with two coats of aluminum-pigmented bituminous paint. Stainless steel shall not have direct contact with carbon steel or zinc.

6.0 SEALING

It is intended that all work under this section shall be weathertight in every respect as required for good workmanship. All joint filling and sealing to this end shall be done in accordance with the standard practice for this class of work.

7.0 SAMPLES

Samples shall be full size, shall be taken from manufacturer's stock, and shall be complete as required for installation in the structure. After approval, samples may be installed in the work, provided each sample is clearly identified and its location recorded. One sample of any item shall be submitted for approval upon request by the Owner.

8.0 CERTIFICATION

Welding to or on structural steel or miscellaneous items of structural steel such as lintels and ladders shall be performed by certified welders qualified in accordance with procedures covered in AWS B3.0 and using procedures and materials and equipment of the type required for the work. Verification of certified welders will be required if requested by Owner.

9.0 ANCHORAGE

9.1 Anchorage shall be provided where necessary for fastening miscellaneous metal items securely in place. Anchorage not otherwise specified or indicated, shall include slotted inserts, expansion shield, and power-driven fasteners when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; through bolts, lag bolts, and screws for wood. Slotted inserts shall be of type required to engage with the anchors and shall be approved by the Owner.

9.2 Anchor bolts shall have two (2) heavy hex nut and one (1) plain-hardened flat washer, and shall all be ASTM A36 carbon steel. All anchor bolts are to be galvanized.

9.3 All machinery anchor bolts shall have two (2) heavy hex nuts and one (1) plain-hardened flat washer, and shall all be ASTM A304 stainless steel or ASTM A36 carbon steel.

9.4 All pump anchor bolts shall received one (1) each high density polyethylene plastic anchor bolt sleeve as manufactured by Sinco Wilson Corp.

10.0 MATERIALS

10.1 Structural steel members shall conform to the requirements of ASTM A36 unless otherwise specified.

10.2 Bolts and anchor bolts shall conform to the requirements of ASTM A307 or ASTM A325, unless otherwise specified.

10.3 All items specified or indicated to be galvanized shall be hot-dipped galvanized in accordance with ASTM A123.

05511-METAL STAIRS

- 1.0 Metal stairs complete with structural or formed channel stringers, grating treads, landings, columns, handrails, and necessary bolts and other fastenings shall be constructed in accordance with the metal stair manual of the National Association of Architectural Metal Manufacturers and shall conform to the following requirements:
 - 1.1 Structural steel shall conform to ASTM A36.
 - 1.2 Gratings for treads shall be of removable 1¼" x ¾" galvanized banded standard size with abrasive nosing full width of tread.
 - 1.3 Safety nosings shall be of galvanized steel or painted surface of diamond plated type. Nosing shall be 3" wide and be full width of tread.
 - 1.4 Steel grating shall be supported with minimum ¼" end plates bolted to stringers. Stringers shall be continued around landings as shown, and shall have an angle welded on to support the steel landings. Exposed ends shall be closed.
 - 1.5 Treads shall be capable of sustaining a superimposed load of 100 pounds per square foot.
 - 1.6 Structural steel for framing of landings shall be furnished as part of the stair work.

2.0 Installation. Anchor bolts, grating fasteners, washers, and all parts or devices necessary for proper installation shall be furnished and installed. Lock washers shall be used under nuts.

3.0 Anchors and Bolts

Anchors and bolts, in addition to those indicated, shall be provided where necessary for securing the work in place. Sizes, types, and spacing of anchors and bolts not indicated or specified otherwise shall be as necessary for their purposes. Anchors and bolts in contact with ferrous metal shall be of the same or approved metals compatible with the materials which they adjoin except anchors into concrete shall be stainless steel.

4.0 Inserts and Sleeves

Inserts of suitable and approved types shall be provided where required for the support or anchorage of equipment and finish construction. Inserts shall be gray or malleable iron castings or of galvanized steel unless indicated or specified otherwise. Sleeves required for the passage of pipes through concrete or masonry construction shall be standard cast iron wall sleeves except that where steel pipe sleeves are indicated, they shall be standard weight zinc coated steel pipe.

5.0 Safety Chain

Safety chains shall be of ¼" ASTM A304 stainless steel metal, fixed at one end in a swiveled ring and arranged for padlocking to similar ring at the opposite end. The rings shall be welded to the jambs at the openings. Rings shall be mounted 3'-6" above the floor, and the chain shall be sufficient length to allow no more than a 2" drop in the chain at the center.

05521- PIPE AND TUBE RAILINGS (HANDRAILS)

- 1.0 Steel railings shall, unless otherwise indicated, be standard-weight Schedule 40 steel pipe conforming to ASTM A53. Pipe shall be 1½" size.
- 2.0 Fabrication: Joints of post, rail, and corners shall be by one of the following methods:
 - 2.1 Flush type rail fittings of commercial standard, welded and ground smooth with railing splice locks secured with ⅜" hexagonal recessed-head setscrews.
 - 2.2 Welded joints made by fitting post to top rail and intermediate rail to post, elbow corners, groove welding joints, and grinding smooth. Rail splices shall be butted and reinforced by a tight-fitting interior sleeve not less than 6" long.
 - 2.3 Railings may be bent at corners in lieu of elbows provided bends are made in suitable jigs and that the pipe is not crushed.
 - 2.4 See Structural Standard Detail Sheet for dimensional details.
- 3.0 Installation
 - 3.1 In Concrete. Rails shall be installed by means of steel pipe sleeve inserts set and anchored in the concrete as indicated. Posts shall be inserted into the steel pipe sleeves, leveled, plumbed, and aligned. The annular space between pipe posts and pipe sleeve inserts shall be filled solid with molten lead or sulfur or a quick-setting hydraulic cement except where railings are indicated to be removable. Anchorage joint shall be covered with pipe collar pinned to post. Ends of rails shall be secured by means of standard steel pipe flange anchored to concrete walls by expansion shields and bolts.
 - 3.2 In Masonry. Rails shall be installed by means of standard steel pipe flange secured to masonry with toggle bolts. Rail ends shall be anchored with a standard steel pipe flange through-bolted at the wall into a back plate.
 - 3.3 In Steel. Rails shall be installed by means of base plates bolted or welded to stringers or structural framework.
- 4.0 Metal Siding and Roofing

All roofing and siding shall be H. H. Robertson HR5-36 22 gage or MR3-36 20 gage with Versacore P.F. coating or an approved equal; flashing shall be minimum 24 gage galvanized PTD KY #113 parchment with wash back plain mill finish. All building trim, including rubber, corner, jamb, head, sill, rake, eave, and drip closures, shall be included. Fasteners shall be self-tapping S.S. screws with neoprene weather seal washers approved by the manufacturer.
- 5.0 Ladders

Ladders shall be steel fixed-rail type conforming to ANSI A14.3. Ladders and accessories shall be ASTM A36. Rungs shall be solid-section rods, fitted into punched holes in rails, welded, and ground smooth. All splices and connections shall have a smooth transition with original members without projections that are sharp or more extensive than required for joint strength. Rails shall be fitted with brackets at the spacing indicated for anchorage to structure. See Structural Standard Detail Sheet.

6.0 Ladder Cages

Ladder cages shall be ASTM A36 and shall be provided as indicated. Bar hoops shall be welded to vertical cage bars. All splices and connections shall have a smooth transition with original members without projections that are sharp or more extensive than required for joint strength. See Structural Standard Detail Sheet.

7.0 Sheet Metalwork

7.1 Scope

This section covers sheet metalwork, complete.

7.2 General

Sheet metal items shall be fabricated to the thickness or weight shown in Table I and multiple lengths of items shall be joined together as shown in Table II. Surfaces that are to receive sheet metal shall be even, smooth, sound, thoroughly clean and dry, and free from defects that might affect the application. Sheet metal items shall be furnished in 8- to 10-foot lengths. Single pieces less than 8 feet long may be used to connect to factory fabricated inside and outside corners, and at ends of runs. Cutting, fitting, drilling, and other operations in connection with sheet metal required to accommodate the work of other trades shall be performed by sheet metal mechanics. Accessories and other items essential to complete the sheet metal installation, though not specifically indicated or specified, shall be provided. Where sheet metal abuts or extends into adjacent materials, the juncture shall be executed in a manner to assure weathertight construction. Factory fabricated components such as flashings, gutters, downspouts, premolded closures and heads shall be packed in cartons which are marked with the manufacturer's name or trademark. Bulk materials from which items are field fabricated shall have manufacturer's name or trademark printed or embossed at frequent intervals to permit easy identification. Steel pipe downspouts are specified on drawings.

7.3 Shop Drawings

Shop drawings showing complete erection layouts, details, and installation instructions shall be submitted. Details and layouts shall show weights, gages, or thicknesses of sheet metalwork, joining, expansion-joint spacing, and procedures to be followed during installation. The Contractor shall be responsible for any errors of detailing and fabrication and for the correct fitting of sheet metalwork. Scaled catalog cuts may be submitted for factory fabricated items. Shop drawings shall be provided for the following items:

Gutters.

