Alabama Port Authority
Specification Booklet

Project Name APMT Phase IV Yard Expansion

Location Mobile, Alabama

Project # 11261 **Task #** 1 **April 2024**

SPECIFICATIONS AND CONTRACT DOCUMENTS

PORT OF MOBILE
ALABAMA PORT AUTHORITY

John C. Driscoll, Director & CEO

Kay Ivey, Governor of Alabama

ISSUED BY

Engineering Services Department

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BID DOCUMENTS

DIVISION I
INDEX

INVITATION TO BID

Sealed bid proposals will be received via courier to the Alabama Port Authority, 1400 Alabama State Docks Blvd, Room 216, Administration Building, Mobile, Alabama 36602 by 1:30 P.M., on June 12, 2024. Sealed bid proposals can also be hand delivered from 1:45 P.M. to 2:00 P.M., on June 12, 2024 to the Alabama Port Authority in the International Trade Center building, 250 North Water Street, 1st Floor – Killian Room, Mobile, Alabama. Faxed or electronic submitted bids will not be accepted. The right is reserved, as the interest of the Alabama Port Authority may require, to reject all bids through a Notice of Non-award or otherwise, and to waive informalities in bids received.

PROJECT 11261
APMT PHASE IV YARD EXPANSION
MOBILE, ALABAMA

The work consists principally of providing bonds, labor, materials, equipment, and supervision necessary for the construction of a new container handling storage yard inclusive of all required removal work, installation of batter piles and a sheet pile bulkhead across a marine slip, fill work of the slip and upland area, surcharge with prefabricated vertical drains, installation of rigid inclusion piles with an associated load transfer platform, soil improvements, precast-prestressed concrete pile and auger cast pile installation, drainage, grading, soil cement stabilized base and RCC paving work, installation of a modular concrete retaining wall, utilities, communication, electrical distribution, lighting and fencing requirements as indicated on the Contract Drawings and Specifications.

Specifications, proposal forms, bid and performance bond forms, and plans are available on the Alabama Port Authority website at www.alports.com. For additional project contractual information, please contact the APA Project Manager, Kyle Strachan at (251)441-7205 (Email to kyle.strachan@alports.com). For technical information, please contact the APTIM Project Manager, Mike Dye at (251) 344-1913 (email at mike.dye@aptim.com).

A Pre-Bid Meeting is scheduled for May 7, 2024 at 2:00 P.M. in the Killian Room with a site visit to follow. **Bidder attendance is MANDATORY.**

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. 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.

A Guarantee will be required with each bid as follows: At least five (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 Port Authority.

A Performance Bond in an amount not less than the sum bid will be required at the signing of the contract and, in addition, a bond in an amount not less than One Hundred (100%) percent of the contract price, insuring payment of all labor and material.

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. This shall include evidence of holding a current license as required from the State Licensing Board for General Contractors, Montgomery, Alabama. Also, non-residents of the State must show evidence of having qualified with the Secretary of State to do business in Alabama.

Bids will be publicly opened at 2:00 P.M., June 12, 2024, in the International Trade Center Building, 250 North Water Street, first floor – Killian Room, Mobile, AL. The right is reserved, as the interest of the Alabama Port Authority may require, to reject any and all bids and to waive informalities in bids received.

INSTRUCTIONS TO BIDDERS

1.0 ADDENDA AND INTERPRETATIONS

All questions about the meaning or intent of the Contract Documents shall be submitted to the Engineer in writing. Replies will be issued by Addenda mailed or delivered 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.

2.0 PREQUALIFICATION OF BIDDERS

No proposal will be considered from any Contractor unless he is licensed to do work in the State of Alabama and 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 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 Port Authority

d) Non-resident (out of state) Contractors shall attach all items included by SP-6

e) Attach a copy of the State Contractor's License to Proposal

f) Certificate of Compliance (pages 7-8 of this document)

One copy of Items (a) through (f) shall be placed in a sealed envelope with the bidder's name, Contractor's License number, the project, and the time and date of bid opening shown on the outside.

PROPOSAL

Proposal of:

Address:

Date:

To: STATE OF ALABAMA, Alabama Port Authority, Mobile, Alabama

Gentlemen:

The undersigned, as Bidder, hereby declares that he has examined the site of the work and informed himself fully in regard to all conditions pertaining to the place where the work is to be done; that he has examined the plans and specifications for the work and contractual documents relative thereto, and has read all Special Provisions and Specifications furnished; and that he has satisfied himself relative to all aspects of the work to be performed and especially to those factors affecting cost, progress, or performance.

The Bidder proposes and agrees, if this bid is accepted, to contract with the Owner in the form of contract specified, to furnish all necessary materials, equipment, tools, apparatus, means of transportation, labor and incidentals to perform in a satisfactory manner, the work described in the Contract Specifications and Drawings for the Alabama Port Authority, for the prices listed below to complete:

PROJECT 11261
APMT PHASE IV YARD EXPANSION
MOBILE, ALABAMA

In full and complete accordance with the shown, noted, described and reasonable intended requirements of the plans, specifications and contract documents to the full and entire satisfaction of the Owner with a definite understanding that no money will be allowed for extra work except as set forth in the attached contract documents.

It is agreed that the description under each item, being briefly stated, implies, although it does not mention, all incidentals and that the prices stated are intended to cover all such work materials and incidentals as constitute Bidder's obligation as described in the specifications and any details not specifically mentioned, but evidently included in the contract shall be compensated for the item which most logically includes it.

Bidder agrees that he will commence the work within the time allotted by the Contract Documents with an adequate force, plant, and equipment and that the work will be completed within time schedules outlined in Special Provisions Article SP-3.

Bidder accepts the provisions of the Contract Documents as to liquidated damages in the event of failure to complete the work on time.