Flashing
Downspout head.

7.4 Materials

Materials shall conform to the respective specifications and other requirements specified below.

7.5 Aluminum Alloy

7.5.1 Sheets: ASTM Standard B209-74, either 3003, 3004, Alclad 3003, Alclad 3004, or Alclad 3005; appropriate temper, unless temper is specified herein.

7.5.2 Extrusions: ASTM Standard B221-75, alloy 6063, temper T5.

7.5.3 Rivets: ASTM Standard B316-75, alloy 1100, 5052, 5056, 6053, or 6061; appropriate temper unless specified.

7.5.4 Screws, bolts, nuts and wire: ASTM Spec. B211-75, alloy 1100, 5052, or 6061; appropriate temper, unless otherwise specified.

7.6 Sealing Compound

7.6.1 Sealing compounds referred to herein are specified in Section 11, Moisture Protection.

7.7 Fastening materials not specified for a particular sheet metal application shall be of the type best suited for the intended purpose. Aluminum rivets, screws, bolts, and nuts, shall be used for fastening aluminum items. Stainless steel fastenings shall be used for connecting dissimilar metals.

7.8 Material Thicknesses

The nominal thickness shall be not less than specified for the item in Table I

TABLE I. SHEET METAL THICKNESSES

<u>Item Description</u>	<u>Aluminum, inch</u>
Downspout heads	.032
Strainers, wire diameter or gage	.144 dia.
Flashings	.050
Gutters:	
Gutter section	.032
Hangers	1"x1"
Cover plates	.032

7.9 Protection of Aluminum

7.9.1 Aluminum that will be in contact with wet or pressure-treated wood, concrete, or ferrous metals shall be protected against galvanic or corrosive action by one of the following methods:

7.9.2 Contact Surface. Aluminum surfaces to be protected shall be solvent cleaned and given a coat of zinc-chromate primer and one coat of aluminum paint.

7.9.3 Non-absorptive tape or gasket shall be placed between the adjoining surfaces and shall be cemented to the aluminum surface using a cement compatible with aluminum.

7.9.4 Type of Joints

Joints consist of locked, lapped, butted, and riveted types. Aluminum 0.040 inch or less in thickness shall be either lapped for expansion joints or lock joined, riveted, and filled with hard setting sealant. Table II herein indicates the types of joints to be used and the sealants required.

TABLE II. SHEET METAL JOINTS

<u>Item Designation</u>	<u>Types of Joint Aluminum</u>	<u>Remarks</u>
Flashing	Butt	None
Gutter	1-inch flat locked, riveted and sealed	Aluminum producers recommend hard setting sealant for locked aluminum joints

7.9.5 Fastenings

7.9.5.1 Connection of sheet metal shall be confined generally to sheet metal having a width of less than 18". Nailing of flashings shall be confined to one edge only. Nails shall be evenly spaced not over 3" on centers and approximately 1/2" from edge unless otherwise specified or indicated.

7.9.5.2 Bolts, rivets, and screws shall be installed where indicated or required to conform with Mobile Building Code wind loads for walls and roof.

7.9.6 Riveting, Seaming, and Sealing

7.9.6.1 Riveting shall apply to either metal as specified.

7.9.6.2 General. Joints in aluminum sheets 0.040 inch or less in thickness shall be made mechanically and sealed with the sealant specified. Aluminum shall not be soldered.

7.9.6.3 Seams shall conform to the following requirements:

7.9.6.4 Flat-lock seams shall finish not less than 1" wide.

7.9.6.5 Flat seams shall be made in the direction of the flow.

7.9.7 Samples

Samples of materials proposed for use shall be submitted to the Engineer on request.

7.9.8 Handling and Storage

Sheet metal items shall be carefully handled to prevent damage to the surfaces, edges, and ends, and shall be stored at the site above the ground in a covered, dry location. Damaged items that cannot be restored to like-new condition will be rejected and shall be replaced at no additional cost to the Owner.

7.9.9 Downspouts

Downspouts shall be 204 stainless steel or galvanized. Downspouts shall be supported adequately to prevent wind deflection and/or any deflection from wall.

7.9.10 Gutters

Gutters shall be rectangular type of 304 stainless steel or galvanized. The rear side of the gutter shall be not less than ½" higher than the opposite side. Openings in gutters shall have outlet tubes flanged, locked and riveted to gutters. Outlet tubes shall conform to the size and shape of the steel pipe downspouts and shall extend not less than 3" into downspouts. Outer edge of gutter shall be provided with bar reinforcement. The gutter shall be supported from below by brackets spaced 36" on centers. Attachment of brackets to gutter shall be such as will permit expansion and contraction of gutter. Gutters shall be reinforced at top by spacers placed mid-point between supporting brackets. Support brackets shall be secured to wood nailer with two wood screws or shall be nailed with screw type nails into wood nailer. Gutters shall be hung with high points

equidistant from downspouts and shall have a slope of not less than $1/16$ " per foot. Joints shall be made as hereinbefore specified. Gutter expansion joints shall be spaced as required. Expansion joints shall provide at least a 1" space between end baffles of gutters, which space shall be closed with a cover plate having a loose-locked slip joint conforming to the gutter manufacturer's recommendations. Cover plate shall conceal the 1" space between gutter faces and bottom of gutters.

7.9.11 Expansion Joints

Expansion and contraction joints for sheet metal shall be provided at 32-foot intervals for aluminum, except that where the distance between the last expansion joint and the end of the continuous run is more than half the required interval spacing, an additional joint shall be provided. Joints shall be evenly spaced.

7.9.12 Flashing

Continuous flashing shall be provided where indicated at the corners of all siding and along the eaves of all metal roof decks. Sheets shall be fabricated without longitudinal joints. Provisions for expansion shall be provided at joints. Factory fabricated internal and external corner units with mitered joints shall be provided. Roof eave flashing shall be installed to extend below the supporting construction to form a drip and to allow the flashing to be hooked over the lower edge at least $3/4$ ". The strip shall be of sufficient bearing area to insure a rigid installation.

05530 - GRATINGS-BAR GRATINGS AND FLOOR PLATES

- 1.0 Unless otherwise noted, grating shall be galvanized standard rectangular pattern, welded steel grating, with 1" x $3/16$ " bearing bars W/L spacing, and fastened to structural steel with galvanized clamps. The grating clips shall be manufactured by IKG Borden or equal specifically for the W/L spacing grating. The clips shall be installed in the manner and quantity as recommended by IKG Borden.
- 2.0 No penetration of steel will be allowed by grating galvanized clamp connectors.
- 3.0 No tack welding of grating will be allowed.
- 4.0 Each piece of grating shall be banded on all sides with galvanized flat bar of the same depth as the grating and $3/16$ " thickness.
- 5.0 Care shall be taken not to cut grating after galvanizing has been applied. If field modification of the grating is required, then the grating shall be tool cleaned as required by SSPC SP 1/2/3 after cutting. After surface preparation has been completed, "Spray-Galv." (Anchor Brand), as manufactured by Dynaflux Co., Cartersville, Ga., shall be applied as required per manufacturer's recommendations. Minimum dry film thickness to be 2.5 mils achieved in minimum of two applications.

- 6.0 If modification of in-place grating is required, and the modification falls on a structural member, then grating shall be removed for modification, modified as required, and replaced back into position. If removal of the grating is not possible, then torch cutting will be permitted with the following stipulations: the angle of the cutting torch shall be as close to parallel to the structural member below to avoid blistering or blackening of the paint below. After grating modification is complete, the grating shall be repaired per Section 10.4.5. The structural member below shall be touched-up as required (see Section 11.5.4 under Section 8A).
- 7.0 All openings in grating greater than 6" diameter or 6" square shall be banded with continuous 3/16" flat bar and shall extend 4" above top of grating. Location of all openings through gratings shall be coordinated with the respective trade requiring the opening, prior to fabrication.
- 8.0 Floor Loadings
- | | |
|---------|---------------|
| Live = | 100 psf |
| Dead = | 10 psf |
| Susp. = | <u>20 psf</u> |
| Total | 130 psf |
- 9.0 Deflections
- 9.1 Less than 1/8" under floor load (130 psf). The Contractor shall provide additional secondary structural members as grating supports for all spans greater than 48" center to center. The detailer shall include the additional members in the shop drawings for review and approval by the Engineer.
- 9.2 Gratings, where indicated, shall be removable or hinged and shall be arranged in sizes to be readily lifted. Frames to receive the gratings shall be fabricated of structural shapes by welding with exposed welds ground smooth. Both the frames and the gratings shall finish flush with the adjacent floors.
- 9.3 Grating shall be fabricated in panels of sizes suitable for delivery and installation, and shall be secured in place by bolted galvanized clips as approved or indicated on the design drawings.
- 9.4 All grating shall receive a hot-dip galvanized coating after fabrication.
- 9.5 Floor plate shall be commercial grade carbon steel with skid resistant raised pattern. The plate shall have a nominal thickness of 1/4" and shall be reinforced with angles as shown on the drawings.
- 9.6 Floor plate shall be hot dipped galvanized after fabrication with angle stiffeners and flat bar bearing block.

SECTION 6 – NOT USED**SECTION 12 – NOT USED****SECTION 13 – SPECIAL CONSTRUCTION****13010 FENDER SYSTEM– MOLDED ARCH FENDERS****1.0 SCOPE OF THE WORK**

The work included under this Section shall consist of furnishing all labor, tools, equipment, materials, services, and supervision necessary for the complete supply and installation of all fenders, as specified herein and indicated on the drawings.

2.0 FENDERS

2.1 Fenders shall be molded of rubber, homogeneous and free from any defects, impurities, pores or cracks, bonded to integral, steel-mounting plates. The steel shall be fully encased in rubber with a minimum thickness of $\frac{1}{16}$ ". Each fender shall exhibit the following performance at horizontal berthing angles of up to 6°.

- | | | |
|-------|---------------------------------|--------------|
| 2.1.1 | Minimum Energy Absorbed | 100 ft.-kips |
| 2.1.2 | Maximum Reaction @ Above Energy | 90 kips |

2.2 The maximum allowable standoff, undeflected, is plus $\frac{1}{2}$ inch. Minimum undeflected stand off shall be less 0 inches.

2.2.1 Fender Rubber. The rubber from which the fenders are molded shall be natural or synthetic conforming to one of the following ASTM D2000 line callouts:

3BA 720 A₁₄, B₁₃, C₁₂, EA₁₄, F₁₇, G_{11A}^A
 3BA 620 A₁₄, B₁₃, C₁₂, EA₁₄, F₁₇, G₁₁
 A-G₁₁ Acceptance Requirement is 250 ppi, Min.

2.2.2 Fender Steel. The integral, steel mounting plates shall be of ASTM A36, or stronger, steel. All steel shall be hot dipped galvanized.

2.2.3 Fender Attaching Bolts. Bolts shall be of size and quantity recommended by fender manufacturer. Bolts shall be A307, galvanized per ASTM A153 or B695. Nuts shall be A563, grade A heavy hex, galvanized per ASTM A153 or B695. Washers shall be standard ANSI B18.22.1 of carbon steel, galvanized per ASTM A153 or B695.

2.2.4 Concrete Embedments. Concrete embedments shall have 316 stainless steel, female threads and be designed to have a minimum pullout strength, assuming

4000 psi concrete, 1.25 times greater than the breaking strength of the male thread.

3.0 QUALITY CONTROL

3.1 Performance curves. Submit certified performance curves for each different fender supplied.

3.2 Certifications. Submit certified test report or certificate of conformance or compliance, furnished by the manufacturer’s testing laboratory or independent testing agency, attesting that each product or material furnished under this specification meets the requirements herein.

3.3 Certified test report or certificate shall be furnished for:

- 3.3.1 Rubber Compound
- 3.3.2 Steel
- 3.3.3 Bolts, Nuts and Embedments
- 3.3.4 Galvanizing

3.4 Shop Drawings. Shop drawings or catalog cuts indicating materials, dimensions and anchor locations shall be furnished.

3.5 Manufacturer Qualifications. Manufacturer of molded arch fenders shall have been in the business of manufacturing molded/bonded, buckling-type, rubber marine fenders for at least 10 years and show proof of three installations, each having been in service at least three years.

3.6 For composite arch systems submitted in lieu of molded systems the following specification shall apply.

3.7 Fenders. Each fender shall consist of one or more molded rubber element(s) and attached UHMW contact panel(s) and exhibit the following performance at horizontal berthing angles of up to 6°.

Minimum Energy Absorbed	100 ft.-kips
Maximum Reaction @ Above Energy	90 kips

3.8 Each fender shall be capable of absorbing a horizontal shearing force equal to 30% of its rated reaction, while simultaneously absorbing the above-defined minimum energy without exceeding the above-defined maximum reaction.

3.9 Rubber Fender Elements. Elements shall be molded of rubber, homogeneous and free from any defects, impurities, pores or cracks, bonded to integral, steel mounting plates. The steel shall be fully encased in rubber with a minimum thickness of 1/16”.

3.9.1 Fender Element Rubber. The rubber from which the elements are molded shall be natural or synthetic conforming to one of the following ASTM D2000 line callouts:

3BA 720 A₁₄, B₁₃, C₁₂, EA₁₄, F₁₇,
3BA 620 A₁₄, B₁₃, C₁₂, EA₁₄, F₁₇,

3.9.2 Fender Element Steel. The integral, steel mounting plates shall be of ASTM A36, or stronger, steel.

3.10 Contact Panel(s). The attached contact panel(s) shall provide a low-friction, non-sparking protective facing, have a minimum wear thickness of ½ inch and be made of UHMW polyethylene with 2 ½% UV-stabilization compound and having UV-stabilized dyes, conforming to the following specifications:

Property	Test Method	Acceptance Requirement
Molecular Weight		3.0 million, min.
Ultimate Tensile Strength	ASTM D638	4000 psi, min.
Izon impact, double notch	ASTM D256A	18 ft.-lbs/in. min.
Abrasion wear (Carbon stl = 100)	Sand Slurry	18 max.
Water Absorption	ASTM D570	Nil
Coefficient of Friction	ASTM D1894	.20 max

3.11 The contact panel(s) shall be attached to the element(s) with ¾" inch or larger bolts, have at least 1-inch thickness under the bolt heads or nuts and have at least a ¾ inch x 45° chamfer along their outside edges.

3.12 Panel Attaching Bolts. Bolts shall be of size and quantity recommended by fender manufacturer. Bolts shall be A307, galvanized per ASTM A153 or B695. Nuts shall be A563, grade A heavy hex, galvanized per ASTM A153 or B695. Washers shall be standard ANSI B18.22.1 of carbon steel, galvanized per ASTM A153 or B695.

3.13 Concrete Embedments. Concrete embedments shall have 316 stainless steel, female threads and be designed to have a minimum pullout strength, assuming 4000 psi concrete, 1.25 times greater than the breaking strength of the male thread.

4.0 QUALITY CONTROL

4.1 Performance Curves. Submit certified performance curves for each different fender supplied.

4.2 Certifications. Submit certified test report or certificate of conformance or compliance, furnished by the manufacturer’s testing laboratory or independent testing agency,

attesting that each product or material furnished under this specification meets the requirements herein.

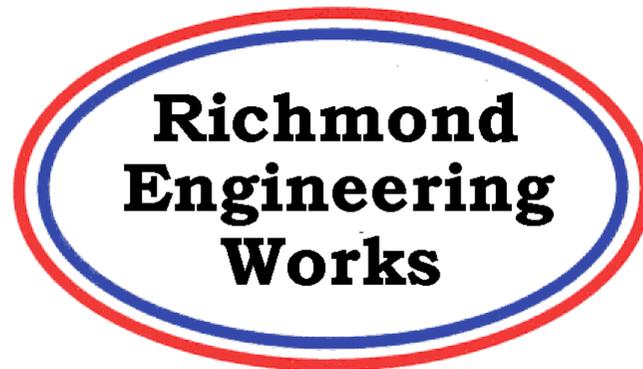
4.2.1 Certified Test Report or Certificate shall be furnished for:

- 4.2.1.1 Rubber Compound
- 4.2.1.2 Steel
- 4.2.1.3 UHMW polyethylene
- 4.2.1.4 Bolts, nuts and embedments
- 4.2.1.5 Galvanizing

4.2.2 Shop Drawings. Shop drawings or catalog cuts indicating materials and dimensions shall be furnished for:

- 4.2.2.1 Fender Assembly
- 4.2.2.2 Concrete Embedments and Setting Plan
- 4.2.2.3 Fender Element(s)
- 4.2.2.4 Contact Panel(s)

4.2.3 Manufacturer Qualifications. Manufacturer of "Lo-Friction" V-Fender shall have been in the business of manufacturing molded/bonded, buckling-type, rubber marine fenders for at least 10 years and show proof of three installations, each having been in service at least three years.



ALABAMA STATE PORT AUTHORITY

McDuffie Coal Terminal

Mechanical Installation and Commissioning Manual

Alabama State Port Authority Project #10873

Richmond Engineering Works # SO3828

November 3, 2023

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Installation and Commissioning Manual

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I. PROJECT DESCRIPTION

Alabama State Port Authority (ASPA) is replacing the existing single barge pulling system with a Dual Barge Shifter Arrangement for barge unloaders BU1 and BU3. Richmond Engineering Works (REW) has been contracted to provide the design and supply of equipment for these systems. REW will also provide on-site technical assistance during the installation and commissioning of the equipment.

Barge Haul Drives

Each Dual Barge Shifter will consist of two (2) barge haul drive winches, sheaves, sag rollers, wire rope and equipment for moving two (2) barges through the unloader. The wire ropes will connect the barge haul winches to the shifter barge which will be pulled through the barge unloader. The loaded barges will be attached to the shifter barge for unloading.

Shifter Barge

A Shifter Barge is provided for moving the barges through the barge unloader. The shifter barge will be completely fabricated and assembled when it is brought to the terminal. The shifter barge will need to be moved into position and connected to the barge haul ropes.