The Bidder further agrees that, in case of failure on his part to execute the Contract and required bonds within ten (10) calendar days from the date written notice of award if mailed or otherwise delivered to 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. . **Items not specifically noted in the schedule of prices shall be considered ancillary to the project and be absorbed in the bid items.**

SCHEDULE OF PRICES

DESCRIPTION		ESTIMATED QTY	UNIT OF MEASURE	UNIT PRICE, $	VALUE, $
1	Project Bonds and Insurance	Lump Sum	L.S.		
2	Mobilization	Lump Sum	L.S.		
I. YARD & SLIP FILL					
I.1 Phase I (West)					
3	Appropriate BMP and Environmental Actions	Lump Sum	L.S.		
4	Demolition and Removal of Existing Structures	Lump Sum	L.S.		
5	Relocation of Water Treatment Plant	Lump Sum	L.S.		
6	Clear and Grub	Lump Sum	L.S.		
7	Proof Rolling	Lump Sum	L.S.		
8	Cut Area ___A___	144,772	C.Y.	/C.Y.	
8A	Cut Area ___B___	132,816	C.Y.	/C.Y.	
9	Yard Fill Area A and B (Existing Material)	53,938	C.Y.	/C.Y.	
10	Construction Access Ramps	Lump Sum	L.S.		
11	Soil Cement Base	77,168	S.Y.	/S.Y.	
12	RCC Paving	78,297	S.Y.	/S.Y.	
13	Flex 650 Paving	2,223	S.Y.	/S.Y.	
14	Drainage	Lump Sum	L.S.		

DESCRIPTION		ESTIMATED QTY	UNIT OF MEASURE	UNIT PRICE, $	VALUE, $
15	Trench Drains (inclusive of water quality units)	Lump Sum	L.S.		
16	MESA Retaining Wall	18,446	S.F.	/S.F.	
17	Firewater Piping	Lump Sum	L.S.		
18	Domestic Water Piping	Lump Sum	L.S.		
19	Electrical	Lump Sum	L.S.		
20	High Mast Light Poles and Fixtures	4	Unit	/Unit	
21	High Mast Light Pole Foundations	4	Unit	/Unit	
22	Perimeter Light Poles and Fixtures	10	Unit	/Unit	
23	Perimeter Light Pole Foundations	10	Unit	/Unit	
24	Bollards	88	Unit	/Unit	
25	Fencing & Swing Gates	Lump Sum	L.S.		
26	Striping and Pavement Markings	Lump Sum	L.S.		
27	Row Signs (Concrete Block and sign at the end of container row)	15	Unit	/Unit	
				Subtotal Phase I	
I.2.	**Phase II (East)**				
28	Appropriate BMP and Environmental Actions	Lump Sum	L.S.		
29	Clear and Grub	Lump Sum	L.S.		
30	Proof Rolling	Lump Sum	L.S.		
31	Cut Area __C____	177,424	C.Y.	/C.Y.	
32	Fill Area __C__	614,646	C.Y.	/C.Y.	
33	Wick Drains	Lump Sum	L.S.		
34	Surcharge	164,893	C.Y.	/C.Y.	
35	Rigid Inclusions	Lump Sum	L.S.		
36	Load Transfer Platform	Lump Sum	L.S.		
37	Soil Cement	69,130	S.Y.	/S.Y.	
38	RCC Paving	69,857	S.Y.	/S.Y.	
39	Flex 650 Paving	1,157	S.Y.	/S.Y.	
40	Drainage	Lump Sum	L.S.		

DESCRIPTION		ESTIMATED QTY	UNIT OF MEASURE	UNIT PRICE, $	VALUE, $
41	Trench Drains (inclusive of water quality units)	Lump Sum	L.S.		
42	MESA Retaining Wall	5,440	S.F.	/S.F.	
43	Firewater Piping	Lump Sum	L.S.		
44	Electrical	Lump Sum	L.S.		
45	High Mast Light Poles and Fixtures	5	Unit	/Unit	
46	High Mast Light Pole Foundations	5	Unit	/Unit	
47	Perimeter Light Poles and Fixtures	6	Unit	/Unit	
48	Perimeter Light Pole Foundations	6	Unit	/Unit	
49	Bollards	84	Unit	/Unit	
50	Fencing	Lump Sum	L.S.		
51	Striping and Pavement Markings	Lump Sum	L.S.		
52	Row Signs (Concrete Block and sign at the end of container row)	13	Sign	/Sign	
				Subtotal Phase II	
II BULKHEAD					
53	Demolition and Removal of Existing Structures	Lump Sum	L.S.		
54	Supply and Installation of PNZ54/NZ19 Combination Wall	Lump Sum	L.S.		
55	Concrete Bearing Piling (24" Square Piles)	4,250	L.F.	/L.F.	
56	Concrete Batter Piling (24" Square Piles 4:12 batter)	840	L.F.	/L.F.	
57	Concrete Batter Pilings (24" Square Piles 6:12 batter)	5,715	L.F.	/L.F.	
58	High Strain Dynamic Testing	4	Unit	/Unit	
59	CAPWAP Analysis	4	Unit	/Unit	
60	Concrete Work (Dock Addition)	Lump Sum	L.S.		
61	Concrete Work (Bulkhead Cap)	Lump Sum	L.S.		
62	Remove and Reinstall Light Poles	Lump Sum	L.S.		

DESCRIPTION		ESTIMATED QTY	UNIT OF MEASURE	UNIT PRICE, $	VALUE, $
63	Storm Drain Line Penetrations for Outfall No. 1	Lump Sum	L.S.		
64	Storm Drain Line Penetrations for Outfall No. 2	Lump Sum	L.S.		
				Subtotal - Bulkhead	
65	All remaining items necessary for a complete job installation	Lump Sum	L.S.		
66	Demobilization	Lump Sum	L.S.		
				TOTAL PROJECT BID	

32A	Alternate bid item for owner supplied slip fill received in barges and offloaded by contractor into slip	575,932	CY	/C.Y.	
				TOTAL ALTERNATE PROJECT BID	

1. Quantities listed in the Schedule of Prices are approximate quantities intended to give the Contractor an order of magnitude of the work involved. The Contractor shall be responsible for determining the actual quantities required and accounting for them in the Bid Prices and notifying the Engineer of any discrepancies.

   Unit Prices for Additional Items if Required:

	Without Driving	With Driving
A) 24" Concrete Pile Buildups	$_____/Ft.	$_____/Ft.
B) Clamshell, if required, at north end of bulkhead for rip/rap – debris removal	Daily Rate	$_____/Day.

_____ **Dollars**

(In Words)

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

ADDENDUM NO._____

ADDENDUM NO._____

ADDENDUM NO._____

Contractor's Signature:

Contractor Company_____

_____ _____ _____

Name **Title** **Date**

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, undersigned, _____

_____ as Principal, and _____
as Surety, are hereby held and bound unto The Alabama 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 Port Authority a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for the Phase IV Yard Expansion, Project 11261 Task #1.

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	

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.

Certified this____day of _____20____

_____
Name of Contractor/Grantee/Recipient

By: _____

Its _____

The above Certification was signed in my presence by the person whose name appears above, on this _____ day of _____20_____

WITNESS:

_____
Signature

_____
Printed Name of Witness

U.S Department of Housing and Urban Development

FY2022 Community Project Funding

Grant Forms

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS--PRIMARY COVERED TRANSACTIONS

(1) The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal department or agency;

(b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification;

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

(2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

_____ _____

Signature / Authorized Certifying Official **Typed Name & Title**

_____ _____

Applicant / Organization **Date Signed**

49 CFR PART 20--CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements

(To be submitted with each bid or offer exceeding $100,000)

The undersigned [Contractor] certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for making lobbying contacts to an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form--LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions [as amended by "Government wide Guidance for New Restrictions on Lobbying," 61 Fed. Reg. 1413 (1/19/96). Note: Language in paragraph (2) herein has been modified in accordance with Section 10 of the Lobbying Disclosure Act of 1995 (P.L. 104-65, to be codified at 2 U.S.C. 1601, *et seq.*)]

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31, U.S.C. § 1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

[Note: Pursuant to 31 U.S.C. § 1352(c)(1)-(2)(A), any person who makes a prohibited expenditure or fails to file or amend a required certification or disclosure form shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such expenditure or failure.]

The Contractor, _____, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. A 3801, *et seq.,* apply to this certification and disclosure, if any.

_____ Signature of Contractor's Authorized Official

_____ Name and Title of Contractor's Authorized Official

_____ Date

AFFIDAVIT AND CERTIFICATE OF COMPLIANCE

FORM FOR SECTIONS 9 (a) and (b) BEASON-HAMMON ALABAMA TAXPAYER AND CITIZEN PROTECTION ACT; CODE OF ALABAMA, SECTIONS 31-13-9 (a) and (b) AFFIDAVIT FOR BUSINESS ENTITY/EMPLOYER /CONTRACTOR

(To be completed as a condition for the award of any contract, grant, or incentive by the State of Alabama, any political subdivision thereof, or any state-funded entity to a business entity or employer that employs one or more employees)

State of _____

County of _____

Before me, a notary public, personally appeared _____ (print name)

who, being duly sworn, says as follows:

As a condition for the award of any contract, grant, or incentive by the State of Alabama, any political subdivision thereof, or any state-funded entity to a business entity or employer that employs one or more employees, I hereby attest that in my capacity as

_____ (state position) for _____ (state business entity/employer/contractor name) that said business entity/employer/contractor shall not knowingly employ, hire for employment, or continue to employ an unauthorized alien.

I further attest that said business entity/employer/contractor is enrolled in the E-Verify program.

(ATTACH DOCUMENTATION ESTABLISHING THAT BUSINESS

ENTITY/EMPLOYER/CONTRACTOR IS ENROLLED IN THE E-VERIFY PROGRAM)

_____Signature of Affiant

Sworn to and subscribed before me this _____day of _____, _____.

I certify that the affiant is known (or made known) to me to be the identical party he or she claims to be.

_____Signature and Seal of Notary Public

CONTRACT DOCUMENTS

DIVISION II
INDEX

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

That: _____
(Name of Contractor)

_____
(Address of Contractor)

_____
(City, State, Zip)

I, a(n) _____ corporation, hereinafter called Principal, and
(state of domicile)

_____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto the Alabama Port Authority hereinafter called OWNER, in the penal sum of _____ DOLLARS, ($ _____) (100% of the Contract Amount) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 20 ____, a copy of which is hereto attached and made a part hereof for the construction of:

APMT PHASE IV YARD EXPANSION
MOBILE, ALABAMA

NOW, THEREFORE, if the Principal shall promptly make payments to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, fuel, repairs on machinery, equipment and tools, consumer or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor performed in such WORK whether by SUBCONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

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

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

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

ATTEST:

_____
Principal

_____
(Principal) Secretary

BY: _____(s)

(SEAL)

_____
Witness as to Surety Principal

_____
(Address)

_____
(Address)

_____

_____

_____

_____
Surety

ATTEST:

_____
Witness as to Surety

BY: _____
Attorney-In-Fact

_____
(Address)

_____
(Address)

_____

_____

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

LABOR AND MATERIAL BOND

KNOW ALL MEN BY THESE PRESENTS:

That: _____
(Name of Contractor)

_____
(Address of Contractor)

_____
(City, State, Zip)

I, a(n) _____ corporation, hereinafter called Principal, and
(state of domicile)

_____
(Name of Surety)

_____
(Address of Surety)

_____
(City, State, Zip)

hereinafter called Surety, are held and firmly bound unto the Alabama Port Authority hereinafter called OWNER, in the penal sum of _____ DOLLARS, ($ _____) (100% of the Contract Amount) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 20 __, a copy of which is hereto attached and made a part hereof for the construction of:

APMT PHASE IV YARD EXPANSION
MOBILE, ALABAMA

NOW, THEREFORE, if the Principal shall promptly make payments to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, fuel, repairs on machinery, equipment and tools, consumer or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor performed in such WORK whether by SUBCONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

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

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

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

ATTEST:

_____
Principal

_____
(Principal) Secretary

BY: _____(s)

(SEAL)

_____
Witness as to Surety Principal

_____
(Address)

_____
(Address)

_____

_____

_____
Surety

ATTEST:

_____
Witness as to Surety

BY: _____
Attorney-In-Fact

_____
(Address)

_____
(Address)

_____

_____

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

ACKNOWLEDGEMENT FOR CHANGE ORDERS

TO: ALABAMA PORT AUTHORITY

RE: APMT PHASE IV YARD EXPANSION
MOBILE, ALABAMA

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 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.”

_____ BY: _____

CONTRACTOR

_____ _____

DATE TITLE

CONTRACT

THIS AGREEMENT, made and executed on this _____ day of the month of _____, Two Thousand and _____ (20___), by and between The Alabama Port Authority, and _____Contractor, 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 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 Port Authority:

Project Name **APMT PHASE IV YARD EXPANSION**

Project # 11261 Task # 1

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 Port Authority shall pay, and the Contractor 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.