Cable Reel

A new cable reel is provided to supply power to the shifter barge to operate the shifter barge hydraulic deck winches. The cable reel, cable guide, and their support frames are to be assembled on the barge unloader. The cable will be shipped on a separate spool and will need connected to the reel and the shifter barge.

II. RECEIVING AND STAGING EQUIPMENT

The mechanical contractor is responsible for unloading supplies and equipment (fabricated steel, parts, and supplies), on site handling and security of supplied equipment and materials on jobsite. This includes, but is not limited to, furnishing tools, material and labor to protect the mechanical and electrical equipment from weather related damage/corrosion, damage that may occur during hoisting and shoring, and securing worksite from normal operation's traffic until the equipment is installed and accepted by the Owner.

The barge haul equipment will be shipped to the site via truck. Approximately eight (8) trucks will arrive to site to deliver the equipment for both systems.

The contractor will be responsible for supplying all labor, rigging, lifting equipment, cranes, cribbing, etc., for unloading the trucks. The equipment is to be staged and protected until assembly. The contractor is to provide all dunnage, tarps, temporary shelters or other protection for the equipment. The contractor is to work with the owner to determine a viable laydown area and/or an enclosed area for the fabricated and electrical equipment.

- a. Fabricated steel parts may be stored outside. Contractor is to provide means to avoid or disperse any water collecting on the parts. Tarps should be used to protect the equipment from the elements and water collecting on the equipment.
- b. Electrical components are to be stored in an enclosed space, protected from weather. It is preferred that control enclosures and drive panels be stored in a climate-controlled space.

The contractor shall be responsible for moving all equipment from the laydown or storage areas to the assembly areas and ultimately to the erection area.

***The contractors, mechanical, electrical and hydraulic, are responsible to ensure all employees are safety trained, all LOTO procedures are followed and will need to verify with the owner that all equipment is locked out prior to any work on the barge haul systems.**

III. MECHANICAL INSTALLATION

A. BARGE HAUL DRIVES

1.0 Drive Base Installation

Prior to any demo, disassembly or construction work, the contractor is responsible for establishing monuments for the project based on the barge unloader centerlines. Monuments shall be placed on the concrete dock. Locations shall be determined for best reference by contractor and owner. A legend of all monuments shall be documented by the contractor and provided to the owner for future reference. Monuments are to be permanent and will remain for future reference. **ALL** installation work will be based on the centerline monuments and drawing dimensions. Any existing monuments must be verified and approved for use by the owner and engineer. Any rejected monuments are to be destroyed.

The existing barge haul drive bases are to be removed from the dock. The wire ropes are to be removed from the system and the existing tow barge shall be removed from the water. All fluids from gearboxes, etc., are to be collected by the contractor for off-site disposal. The contractor is to work with the owner for proper disposal.

The drive base area shall be completely cleaned and prepped for new anchor bolts. The concrete is to be drilled and new anchor bolts set in place per the drawings. Shear key pockets will require sawing/jackhammering of existing concrete per drawing details.

The barge haul drive bases will arrive at the site assembled and aligned with the rope drum, reducer, motor and brake. The drive bases are to be set in place on the new anchors, leveled and bolts torqued to the drawing specifications. Forms for epoxy grout shall be used to provide a clean installation. Grout, anchors and epoxy are to be provided by the contractor and shall be supplied per REW specification as referenced on the drawings.

The contractor/contractors are to work with the owner for proper disposal of all fluids and existing equipment.

2.0 Sag Rollers and Sheaves

The existing sag rollers and sheaves are to be removed from the dolphins and cells.

The sag rollers, the 3-pile dolphins shall be completely cleaned and prepped for new anchor bolts. The new anchor bolts can then be set in place per the drawings, leveled and properly secured according the drawing specifications.

The sag rollers will have different arrangements based on their location. The support bases are to be assembled and set in place on the new anchors, leveled and properly secured according to the drawing specifications. The assembly of the roller supports are modular and adjustable and shall be set to be tangent to the haulage rope. Rollers shall not carry any directional force by lifting the rope from its straight-line trajectory between the sheave and drum.

The existing sheave cells will be abandoned or demolished in accordance with the civil plan. New cells for the sheave support towers shall be installed in accordance with civil drawings. The cells shall have anchors cast in place according to REW drawings. The concrete will require tension and shear reinforcements and shall be designated on the civil plans.

3.0 Rope Reeving and Installation

The new wire rope is to be installed and connected to the barge haul drives and shifter barge. Reeving and dead wrap details shall be followed in accordance with the drawing specifications.

Care of the ropes during installation is crucial such that no kinks or fraying is caused. Any damage to the ropes will require replacement of the entire segment.

Wire ropes shall receive a penetrating lubricant suitable for exposure to marine environments.

4.0 Cable Reel and Guide

A new Cable Reel is to be installed near the top of the barge unloader structure. A new support base is provided.

The installation sequence shall be as follows:

- a. Assemble the cable reel support base.
- b. Lift and install the support base onto the barge unloader structure.
- c. Assemble the cable guide and support structure.
- d. Lift and install the cable guide to the barge unloader structure.
- e. Assemble the cable reel.
- f. Lift and install the cable reel onto the support platform.
- g. The new shifter barge power cable is to be installed onto the reel and wrapped completely onto the spool. The electrical contractor is to assist and make the cable connections.
- h. Pull cable off of the reel and install into the tower on the shifter barge. The electrical contractor is to assist and make the cable connections.

5.0 Manual Lubrication

- a. The contractor is responsible for supplying all grease for the equipment.
- b. The contractor is responsible for manually lubricating all lubrication points shown on the lubrication drawing. The contractor is to review the lubrication drawing to ensure the proper grease is purchased for each lubrication point. All grease points shall be greased until grease is visible coming out of pins and bushing areas or per manufacturer's specifications.
- c. The contractor is responsible for the purchase and first fill of all reducer oils and/or equipment that is required to have fluids filled with the exception of the HPU. The following types and quantities are expected:
 - (4) Barge Haul Gearbox – ISO320; 42.3 gallons each

IV. COMMISSIONING

The information contained in this document is considered confidential and proprietary to Richmond Engineering Works and shall not be disclosed to other persons without express written consent of Richmond Engineering Works.

The installation contractor shall not proceed with any commissioning prior to the owner's acceptance of the installation and the entire commissioning team is on site.

Commissioning shall involve the owner, installation contractor and its sub-contractors (as required) and the REW field representative. These personnel will be referred to as the commissioning team.

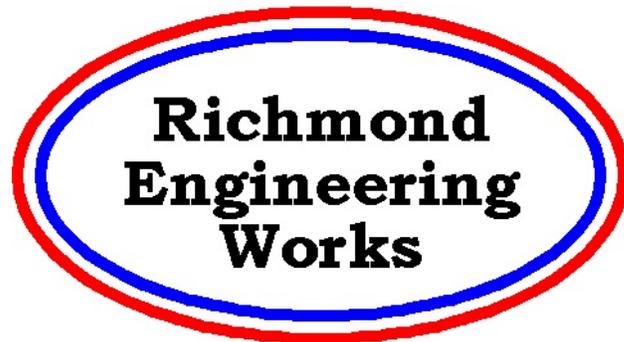
PERFORMANCE TEST

The performance testing is to verify the operation of the entire system working together. The HMI should be used for operation.

The system will be operated with material. The first barge will be used to test the operation and make adjustments to the system under load. The system should be operated as normal and stopped as needed to make adjustments.

V. ATTACHMENTS

- **Barge Haul System General Arrangement Drawings**
- **Foundation Anchor Bolt Layout Drawings**
- **Estimated Barge Haul Equipment Weights**
- **Bolt Torque Table**
- **Standard Paint Specification PS-4**
- **Equipment Storage Procedure**
- **General Specification for Fabrication and Assembly**



An American Engineering Company

**GENERAL SPECIFICATION FOR
FABRICATION AND ASSEMBLY**

Rev. 2

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GENERAL FABRICATION AND ASSEMBLY SPECIFICATION

REVISION PAGE

ISSUE NO.	DATE	REVISION	ISSUED BY
0	4/5/17	INITIAL ISSUE	B. FRATANGELI SR.
1	9/7/17	REVISIONS	KIMBERLY JUDY
2	8/17/18	UT testing	B.FRATANGELI SR.

1) GENERAL REQUIREMENTS

This specification is designed to describe and define the mechanical fabrication and assembly requirements for items, components, and equipment described in the purchase order document(s). In this specification, Richmond Engineering Works will be referred to as Richmond Engineering Works or REW. The supplier, fabricator, machine shop, assembling, and/or the shop painting contractor will be known as the FABRICATOR. The fabrication and machining of the various component and/or components for equipment, any assembly, and painting of same shall be completed in the FABRICATOR'S facility. Prior to the onset of manufacturing and/or anytime during the manufacturing process, the FABRICATOR is invited to contact Richmond Engineering Works to schedule a meeting at REW's office in Pittsburgh, Pennsylvania to discuss in further detail, the scope of work or requirements of the purchase order contract. The fabricator must detail any special conditions on which their price is based. The fabricator shall, in detail, list all processes the fabricator is considering taking exception to and reasons for the exceptions.

2) SPECIFICATIONS AND STANDARDS

The FABRICATOR shall be responsible for adhering to applicable sections of industry standards using the latest edition or addendums of the specifications listed below. Fabrication and assembly shall be in accordance with the following specifications:

- AFBMA - Anti-Friction Bearing Manufacturers Association
- AGMA - American Gear Manufacturer Association
- AISC - American Institute of Steel Construction
- ANSI - American National Standards Institute



- ASME - American Society of Mechanical Engineers
 - ASTM - American Society for Testing and Materials
 - AWS - American Welding Society - Structural Welding Code D1.1 Clause 1 through 7 and 9
 - OSHA - Occupational Safety and Health Administration
 - MSHA - Metal and Nonmetal Mine Health and Safety Standards
 - SSPC - Steel Structure Painting Council - Steel Structures Painting Manual Volume 1 and Volume 2 - SSPC-SP 3-Latest Issue - Power Tool Cleaning - SSPC-SP 6-Latest Issue - Commercial Blast Cleaning
- ❖ Wherein there may be conflict between the standards and codes specified, the most restrictive of those standards shall apply and take precedence over all others.
- ❖ Wherein there may be conflict with the standard codes specified and these specifications, these specifications shall take precedence and apply.
- ❖ It shall be the responsibility of the bidder to secure and acquaint themselves with the aforementioned standards and codes prior to the preparation of manufacturing. Ignorance or lack of understanding of these standards and codes will not be accepted by REW as a basis for claims for cost adjustments and/or failure to comply.

3) SCOPE OF FABRICATION

- a. The work covered by this specification shall consist of furnishing of all necessary materials listed on the drawings bill of materials (B.O.M.), except as noted in the purchase order, completing the fabrication, machining, any shop assembly, testing, surface preparation, painting, and preparing components for shipment. Shipment will be negotiated during the inquiry stage.



GENERAL FABRICATION AND ASSEMBLY SPECIFICATION

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- b. It is the intention of this specification that the FABRICATOR furnish, assemble, and ship all items shown on the drawings bill of materials (B.O.M.) unless specifically noted otherwise in the purchase order. If at any time the FABRICATOR is unclear about the scope of work or requirements of the purchase order contract, the FABRICATOR shall contact REW promptly to review and confirm any questions, comments and/or concerns of work supplied. Any items that will be furnished by others, but assembled by the FABRICATOR, the items are to be inspected and tagged as such at the time of receipt. If the FABRICATOR feels the items(s) received are not the correct kind or quantity, the FABRICATOR is to notify REW promptly of the discrepancy.
- c. It is the responsibility of the FABRICATOR to familiarize themselves with all specifications and standards mentioned in these specifications.
- d. If the FABRICATOR discovers a discrepancy with drawing details, general arrangement, and/or assembly drawings, The FABRICATOR shall promptly notify REW of the discrepancy so it can be reviewed and resolved with minimum of lost time and extra expense.
- e. All assemblies shall be properly aligned, leveled etc. as shown on drawings and in accordance with any manufacturer's recommendations. All components of an assembly shall be fastened firmly and/or torqued properly with bolts and permanently located as shown on the drawings.
- f. The FABRICATOR shall be responsible for implementing a quality assurance and quality control program to assure REW and REW's customer that compliance with the purchase order contract requirements are being followed and to assure quality products are being produced. The FABRICATORS effort is to be directed toward compliance with the requirements of engineering design, material compliance, and proper material preparation, proper machining practices and acceptable



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workmanship standards. The quality control program shall include "in process" and final inspections on major components and subassemblies along with a percentage of secondary components/items in order to verify conformance with drawings designs and manufacturing specifications such noted in this specification.

- g. Visual inspections shall be conducted to verify: burning, shearing, forming, surface preparation prior to painting, paint application including measurement of film thickness and any other special testing as specified in the drawings and specifications and work is meeting the quality standards.
- h. Dimensional measurements shall be performed to assure fabricated, machined, and assembled components conform to the drawing design and manufacturing specifications. Documented measurements shall be a part of the quality control program. All documented measurements shall be submitted to REW at the time of request. Photographic support may also be requested by REW as reinforcement of the manufacturing process and/or procedures.
- i. The FABRICATOR will permit free access to their facility by REW and REW's customer for inspections or expediting during the manufacturing process.
- j. Should there be any rejections in the fabrication, machining, assembly, painting, or packaging, the rejections will be repaired and/or replaced at the FABRICATOR'S expense.
- k. Certified test reports shall be required for all shafting, mild carbon steel plate, high carbon and alloy steel plate. All material testing must be in accordance with the American Society for Testing and Materials (ASTM) Standard 370-76. The test reports shall certify all physical and metallurgical properties specified on the REW's drawings, specifications or purchase order meet or exceed the standard requirements for that particular



material. Any deviation request MUST be reviewed and approved by REW prior to use. All material specified to a Brinell Hardness shall be hardness tested by the material manufacturer or by an accredited testing agency at the FABRICATOR's expense. Acceptance of the material will be approved only if within the REW specified limits. Any deviation acceptance will need to be reviewed on a case by case basis by REW's Engineering department. Forgings and castings, if purchase by the FABRICATOR, shall be clean, free from cracks, any inclusions, holes, warpage, flaws, excessive shrinkage, or laminations. The material shall be wholly sound. No welding or other like process shall be used for repairing defects without special permission from REW. All repair requests from the FABRICATOR must be in writing detailing a procedure for repair. REW reserves the right to review each procedure for acceptance. All material certifications for material used in forgings and castings (if supplied by FABRICATOR) shall be furnished to REW for review and acceptance.

- l. All lubricants for shop testing and shipment of units shall be provided by the FABRICATOR unless otherwise agreed to prior to the start of manufacturing.

- m. All assembled units are to be shop tested unless otherwise specified. All material and labor for shop testing are to be supplied and installed by the FABRICATOR unless otherwise specified.

4) FABRICATION AND WORKMANSHIP

- a. All parts shall be fabricated with a highest level of workmanship and accuracy in accordance with the drawings. Industry standard shop practices shall be enforced and all components neatly finished. All materials purchased shall be new and within industry standards. All welded joints shall be suitably cut or beveled in accordance with AWS D1.1 latest edition and/or the drawing design. All joints shall be properly aligned



and fitted, and shall be free from any excess oil, grease, paint, moisture, or other foreign material prior to welding which would prevent a sound weld. Welds shall be of sound quality and within the visual criteria of AWS D1.1 table 6.1(cyclically loaded non-tubular connections); free from excessive undercut, undersize welds, lack of fusion, porosity, crater cracks, weld cracks, and excessive concavity. All welding shall be performed with certified welders in accordance with AWS D1.1 criteria (Clause 3 and Clause 4) and all fabrication, and welding performed within the criteria of AWS D1.1 and/or REW's drawing design, using acceptance criteria for cyclically loaded structure.

- b. Machinists, fitters, welders, and general assemblers shall be certified for the type of work to be performed.
- c. Workmanship shall be of first class quality, equal to the most current shop practices in fabrication, and machining. Straightening of sharp kinks or bends in members shall be cause for rejection. Surfaces of rolled shapes to which plates are to be attached shall be straight and true to the normal axis of the member and sub-members necessary to meet this requirement before fabrication.
- d. Shearing shall be accurately done, and all edges of the work neatly finished. All sharp edges shall be removed prior to welding. Corners shall be square and true unless otherwise noted on the drawings. Where heating is required, precautions shall be taken to avoid overheating the metal and it shall be allowed to cool in such a manner as not to destroy the original properties/integrity of the metal. Repaired Steel by welding will not be accepted, except where welding is definitely specified on the drawings, or otherwise approved by REW.
- e. All bolts, nuts, and screws shall be tight and torqued properly to the specified values listed in REW's bolt torque specification and/or drawing requirements.



- f. All attachments for shop handling such as welded lifting lugs must be approved by REW. No shop handling/lifting device shall be permitted on final assemblies unless prior approval by REW.
- g. Dimensions shall be measured by means of approved calibrated measuring devices of the same temperature as the structure at the time of measurement. The FABRICATOR shall be responsible for all manufacturing errors in fabrication and machine components.
- h. Low carbon structural steel may be cut by machine guided or hand guided torches instead of by shears or saws. Where a torch is mechanically or hand guided, all slag, sharp edges, burn gouges shall be removed. All burn gouges that will be exposed or visible shall be ground smooth or machined to sound metal. No burrs or rough edges shall be permitted.
- i. The FABRICATOR will follow the manufacturers recommended practices for cutting of high carbon or alloy steels.
- j. The material used for manufacturing shall be as specified on the drawings bill of material (B.O.M.). Material substitutions or any deviation from the drawings must be submitted to REW for review and approval no exceptions.
- k. Bolt holes may be punched or drilled full size. Material with a thickness greater than the nominal size of the bolt plus 1/8" shall be drilled or sub-punched and reamed. Holes shall be smooth free from stress risers, perpendicular and cylindrical. Bolt holes shall be 1/16" larger than the nominal diameter of the bolt, unless otherwise specified by REW. Burning of bolting holes is NOT permitted unless prior approved by REW. Poor matching of holes in adjoining assemblies will be cause for rejection.
Layout of all bolting holes shall be located from true center of the



structure working outward. All center distances of bolting holes shall be accurately located on centers as indicated on the detail drawings.