WITNESS: Alabama Port Authority

_____ BY: _____

WITNESS: Contractor Party of the Second Part

_____ BY: _____

Alabama Port Authority
Specification Booklet

Project Name APMT Phase IV Yard Expansion

Location Mobile, Alabama

Project # 11261 **Task #** 1 **April 2024**

SPECIAL PROVISIONS

DIVISION III
INDEX

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SP-01 DESCRIPTION OF WORK

The work consists principally of providing bonds, labor, materials, equipment, and supervision necessary for the construction of a new container handling storage yard inclusive of all required removal work, installation of batter piles and a sheet pile bulkhead across a marine slip, fill work of the slip and upland area, surcharge with prefabricated vertical drains, installation of rigid inclusion piles with an associated load transfer platform, soil improvements, precast-prestressed concrete pile and auger cast pile installation, drainage, grading, soil cement stabilized base and RCC paving work, installation of a modular concrete retaining wall, utilities, communication, electrical distribution, lighting and fencing requirements as indicated on the Contract Drawings and Specifications.

SP-02 OWNER PURCHASE OF MATERIALS

The Alabama Port Authority will authorize the Contractor to utilize its sales tax exemption status on this project. It will be the responsibility of the Contractor to complete the required paperwork once initiated by APA. The following items within Division IV are hereby deleted in their entirety:

- Division IV Section 20-14.2, Purchase of Materials or Equipment
- Division IV Section 20-14.3, Payment of Materials or Equipment
- Division IV Section 20-14.4, Accounting Procedures
- Division IV Section 20-14.5, Procedures
- Division IV Section 20-14.7, Project Close-Out

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 project milestones within the following time frames referenced to receipt of Notice to Proceed:

1. Completion of the upland yard area and release for use — 365 calendar days
2. Installation of the pipe-z bulkhead wall and associated piling — 460 calendar days
3. Project completion — 1,310 calendar days

The time stated for final completion shall include final clean-up of the premises. 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.

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. All bidders must be licensed to operate as contractors in the State of Alabama. Attention of bidders is directed to Chapter 8 of Title 23 of the Code of Alabama, 1975, and Amendments thereto, relating to the licensing of General Contractors. No bid will be accepted from anyone except a qualified Contractor, licensed by the State Licensing Board for General Contractors. 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-8 SUPERVISION & OFFICE TRAILER

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 shall also submit an organizational chart, which shall clearly show the Contractor'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.

The Contractor shall maintain an on-site trailer for the duration of the project. The Contractor shall also provide office space for the Engineer's representative. This space shall be air conditioned and shall be provided with a suitable desk and chair for the purpose of reviewing project drawings.

SP-9 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

N/A

SP–11 INSURANCE

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

1) Omit Section 40-04 Owner's and Contractor's Protective Liability – **Not Required**
2) Omit Section 40-08 Railroad Protective Liability – **Not Required**
3) Omit Section 40-10 – Professional Liability Coverage – **Not Required**

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 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 Port Authority along with proof of the bidding company's enrollment in the e-verify program with your bid package. The following E-Verify website link is provided for convenience: http://www.dhs.gov/files/programs/gc_1185221678150.shtm.

SP-13 GUARANTEE

The Contractor shall furnish to the Alabama Port Authority a two (2) year written guarantee issued from the date of final acceptance. This guarantee shall cover any defective material or workmanship on the entire project.

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 INTENT OF PLANS AND SPECIFICATIONS

The following is in addition to Article 60-03 of DIVISION IV, GENERAL PROVISIONS.

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.

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 such 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 PORT ACCESS CREDENTIALS

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, APA badge and an APA vehicle decal with no exceptions. Information regarding APA's access policy is provided on the APA website at the link below.

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

GENERAL PROVISIONS, CLAUSES, REQUIREMENTS AND COVENANTS

DIVISION IV
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SUBSECTION **PAGE**

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 AASHTO. The American Association of State Highway and Transportation Officials, the successor association of AASHO.

10-02 ACCESS ROAD. The right-of-way, the roadway and all improvements constructed thereon connecting the site of work to a public highway.

10-03 ADVERTISEMENT. A public announcement, as required by local law, inviting bids for work to be performed and materials to be furnished.

10-04 ALDOT SPECS. The State of Alabama Department of Transportation Standard Specifications for Roads and Bridges, latest edition.

10-05 AISC. The American Institute of Steel Construction.

10-06 AREA. American Railway Engineering Association.

10-07 ASA. American Standards Association.

10-08 ASTM. The American Society for Testing and Materials.

10-09 AWARD. The acceptance, by the OWNER, of the successful bidder's proposal.

10-10 AWPI. American Wood Preservers Institute.

10-11 BIDDER. Any individual, partnership, firm or corporation, acting directly or through a duly authorized representative, who submits a proposal for the work contemplated.

10-12 CALENDAR DAY. Every day shown on the calendar.

10-13 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.

10-14 COMMERCE. The prime business of the OWNER, consisting of the transshipping and storage of goods and materials by highway, rail, barge, and ship.

10-15 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.

10-16 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.

10-17 CONTRACT ITEM (PAY ITEM). A specific unit of work for which a price is provided in the Contract.

10-18 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.

10-19 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.

10-20 DEPARTMENT. The Alabama Port Authority.

10-21 DIRECTOR. The Director of the Alabama Port Authority, as constituted under the laws of Alabama.

10-22 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.

10-23 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.

10-24 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.

10-25 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.

10-26 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.

10-27 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.

10-28 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.

10-29 LABORATORY. The official testing laboratories of the OWNER or such other laboratories as may be designated by the Engineer.

10-30 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.

10-31 MATERIALS. Any substance specified for use in the construction of the Contract work.

10-32 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.

10-33 OWNER. The term OWNER shall mean the State of Alabama acting by and through the Alabama Port Authority.

10-34 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.

10-35 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.

10-36 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.

10-37 PROJECT. The agreed scope of work for accomplishing specific development.

10-38 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.

10-39 PROPOSAL FORM. The approved, prepared form on which the OWNER requires that formal bids be submitted for the work contemplated.

10-40 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.

10-41 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.

10-42 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.

10-43 STATE. The State of Alabama, the Party of the First Part to the Contract, acting by and through the Alabama Port Authority.