- I. Pin bores shall be true to size and within the drawing required dimensional tolerances, accurately located and line bored where so indicated on the drawings.

5) WELDING

- a. Welding, unless otherwise specified, shall conform to the applicable criteria of the American Welding Society (AWS) D1.1, latest edition, using acceptance criteria for cyclically loaded structures. Welding operators, welders, and tack welders, shall be qualified for the particular type of work according to the applicable code of the American Welding Society (AWS) D1.1, latest edition. All welding operators, welders, and tack welders welding certifications shall be submitted to REW's quality department for review, approval, and retention.
- b. Ultrasonic testing of welds shall be performed in accordance with the American Welding Society (AWS) D1.1 – Latest Edition, Table 6.3 (Cyclically Loaded Nontubular Connections). All reporting documentation shall note the applicable code and criteria to which it was tested.
- c. Ultrasonic testing of tubular structures shall be performed in accordance with the American Welding Society (AWS) D1.1 – Latest Edition, Clause 9 section 9.27 and 9.25. All reporting documentation shall note the applicable code and criteria to which it was tested.
- d. Materials to be welded shall be tightly fit-up and rigidly held by sufficient clamps or other adequate means to maintain dimensional accuracy. Adequate precautions shall be taken to minimize lockup stresses and distortion.



- e. Welding procedures shall be established prior to fitting and welding. All welding procedures shall be submitted to REW for review prior to the start of fit-up.
- f. Each layer of weld shall be thoroughly cleaned and slag removed. This is especially necessary before multiple weld passes are deposited. Final welds shall be thoroughly cleaned, chipped, wire brushed or any other means to remove slag or any other imperfections seen in the weld.
- g. All welds shall be free from crater cracks, cracks, overlap, undercutting, feathered edges and insufficient throat or leg sizes that will be a violation of the AWS D1.1 visual inspection criteria. Any indication of incomplete fusion between the welds and base metals shall be cause for rejection or shall require that the entire weld be cut out and rewelded. Minor imperfections in welds may be chipped out and the defect rewelded. Distortions due to welding or stress relieving shall be corrected by pressing, heat straightening or other suitable means. Straightening by means of hammering is NOT permitted.
- h. Wherever there is a concern of an assembled structure or member becoming warped or distorted by localized welding stresses, the welds shall be thoroughly peened to relieve such stresses.
- i. No welding will be permitted, except where welding is definitely detailed on the approved detail drawings unless prior approved by REW.
- j. If a shop splice is required/requested by the fabricator, any and all shop splices must first be approved by REW prior to fabrication. All shop splices must be full penetration welded. All full penetration shop splices shall be Ultrasonically tested and shall be tested in accordance with the American Welding Society (AWS) D1.1 – Latest Edition, Table 6.3 (Cyclically Loaded



Nontubular Connections). All reporting documentation shall note the applicable code and criteria to which it was tested. No exceptions.

- k. Weld filler metal shall be of the proper composition to match the physical properties of the base metal. Base metal shall be preheated, as required by AWS D1.1. Full penetration welds shall be welded with the use of run off tabs where applicable. FABRICATOR shall remove run off tabs upon completion of welding.

6) WELDING AND FABRICATION TOLERANCES

- a. It is the responsibility of the FABRICATOR to control shrinkage and distortion of any fabrication, machined, and/or assembled item or component. Welding processes and procedures to control distortion must be evaluated, analyzed, and controlled by the FABRICATOR separately for each individual fabricated item or component.
- b. Dimensional tolerances for flatness, twist, squareness, and shrink shall be in accordance with all drawing notes and/or seen in the drawing tolerance block. All other tolerances not stipulated on the drawing shall be applicable with AISC 303-05, CODE OF STANDARD PRACTICES, including Chapter 6, Sections 6.4.1 through 6.4.6.
 - ❖ Where there may be conflict between the standards and codes specified, the most restrictive of those standards shall apply and take precedence over all others.
 - ❖ Where there may be conflict with the standard codes specified and these specifications, these specifications shall take precedence and apply.
 - ❖ It shall be the responsibility of the bidder to secure and acquaint themselves with the all industry standards and codes prior to the

preparation of manufacturing. **Any questionable areas of concerns shall be reviewed with REW's Engineering Department prior to the start of fabrication.**

7) HEAT TREATMENT

- a. Heat treatment requirements shall be as called for on drawings, bills of material, and/or specifications.
- b. The correct procedures, temperatures, and cooling rate shall be used to prevent cracks and to minimize distortion of the final product. Heat treatment and hardness testing shall be in accordance with the applicable code and/or specification. Certification of heat treatment, hardness, and final heat-treating properties shall be properly documented. Proper documentation shall be submitted to REW for review, acceptance, and retention.

8) STRESS RELIEVING

- a. Components requiring thermal stress relief will be stress relieved by heat treating in accordance with American Welding Society Code D1.1 (AWS D1.1), latest edition, or the American Society of Mechanical Engineers (ASME) Unfired Pressure Vessel Code. All fabrications requiring thermal stress relieving must be stress relieved after welding or before machining. Absolutely no welding will be permitted on the fabrication after thermal heat treating.
- b. Components requiring stress relieving, but is too large, may be permitted to be vibratory stress relieved. Vibratory stress relieving will be permitted only by REW's review on a case by case basis.

9) MACHINING

- a. Gearing shall be cut from solid blanks unless otherwise noted in the drawings. All gearing shall be manufactured in strict accordance with the drawings and meet the requirements of American Gear Manufacturer



Association (AGMA) for the particular AGMA Class specified on the drawings or purchase order.

- b. Machined surfaces to be in accordance with ANSI B46.1 latest edition or the latest edition of the machinery handbook "Table 1. Surface Roughness Produced by Common Production Methods".
- c. All high strength bolts, regular machine bolts and threaded holes shall be to American National Standards Institution (ANSI) standards. These requirements apply to all purchased and fabricated items. Unless otherwise noted, threaded holes shall be 2B Class.
- d. All surface finishes shall conform to those indicated on the drawings. Failure to conform to the drawings shall be reason for non-acceptance of the piece. The surface roughness standards to be used are the American Root Mean Square Standards. Values of roughness height specified are Root Mean Square average deviation expressed in micro inches. Roughness specified is the maximum value and any lesser degree shall be satisfactory unless otherwise called for on the drawings. Refer to the latest edition of the Machinery handbook.
- e. Unless otherwise noted, tolerances for machine finished surfaces designated by 3 decimal place dimensions (0.000) shall be within plus/minus 0.005", 1/64 inch for fractional dimensions and $\pm 0^{\circ}-5'$ for angular dimensions. Non-machined dimensions shall be plus/minus 1/16" maximum, unless otherwise noted.
- f. Sufficient machining stock shall be allowed to insure true and flat surfaces and 100% cleanup. Finished contact or bearing surfaces shall be true and exact to secure full contact. FABRICATOR is responsible, where applicable, for stacking dimensions to achieve fit of assembled components. If for any reason the FABRICATOR is not clear on a machining surface, bore, shaft dimensions etc... or feels that an error in design has been made, the



FABRICATOR shall promptly contact REW for clarity prior continuing with machining to avoid any delays and/or extra expense.

- g. Fabricating tolerances on weldments shall be $\pm 1/16$ inch for linear dimensions and $\pm 0^\circ-15'$ for angular dimensions.
- h. All machining shall be of the highest quality standard and of the latest or most modern means of machining practices.

10) ASSEMBLY

- a. The FABRICATOR will be responsible for furnishing all labor, equipment, and tooling for the assembly of all mechanical components as detailed in the purchase order contract and/or as detailed in the assembly drawings.
- b. Workmanship shall be of the highest quality in industry standards.
- c. All assemblies shall be visually and dimensionally inspected to ensure dimensional measurements are held within the drawing dimensional tolerances.
- d. All bolting hardware shall be torqued to the minimum requirements of REW "Bolt Torque Table" appendix "A".
- e. All lube points shall be purged with grease prior to testing. All bearings must be packed with grease prior to assembly.
- f. Coupling shall be aligned in accordance with the manufacturers recommended for parallel offset and angular offset.
- g. All rotating mechanical components and structures, pivot points and sliding surface shall be actuated and/or spun to ensure smooth and free movement.



- h. Acceptance of the assemblies will be approved only if within the REW specified limits. Any deviation acceptance will need to be reviewed on a case by case basis by REW's Engineering department.
- i. If for any reason the FABRICATOR feels that an error in design has been made, the FABRICATOR shall promptly notify REW with details of their concerns to avoid any delays and/or extra expense. The FABRICATOR shall not continue with assemblies until REW has reviewed and made a determination regarding any questions or concerns.

11) TEST AND INSPECTION

- a. The FABRICATOR shall be responsible for all testing as described in the drawings and/or purchase order to determine the conformance of materials, welding, machining and assembly, including all non-destructive testing.
- b. For shop assembled gear sets, the FABRICATOR shall test gear alignment for each backlash and tooth contact. Tooth contact shall be verified by means of bluing. 80% contact across the tooth flank shall be the minimum acceptable percent, unless otherwise specified, this when the unit is run without load. Backlash shall be verified by means of indicators or other suitable means for verifying proper backlash.
- c. The FABRICATOR shall make available to REW one (1) approved copy of structural steel mill tests reports, certified heat-treat test reports for all shafting, forgings, castings and specified plate (when required by drawings design). Any and all actual dimensional inspection checklists, inspection reports, NDT reports (provided by a certified ANST-TC-1A level II technician), thermal stress relieving reports, with heat charts, and paint reports. All copies shall be retained by the FABRICATOR for three (3) years after commercial operation of the plant and not destroyed without REW's approval. REW shall have the option of retaining these copies after this time period.



- d. In addition, based on visual inspections, when doubt exists as to the soundness of any part, the REW inspectors may require the questionable parts to be subjected to one or more non-destructive types of inspection. REW shall bear the cost of tests provided the structure or component is found to be within acceptable parameters of the applicable code or specification. However, if deficiencies are discovered, the FABRICATOR will be responsible for all correction and/or remade components at the FABRICATOR's own expense along with the expense of the NDT testing.

12) QUALITY CONTROL

- a. The FABRICATOR shall be responsible for implementing a quality assurance and quality control program to assure REW and REW's customer that compliance with the contract requirements are being followed and assure quality products are produced. The effort is to be directed toward compliance with the requirements of engineering design, material compliance, and proper material preparation, proper machining practices and acceptable workmanship standards. The quality control program shall include "in process" and final inspection on major components and subassemblies along with a percentage of secondary components/items in order to verify conformance with drawings designs and manufacturing specifications such noted in this specification.

13) LUBRICATION

- a. All bearings and equipment shall be lubricated in accordance with the manufacturer's recommendations prior to shipment and are subject to dismantling for the purpose of certifying they have been properly packed.
- b. Manual lubrication fittings, if required, are to be a ¼" standard button head type grease fitting or as noted in the drawings.



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- c. Unless otherwise specified, the following lubricants shall be properly applied to components for shop testing and also prior to shipment:

<u>Component</u>	<u>Lubrication</u>
Open Gearing	DOW Molycoat 321
Motors	See Manufacturer's Recommendations
Reducers	See Manufacturer's Recommendations
Bearings	NLGI No. 2 EP
Couplings	NLGI No. 1
Bushings/Pins	NLGI No. 2 EP

- d. All lubricants for shop testing and shipment of the units shall be provided by the FABRICATOR unless components are received by the FABRICATOR pre-lubed.

14) SURFACE PREPARATION & SHOP PAINTING

- a. Refer to REW's standard paint specification sheets, PS-1, PS-2, PS-3, PS-4, PS-5, PS-6, etc.. as required by the purchase order contact.
- b. All painting and shop preparation shall be performed in accordance with SSPC (Structural Steel Painting Council) and their manual identified as Volume 2, Systems and Specifications, latest edition, and the paint manufacturer's recommendations. In the event of a conflict, REW shall be notified, and the stricter requirement shall control.
- c. Special attention must be paid to the type and brand of paint for each application. Colors for different applications shall be noted in each individual specification and/or by customer contract requirement, which will be specified in the purchase order.



15) PACKING AND SHIPPING

- a. All complete fabrications, machined components, and/or assemblies under the purchase order contract shall be subject to expediting by REW or a REW representative. REW's personnel and/or customer shall be allowed reasonable access to FABRICATOR'S facilities and those of its sub-contracting suppliers, for expediting purposes. As required by REW, the FABRICATOR shall supply production schedules and periodic progress reports to REW's for use in expediting and inspection scheduling.
- b. Items, components, and/or assemblies shall be labeled and numbered so that each section or assembly may be identified before being uncrated or unpackaged. As a minimum, labeling shall include, but not be limited to the contract number, piece mark number, drawing number, and a brief description of the item, component or assembly being shipped. Any items not fully assembled or is a removable item shall be packaged separately, labeled accordingly and shipped, if possibly with the mating assembly.
- c. Match marks and labeling on the packaged equipment, items components or assemblies shall be tagged, permanently marked and visible or etched until equipment is received, assembled or installed.
- d. Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage, corrosion or contamination in accordance with the manufacturer's recommendations. Damaged or defective items shipped from the FABRICATOR, in the opinion of REW or REW's Customer, shall be replaced.
- e. The FABRICATOR shall have adequate means provided for lifting and for moving all packaged equipment, items, components or assemblies.
- f. Ship loose items, including bolts, shall be tagged and crated, and shipped with their corresponding units. Bolts furnished by the FABRICATOR for items not manufactured by them shall be segregated for shipment by type,



size and length. The bolts shall be boxed or crated and labeled according as noted above.

- g. All excess shims not used in shop alignment of components shall be packaged, taped together, into a partial shim packs, labeled properly with the piece mark number, drawing number, and contract number and shipped with their respective components for possible use by others during final field erection and alignment.
- h. All shim packs shall be assembled into packs as shown and noted in the drawings, taped, or wired together and labeled in accordance with the specifications noted above. Shim pack shall be shipped with their corresponding items or components where practical.
- i. All equipment and material shall be subject to inspection and shall not be shipped without final release from REW's inspection department or representative of.
- j. All components shall be carefully boxed or otherwise prepared in a manner that will prevent loss and protect them against dirt, weather, entrance of foreign matter or other damage while in transit or pre-erection storage. Shipping protection shall be adequate for at least six month's field storage.
- k. All gasket surfaces, flanged faces, and machined or polished metal surfaces and exposed threaded parts, except those designed for welding, shall be thoroughly cleaned and coated with a protective long-term rust inhibitor. All surfaces shall be protected with suitable wood, metal, or other substantial covering to ensure protection against damage during transportation.
- l. Exposed finished shafting shall also be wrapped and banded to protect the surface against scoring. Keys, where not shop assembled, shall be suitably



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taped to their respective shafts. Machined-finished surfaces and shafts shall be thoroughly cleaned of foreign matter and coated with a long-term rust inhibitor. Finished surfaces of large parts and other delicate surfaces shall be protected with wooden pads or by other suitable means.



APPENDIX A - TORQUE SPECIFICATIONS

Bolt Torque Table

All bolts in mechanical connections subject to vibration or cyclic loadings shall be tightened to the minimum torques listed in the table below.

Units : ft-lbs

Dia (inch)	Gr. 2 & A307	Gr. 5 & A325	Gr. 8 & A490	304 SS
1/2	35	80	115	45
5/8	65	160	230	95
3/4	120	290	410	130
7/8	180	470	660	200
1	270	700	980	290
1- 1/8	380	860	1400	420
1-1/4	540	1200	2000	530
1-3/8	720	1600	2600	690
1-1/2	950	2100	3400	890

Notes:

- 1) Above values are for dry uncoated steel bolts. Decrease above values by 25% for lubricated threads.
- 2) Above values are for coarse UNC threads.
- 3) Above charts does not apply to Structural Steel Connections. Structural Steel Connections must be tightened in accordance with the RCSC Specification for Structural Joints Using ASTM A325 or A490 Bolts.
- 4) Above values based on K=0.18, and 90% of proof load.



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APPENDIX B – SLIP CRITICAL JOINTS & FAYING SURFACES

Slip-Critical Joint

Slip-critical joint from [structural engineering](#), is a type of bolted structural steel connection which relies on [friction](#) between the two connected elements rather than bolt [shear](#) or bolt bearing to join two structural elements.

Shear (and [tension](#)) loads can be transferred between two structural elements by either a bearing-type connection or a slip-critical connection. In a slip-critical connection, loads are transferred from one element to another through friction forces developed between the [faying surfaces](#) of the connection. These friction forces are generated by the extreme tightness of the structural bolts holding the connection together. These bolts, usually tension control bolts or compressible washer tension indicating type bolts, are tensioned to a minimum required amount to generate large enough friction forces between the faying surfaces such that the shear (or tension) load is transferred by the structural members and not by the bolts (in shear) and the connection plates (in bearing).

If REW specifications allow the faying surfaces to remain unpainted, the surfaces must be properly prepared. Usually this requires cleaning, descaling, roughening and/or blasting of the faying surfaces.

Faying surfaces

The surfaces of materials in contact with each other and joined or about to be joined together. The faying surface of slip critical connections shall be prime coated only. Primer shall meet the minimum requirements for Class B slip coefficient and creep resistance per Research Council on Structural Connections (RCSC) (Appendix A). Other paints that do not offer a defined slip-coefficient are not permitted on the faying surfaces of slip-critical connections, even when due to inadvertent over-spray.