10-44 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.

10-45 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.

10-46 SUBGRADE. The soil which forms the pavement foundation.

10-47 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.

10-48 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.

10-49 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.

10-50 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.

10-51 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 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, Contractor's License number, Contractor's Classification of License, 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 the bidder has not complied with the provisions of the Laws of the State of Alabama concerning licensing of Contractors.

(e) 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	0.033% of Contract Amount

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 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 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 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 Manger 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/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 General 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 - Required for this project

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 $15,000,000 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 – NOT REQUIRED FOR THIS PROJECT

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 – Required for this project

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 – AL WC/EL required for this project

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 –Required for this project if applicable

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 – NOT REQUIRED FOR THIS PROJECT

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 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.

40-09 BUILDER’S RISK or INSTALLATION FLOATER –Required for this Project

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 COVERAGE– NOT REQUIRED FOR THIS PROJECT

The Contractor shall take out and maintain during the life of the contract Professional Liability insurance including design with limits not less than $2,000,000 per occurrence.

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.

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.

(Rev. 1/26/06)

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 shall be paid, at the applicable contact 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's 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 3of 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 will 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 builts” 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's 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 Port Authority
Specification Booklet

Project Name APMT Phase IV Yard Expansion

Location Mobile, AL

Project # 11261 **Task #** 1 **April 2024**

CONSTRUCTION SPECIFICATIONS

DIVISION V
INDEX

SECTION 01100 – GENERAL PROVISIONS

1.0 GENERAL

1.1. 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.

1.2. 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.

1.3. 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

1.4. 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.

1.5. **Since the work consists of new construction which 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.**

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

1.7. Permits and Fees – CONTRACTOR shall obtain all necessary permits, licenses, meters, and inspections required for his work and pay all fees and charges required for execution of this contract. Provide certificates of approval to ENGINEER and OWNER

1.8. Verification of OWNER'S Data – Prior to commencing any excavation or removal of existing work, the CONTRACTOR shall satisfy himself as to the accuracy of all data indicated on the Drawings and/or provided by the OWNER. Should the CONTRACTOR discover any inaccuracies, errors, or omissions in the data, he shall immediately notify the ENGINEER. Commencement by the CONTRACTOR of any removal of existing work, excavation or upgrading shall be held as an acceptance of the data by him after which time the CONTRACTOR has no claim against the OWNER resulting from alleged errors, omissions or inaccuracies of the said data.

1.9. Delivery and Storage of Materials – Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. All material shall be stored to provide protection from the weather and accidental damage. Any damage to material shall be the responsibility of the CONTRACTOR to coordinate with the supplier for replacement and/or repair.

1.10. Extent of work is indicated in the Drawings, Schedules, and Specifications. Singular references shall not be construed as requiring only one device if multiple devices are shown on the Drawings or are required for proper system operation.

1.11. **The CONTRACTOR acknowledges that this work is to be performed at an existing working facility and as such the CONTRACTOR shall coordinate with the OWNER and work in conjunction and around the OWNER'S operations.**

1.12. Definitions:

1.12.1 Provide – Furnish, install, and test, complete and ready for intended use.

1.12.2 Furnish – Supply and deliver to project site, ready for subsequent requirements.

1.12.3 Install – Operations at project site, including providing, unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar requirements.

1.12.4 Approved – Approved and accepted for construction by the ENGINEER. Any exceptions shall be noted in writing.

1.12.5 Approved Equal – Approved as equivalent in quality and workmanship and will perform satisfactorily according to their intended purpose. The ENGINEER shall approve in writing all such substitutions in materials or equipment.

1.13. Requests for Substitution:

1.13.1 Where a particular system, product or material is specified by name, consider it as standard basis for bidding, and base proposal on the product or material specified. Other systems, products, equipment or materials may be accepted only if in the opinion of the ENGINEER, they are equivalent in quality and workmanship and will perform satisfactorily according to their intended purpose. The ENGINEER shall approve all such substitutions in materials or equipment in writing.

1.13.2 In making requests for substitutions, the CONTRACTOR shall list the particular product, equipment or material he wishes to substitute and at bid time the CONTRACTOR shall state the amount he will add or deduct from his base bid if the substitution is approved by the ENGINEER. If the CONTRACTOR allows no deduction or addition to the base bid for such substitution, it shall be so stated on the request.

1.13.3 Requests by CONTRACTOR for substitution will be considered only when reasonable, timely, fully documented, and qualifying under one or more of the following circumstances.

a. Required product cannot be supplied in time for compliance with Contract time requirements.

b. Required product is not acceptable to governing authority, or determined to be non-compatible, or cannot be properly coordinated, warranted or insured, or has other recognized disability as certified by CONTRACTOR.
c. Substantial cost advantage is offered OWNER after deducting offsetting disadvantages including delays, additional compensation for redesign, investigation, evaluation and other necessary services and similar considerations.

1.13.4 All requests for substitution shall contain a "Comparison Schedule" and clearly and specifically indicate any and all differences or omissions between the product specified as the basis of design and the product

proposed for substitution. Differences shall include but shall not be limited to data as follows for both the specified and substituted products:

a. Principle of operation.
b. Materials of construction or finishes.
c. Thickness of materials.
d. Weight of item.
e. Deleted features or items.
f. Added features or items.
g. Changes in other work caused by the substitution.
h. Performance and rating data.

1.13.5 If the approved substitution contains differences or omissions not specifically called to the attention of the ENGINEER, the OWNER reserves the right to require equal or similar features to be added to the substituted products at the CONTRACTOR'S expense.

1.14. Prior Approval – Where the terms "approved equal" is used in the Drawings or the Specifications, submit all requests for ENGINEER'S written approval of the alternate manufacturer's products. Approval will be in the form of an Addendum to the Specifications and Drawings. Clearly indicate all differences between the specified and proposed product following the guidelines for substitution herein. This requirement may be waived if, by the opinion of the ENGINEER, it is for the best interest of the OWNER.

1.15. United States Army Corps of Engineers Permit – Refer to Appendix B for the permit conditions that apply to the work, as applicable.

END OF SECTION

SECTION 01200 – REMOVAL AND DEMOLITION WORK

1.0 SCOPE OF WORK

The work included under this section shall consist of furnishing all labor, tools, equipment, material, services, and supervision necessary for demolition and removal from the site, including clearing and grubbing where appropriate, of all indicated structures and other miscellaneous items within the limits of construction shown on the plans. Each item so listed shall be completely removed or removed to the elevation indicated on the plans.