	<p style="text-align: center;">EQUIPMENT STORAGE PROCEDURES</p>	<p>Project No.: SO3828 Revision No.: 0</p>
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EQUIPMENT STORAGE PROCEDURES

1 GENERAL REQUIREMENTS

All equipment should be inspected prior to storage to ensure that the material/equipment has the proper protection for the duration of storage expected. The information contained herein has been prepared to identify the different storage requirements required.

If material/equipment is to be stored for a period of time prior to installation, the following procedures are recommended:

1. Indoor storage areas should be clean and dry. Storage should be off of the floor, preferably on skids, pallets or cribbing.
2. Machines surfaces should arrive with a coat of cosmoline to protect from corrosion. The cosmoline is to be removed upon installation. Unprotected surfaces should be coated with cosmoline for corrosion prevention.
3. Storage area should be free from rapid temperature changes. If necessary, an additional heat source should be used.
4. Storage area should not subject equipment to vibration.
5. Periodic recorded inspections should be made, checking the covering, any moisture present, cleanliness and general appearance. Any deficiencies should be recorded, and then corrected.
6. When outdoor storage is used, the material/equipment should be fully covered with weatherproof material, vented so as not to trap moisture, but drip-proof so the water cannot enter or splash up into it.
7. Storage must be above any possible water or snow lines.

2 ROTATING EQUIPMENT

2.1 Motors

1. Store Inside in a climate controlled area. Motors must be stored in a clean, dry, well-ventilated location free from vibration and rapid or wide temperature variations.
2. When in storage, the motor shaft must be turned several rotations monthly and the bearings re-lubricated yearly.

2.2 Reducers

1. Store inside with covered storage in a climate controlled area. Reducers must be stored in a clean, dry, well-ventilated location free from vibration and rapid or wide temperature variations.
2. When in storage, the reducer should be operated for 5 to 10 minutes every 2 months with the recommended lubricant.
3. For long term storage of 6 months or more, the reducer interior space should be filled with a vapor phase inhibitor.

2.3 Bearings

Includes components and assemblies containing bearings such as wheels and shafts. This section also applies to couplings and similar components.

1. Store Inside or Outside with Covered Storage and Blocked to prevent ground contact.

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2. Bearings stored in unprotected areas subject to rain, dust, etc, should be packed 100% full with grease. Prior to installation excess grease must be removed. Operation with bearings over-greased is likely to cause overheating and premature failure.

3 ELECTRICAL COMPONENTS

3.1 Control Panels

Includes PLC panel, VFD panels, MCC's, Junction Boxes, etc.

1. Store inside with covered storage in a climate controlled area. Electrical equipment must be stored in a clean, dry, well-ventilated location free from vibration and rapid or wide temperature variations.
2. Heaters may be needed to maintain consistent temperatures and prevent condensation inside the panels.
3. Any openings shall be completely sealed to prevent the ingress of dust or other contaminants.

3.2 Computer Equipment and HMI

Store inside in a climate controlled area. Computer equipment must be stored in a clean, dry, well-ventilated location free from vibration and rapid or wide temperature and humidity variations.

3.3 Switches and Control Equipment

Store inside with covered storage in a climate controlled area. Switches and control equipment must be stored in a clean, dry, well-ventilated location free from vibration and rapid or wide temperature variations.

4 HYDRAULIC/PNEUMATIC EQUIPMENT

4.1 Hydraulic Power Unit

Store inside in a climate controlled area. The HPU should be stored in a clean, dry, well-ventilated location free from vibration and rapid or wide temperature and humidity variations.

The HPU control room is suitable protection for the HPU and the HVAC unit can be powered temporarily to maintain temperature and prevent condensation.

4.2 Cylinders

1. Cylinders should be stored in a clean, dry, well-ventilated location free from vibration and rapid or wide temperature and humidity variations.
2. Coat the interior of the cylinder with oil and leave half-filled if practical.
3. Plug all ports to ensure foreign matter is kept out of the cylinder.
4. Store the cylinder in a vertical position if at all possible. If the cylinder must lay flat, regularly rotate the cylinder 90° to ensure seals maintain proper shape and elasticity.
5. Keep all mounting surfaces and threads either covered or coated with protective lubricant.

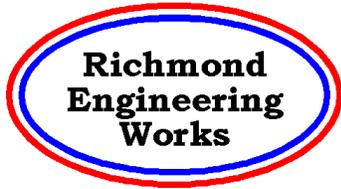
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4.3 Manifolds and Control Panels

Store inside in a climate controlled area. The manifolds and control equipment should be stored in a clean, dry, well-ventilated location free from vibration and rapid or wide temperature and humidity variations.

5 FABRICATED STEEL

1. Store Outside Covered.
2. Parts should be cribbed 12 to 18 inches from the ground on a solid surface to prevent shifting.
3. The material/equipment should be fully covered with weatherproof material, vented so as not to trap moisture, but drip-proof so the water cannot enter or splash up into it.
4. The covering must prevent the accumulation of standing water on painted surfaces. The paint will be damaged by prolonged submersion.
5. Check and clean the equipment monthly – more often during rainy periods.
6. Field Bolts should be stored inside protected from water and temperature changes that could cause condensation and corrosion.



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Standard Paint Specification PS-4

1) General

This painting specification shall be utilized where structural steel components are submerged in water. All painting and shop preparation shall be performed in accordance with SSPC (Structural Steel Painting Council) and their manual identified as Volume 2, Systems and Specifications, latest edition, and the paint manufacturer's recommendations. In the event of a conflict, Richmond shall be notified, and the stricter requirement shall control.

2) Surface Preparation

All structural steel shapes, plates and miscellaneous parts requiring painting shall be prepared to Near White Metal Blast Clean in accordance with the SSPC-SP10/NACE #2 Commercial Blast Cleaning Method.

3) Primer Coat:

Apply one coat of Sherwin Williams Dura-Plate 235 Multi-Purpose Epoxy, 5.0 to 7.0 mils dry film thickness, or approved equivalent. Color shall contrast the finish coat to ensure complete coverage.

4) Finish Coat:

Apply one coat of Sherwin Williams Dura-Plate 235 Multi-Purpose Epoxy, 5.0 to 7.0 mils dry film thickness, or approved equivalent. Color to be provided per the manufacturing drawings.

Standard Paint Specification PS-4

5) Machined Surfaces:

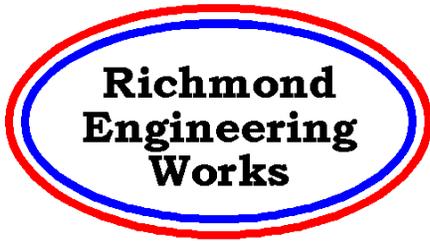
Machined surfaces, if any exposed after assembly, shall be painted per this specification.

6) Stainless Steel Surfaces:

All stainless steel surfaces that will be exposed shall receive a light sandblast finish to eliminate discolorations, knicks, scratches and other imperfections resulting from the manufacturing process.

7) Miscellaneous:

- a) Faying surfaces of bolted connections shall be painted per this specification. This procedure is not rated for slip critical connections.
- b) All materials of paint system shall be the products of one manufacturer.
- c) Interior surfaces of pipes shall not be painted.
- d) All handrail, toe plate, posts and safety guards shall be painted safety yellow.
- e) All purchased items such as motors, reducers, etc. shall be painted in accordance with manufacturer's standard paint finish.



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Bolt Torque Table

REV. 3 9-27-22

All bolts in mechanical connections subject to vibration or cyclic loadings shall be tightened to the minimum torques listed in the table below.

Units : ft-lbs

Dia (inch)	Gr. 2 & A307	Gr. 5 & A325	Gr. 8 & A490	304 SS
1/2	40	80	101	45
5/8	80	160	200	95
3/4	140	285	350	130
7/8	230	460	570	200
1	340	680	850	290
1- 1/8	490	850	1200	420
1-1/4	680	1200	1700	530
1-3/8	900	1550	2250	690
1-1/2	1190	2100	2900	890

Notes:

- 1) Above values are for dry uncoated steel bolts (as received). Decrease above values by 25% for lubricated threads.
- 2) Above values are for coarse UNC threads.
- 3) Above charts does not apply to Structural Steel Connections. Structural Steel Connections must be tightened in accordance with the RCSC Specification for Structural Joints Using ASTM A325 or A490 Bolts. Slip Critical Joints shall be pretensioned using one of the following methods:
 - a. Turn-of-nut
 - b. Calibrated Wrench
 - c. Twist-off Type
 - d. Direct-tension-indicator
- 4) Above values based on $K=0.18$, and 90% of proof load.

ASPA – McDuffie Island Terminal
Barge Haul Systems

ESTIMATED WEIGHTS

	TOTAL WEIGHT
Barge Haul Drive Assembly (ea)	18,500 lbs
Wire Rope Segment (ea)	4,350 lbs
Cable Reel - Assembled (ea)	1,500 lbs
Cable Reel Cable (ea)	750 lbs