2.0 APPLICABLE CODES AND STANDARDS

2.1. ANSI/ASSP A10.6 – Safety and Health Program Requirements for Demolition Operations

2.2. 40-CFR Part 61 SUBPART M National Emission Standard for Asbestos

2.3. National Demolition Association – Demolition Safety Manual

3.0 NOTIFICATION OF DEMOLITION AND DISPOSAL

The CONTRACTOR shall comply with federal, state, and local hauling and disposal regulations, furnishing timely notification of the demolition work to Federal, State, Regional and Local Authorities as required.

4.0 DUST AND DEBRIS CONTROL

The CONTRACTOR shall prevent the spread of dust and debris and avoid the creation of a nuisance or hazard in the surrounding area. Water spray shall be required during demolition operations when conditions warrant.

5.0 PROTECTION OF EXISTING STRUCTURES

To protect pedestrian and vehicular traffic in and around the work area, traffic barricades with flashing lights shall be used as required. Buildings, equipment, and other items in the adjacent area shall be protected as required during demolition and removal work. Any such items damaged during the course of the work shall be restored to their original condition or replaced. Where demolition and removal work cause hazardous conditions appropriate barriers and temporary coverings shall be used as required.

6.0 MATERIALS

6.1. Any concrete, metal, pavement, or any other item which will not become part of final construction shall be removed.

7.0 DISPOSAL OF REMOVED MATERIALS

7.1. Removed materials as noted herein or as may be designated by the ENGINEER shall remain the property of the OWNER and shall be neatly stockpiled as directed. Material specified to be disposed of shall become the CONTRACTOR'S property and shall be disposed of off OWNER'S property.

7.2. Care shall be taken to avoid dropping any removed material in the water and any such materials entering the water shall be immediately removed.

7.3. Existing utilities to be removed shall be terminated in a manner conforming to the nationally recognized code covering the specific utility.

8.0 CONCRETE DEMOLITION

8.1. General – Concrete demolition shall be performed as shown on the drawings.

8.2. Cutting Concrete – The width of the concrete to be removed shall be established by making parallel saw cuts a minimum of 1 inch deep. Reasonable care shall be exercised to keep the finished broken edges in line with the saw cuts and to prevent spalling or cracking from extending beyond the lines of the saw cuts. Appropriately sized hammers shall be used to achieve this profile. Should the finished broken edges extend beyond the lines of the saw cuts to the extent that would provide faces unsuitable for structurally sound joints, as determined by the ENGINEER, the CONTRACTOR shall resaw and break out the concrete as directed.

8.3. Cutting Reinforcement – Insofar as practical, existing reinforcement shall protrude from cut edges a sufficient distance (as shown on the drawings) to fully develop the reinforcement by lapped splices. Where projection of existing reinforcement is insufficient for lapped splice, the splice shall be made by a mechanical splice or welding to fully develop the bar.

9.0 EXISTING CONSTRUCTION

9.1. It shall be the CONTRACTOR'S responsibility to determine all necessary details of the existing construction as relative to its effects on his work.

10.0 MEASUREMENT AND PAYMENT

10.1. Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 02085 – WATER UTILITY DISTRIBUTION VALVES

PART 1 – GENERAL

1.0 SCOPE OF WORK

1.1. The work covered by this Section consists of furnishing all labor, tools, equipment, materials, services, and supervision necessary for the complete installation of all water utility valves, valve boxes, and appurtenances, as specified herein and as indicated on the drawings.

2.0 REFERENCES

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 Section:

2.1.1 American Water Works Association:

a. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.

b. AWWA C509 - Resilient-Seated Gate Valves for Water-Supply Service.

c. AWWA C550 - Protecting Interior Coating for Valves and Hydrants.

d. AWWA C906 – Polyethylene (PE) Pressure Pipe and Fittings, 4 in. Through 65 in. (100 mm Through 1,650 mm), For Waterworks

e. AWWA M55 – PE Pipe - Design and Installation

f. AWWA M17 – Fire Hydrants: Installation, Field Testing, and Maintenance

2.1.2 National Sanitation Foundation:

a. NSF/ANSI 61 - Drinking Water System Components - Health Effects

2.1.3 Mobile Area Water and Sewer System (MAWSS) – Policies and Procedures.

3.0 SUBMITTALS

3.1. Installation – Prior to installation, the CONTRACTOR shall submit the following to the ENGINEER:

3.1.1 Installation Plan – a description of the proposed installation.

3.1.2 Design Data – submit manufacturer's latest published literature include illustrations, installation instructions, maintenance instructions and parts lists.

3.1.3 Manufacturer's Certificates:

3.1.4 Statement of Compliance

3.1.5 Supporting data, from material suppliers attesting that valves and accessories provided meet or exceed AWWA Standards and specification requirements.

3.1.6 Manufacturer's name and pressure rating marked on valve body.

3.1.7 Manufacturer and installer qualifications.

3.2. Close Out – Following installation, submit the following to the ENGINEER:

3.2.1 Project Record Documents – a record of actual locations of all valves.

3.2.2 Operation and maintenance data for valves.

3.2.3 All test reports for pressure and flow tests.

4.0 QUALITY ASSURANCE

4.1. All work shall be performed in accordance with MAWSS Policies and Procedures and AWWA standards.

5.0 QUALIFICATIONS

5.1. Manufacturer – a company specializing in manufacturing products specified in this section with a minimum three years' experience.

5.2. Installer – a company specializing in performing work of this section with a minimum 3 years' experience and meeting the requirements of the City of Mobile

6.0 PRE-INSTALLATION MEETING

6.1. The CONTRACTOR shall convene a pre-installation meeting with the ENGINEER a minimum of at least one week prior to commencing the work of this section.

7.0 DELIVERY, STORAGE AND HANDLING

7.1. Valves and accessories shall be prepared for shipment according to AWWA standards and valve ends shall be sealed to prevent entry of foreign matter into product body.

7.2. Products shall be stored in areas protected from weather, moisture, or possible damage. Products shall not be stored directly on the ground, and all handling should be in a manner to prevent damage to interior or exterior surfaces.

8.0 ENVIRONMENTAL REQUIREMENTS

8.1. Operations shall be conducted such as not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.

9.0 COORDINATION

9.1. The CONTRACTOR shall coordinate work with the City of Mobile, OWNER and other local utilities within construction area.

10.0 MAINTENANCE MATERIALS

10.1. The CONTRACTOR shall furnish one tee wrench to OWNER of sufficient length for operation of valves.

PART 2 – PRODUCTS

11.0 RESILIENT WEDGE GATE VALVES

11.1. Manufacturers:

11.1.1 Mueller Company

11.1.2 Clow Eddy – Iowa

11.1.3 American Flow Control

11.2. Furnish materials in accordance with MAWSS Policies and Procedure Manual.

11.3. Resilient Wedge Gate Valves shall have the following characteristics:

11.3.1 AWWA C509; iron body, bronze or ductile iron.

11.3.2 Resilient seats.

11.3.3 Stem – non-rising, bronze.

11.3.4 Operating Nut – Square, counterclockwise to open unless otherwise indicated.

11.3.5 Ends – flanged, mechanical joint, or bell end connections.

11.3.6 Coating - AWWA C550, interior/exterior.

11.3.7 Sizes 12-inch (300 mm) diameter and smaller – 200 psig (1380 kPa).

11.4. Valve Boxes

11.4.1 Valve boxes for valves 12-inch (300 mm) diameter and smaller shall have the following characteristics:

11.4.2 Domestic cast iron, two-piece, screw type.

11.4.3 Cast iron lid, marked "Water".

11.5. ACCESSORIES

11.5.1 Concrete for thrust restraints shall be as per the details shown on the design drawings.

11.5.2 Concrete type shall be as specified in Section 03300.

PART 3 – EXECUTION

12.0 EXAMINATION

12.1. The exact location and size of valves shall be determined from the drawings. Clarification and directions shall be obtained from the ENGINEER prior to execution of work.

12.2. Invert elevations of existing work shall be verified prior to excavation and installation of valves.

13.0 PREPARATION

13.1. The following shall be identified prior to installation:

13.1.1 Required lines, levels, contours and datum locations.

13.1.2 Utilities to remain shall be located, identified, and protected from damage.

13.2. Existing utilities shall not be interrupted without permission and without making arrangements to provide temporary utility services. If interruption is necessary:

13.2.1 The ENGINEER shall be notified not less than three (3) days in advance of proposed utility interruption.

13.2.2 The CONTRACTOR shall not proceed without written permission from the ENGINEER.

13.3. Trench excavation, backfilling and compaction shall be preformed in accordance with Section 02200 - Earthwork.

14.0 INSTALLATION

14.1. Valves shall be installed in conjunction with pipe laying. All valves should be set plumb.

14.2. Buried valves should be provided with valve boxes installed flush with finished grade.

15.0 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

15.1. Following installation, the entire system shall be flushed and disinfected.

16.0 FIELD QUALITY CONTROL

16.1. The water distribution system shall be pressure tested in accordance with AWWA C600 and MAWSS Policies and Procedures Manual.

16.2. Flow testing shall be performed in accordance with AWWA Manual M17.

17.0 MEASUREMENT AND PAYMENT

17.1. Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices

END OF SECTION

SECTION 02086 – WATER UTILITY DISTRIBUTION FIRE HYDRANTS

PART 1 – GENERAL

1.0 SCOPE OF WORK

1.1. The work covered by this Section consists of furnishing all labor, tools, equipment, materials, services, and supervision necessary for the complete installation of all fire hydrants and appurtenances, as specified herein and as indicated on the drawings.

2.0 REFERENCES

2.1. The CONTRACTOR shall follow the practices and stan¬dards described in the latest edition of the following specifications which are made a part of this Section:

2.1.1 American Water Works Association:

a. AWWA C502 – Dry-Barrel Fire Hydrants.

b. AWWA C550 – Protecting Interior Coating for Valves and Hydrants.

c. AWWA C906 – Polyethylene (PE) Pressure Pipe & Fittings, 4 in. through 63 in. (100 mm through 1,650 mm) for Waterworks

d. AWWA M55 –PE Pipe - Design and Installation

2.1.2 National Sanitation Foundation:

a. NSF/ANSI 61 – Drinking Water System Components - Health Effects

2.1.3 National Fire Protection Association:

a. NFPA 281 - Recommended Practice for Water Flow Testing and Marking of Hydrants

3.0 SUBMITTALS

3.1. Installation – Prior to installation, the CONTRACTOR shall submit the following to the ENGINEER:

3.1.1 Installation Plan – a description of the proposed installation to the OWNER.

3.1.2 Design Data – submit manufacturer's latest published literature include illustrations, installation instructions, maintenance instructions and parts lists.

3.1.3 Manufacturer's Certificates:

a. Statement of Compliance

b. Supporting data, from material suppliers attesting that valves and accessories provided meet or exceed AWWA Standards and specification requirements.

c. Manufacturer's name and pressure rating marked on valve body.

d. Manufacturer and installer Qualifications.

3.1.4 Maintain one copy of each submittal on site.

3.2. Closeout – Following installation, submit the following to the ENGINEER:

3.2.1 Project Record Documents – a record of actual locations of all valves.

3.2.2 Operation and maintenance data for valves.

3.2.3 All test reports for pressure and flow tests.

4.0 QUALIFICATIONS

4.1. Manufacturer – a company specializing in manufacturing products specified in this section with a minimum three years' experience.

4.2. Installer – a company specializing in performing work of this section with a minimum 3 years' experience and meeting the requirements of the City of Mobile.

5.0 DELIVERY, STORAGE AND HANDLING

5.1. Valves and accessories shall be prepared for shipment according to AWWA standards and hydrant ends shall be sealed to prevent entry of foreign matter into product body.

5.2. Products shall be stored in areas protected from weather, moisture, or possible damage. Products shall not be stored directly on the ground, and all handling should be in a manner to prevent damage to interior or exterior surfaces.

6.0 ENVIRONMENTAL REQUIREMENTS

6.1. Operations shall be conducted such as not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.

7.0 COORDINATION

7.1. All work shall be coordinated with Municipality of Mobile, OWNER, and other utilities within construction area.

PART 2 – PRODUCTS

8.0 FIRE HYDRANTS

8.1. Hydrants shall have the following characteristics:

8.1.1 Dry-barrel, break-away type, AWWA C502

8.1.2 Cast-iron body and compression type valve.

8.1.3 Inlet Connection shall be six (6) inches (150 mm).

8.1.4 Valve Opening shall be 5-1/4 inches (133 mm) diameter.

8.1.5 Ends shall be either mechanical joint or bell end.

8.1.6 Bolts and nuts shall be corrosion resistant.

8.1.7 Coating shall be in accordance with AWWA C550, interior.

8.1.8 Direction of opening shall be counterclockwise unless otherwise indicated.

8.1.9 The hydrant shall have one (1) pumper with two (2) hose nozzles.

a. Obtain thread type and size from City of Mobile fire department.

b. Attach nozzle caps by separate chains.

8.2. The finish shall consist of primer and two coats of bright red enamel or otherwise in accordance with City of Mobile Fire department requirements.

9.0 ACCESSORIES

9.1. Concrete for thrust restraints shall be as per the details shown on the design drawings.

9.2. Concrete type shall be as specified in Section 03300.

9.3. Aggregate for drain of fire hydrant shall be screened and washed crushed stone with the following characteristics:

9.3.1 100 percent retained by 1/4-inch sieve

9.3.2 100 percent passing a 1-inch sieve

9.3.3 Uniformly graded from maximum to minimum size.

9.4. Protection bollards shall be installed for each fire hydrant as indicated on Drawings.

PART 2 – PRODUCTS

10.0 EXAMINATION

10.1. Exact location and size of hydrants shall be determined from the drawings. Clarification and directions shall be obtained from the ENGINEER prior to execution of work.

10.2. Invert elevations of existing work shall be verified prior to excavation and installation of fire hydrants.

11.0 PREPARATION

11.1. The following shall be identified prior to installation:

11.1.1 Required lines, levels, contours and datum locations.

11.1.2 Utilities to remain shall be located, identified, and protected from damage.

11.2. Work required for the adjustments of a water main and service line shall be performed by the CONTRACTOR in such a manner that shall limit interruption of the service for a minimum period.

11.3. Existing utilities shall not be interrupted without permission and without making arrangements to provide temporary utility services. If interruption is necessary:

11.3.1 The ENGINEER and the OWNER shall be notified not less than three (3) days in advance of proposed utility interruption.

11.3.2 The CONTRACTOR shall not proceed without written permission from the ENGINEER.

11.4. Trench excavation, backfilling and compaction shall be performed in accordance with Section 02200 - Earthwork.

12.0 INSTALLATION

12.1. Support blocking and drainage gravel shall be provided during installation. The drain hole shall not be blocked.

12.2. Hydrants shall be set plumb with pumper nozzle facing aisle way with the centerline of pumper nozzle 18 inches (450 mm) above finished grade and the safety flange not more than six (6) inches (150 mm) nor less than two (2) inches (50 mm) above grade.

12.3. Paint hydrants bright red or per City of Mobile standards.

12.4. After hydrostatic and flow testing, hydrants shall be flushed and checked for proper drainage.

13.0 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

13.1. Following installation, the entire system shall be flushed and disinfected.

14.0 FIELD QUALITY CONTROL

14.1. The water distribution system shall be pressure tested in accordance with AWWA C600 and MAWSS Policies and Procedures Manual.

14.2. Flow testing shall be performed in accordance with AWWA Manual M17.

15.0 MEASUREMENT AND PAYMENT

15.1. Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices

END OF SECTION

SECTION 02100 – WATER PIPING

PART 1 - GENERAL

1.0 SCOPE OF WORK

1.1. The work covered by this Section consists of furnishing all labor, tools, equipment, materials, services, and supervision necessary for the complete installation of all water piping and appurtenances, as specified herein and as indicated on the drawings.

1.2. This Section shall cover the new work and also the work associated with removing, relaying and resetting existing water pipe, water mains, water meters and boxes, valves and valve boxes, fire hydrants, appurtenances, and constructing connections to existing water mains.

2.0 REFERENCES

2.1. American Water Works Association:

2.1.1 AWWA C906 – Polyethylene (PE) Pressure Pipe and Fittings, 4 in. Through 65 in. (100 Mm Through 1,650 Mm), for Waterworks

2.1.2 AWWA M55 – PE Pipe - Design and Installation

2.2. ASTM International:

2.2.1 ASTM D3035 – Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter

2.2.2 ASTM D3261 – Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

2.2.3 ASTM D3350 – Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

2.2.4 ASTM D1238 – Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer

2.2.5 ASTM D1505 – Standard Test Method for Density of Plastics by the Density-Gradient Technique

2.2.6 ASTM D2837 – Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products

2.2.7 ASTM F714 – Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter

2.2.8 ASTM D1785 – Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

2.2.9 ASTM D2467 – Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80

2.3. Mobile Area Water and Sewer System (MAWSS) – Policies and Procedures

3.0 SUBMITTALS

3.1. The CONTRACTOR shall submit the following to the ENGINEER:

3.1.1 Product Data – data on pipe materials, pipe fittings and accessories.

3.1.2 Project Record Documents – a record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations.

3.1.3 Identification and descriptions of any unexpected variations to subsoil conditions or discovery of uncharted utilities.

3.1.4 Maintain one copy of each submittal document on site.

4.0 QUALITY ASSURANCE

4.1. All work shall be performed in accordance with AWWA standards.

PART 2 - PRODUCTS

5.0 WATER PIPE

5.1. Pipe shall be laid in the presence of the ENGINEER. Pipe shall not be covered until allowed by the ENGINEER. Pipe designated to be re-laid that is damaged or rendered unfit for use through negligence or improper handling by the CONTRACTOR shall be replaced by the CONTRACTOR without additional compensation.

5.2. All new pipes shall be handled in such a manner as to prevent damage to the pipe and pipe lining. The interior of all pipes, valves, and fittings shall be free from dirt and debris. All material shall be stored in the appropriate manner to protect the materials from damage by freezing and subsequent handling.

5.3. The construction methods employed in the adjustment, relocation, and placement of the water pipe shall be in accordance with the current codes and practices of the AWWA and NFPA.

5.4. When installing non-metallic water pipe, the CONTRACTOR shall install a metallic tape or locating wire on the pipe or provide other suitable means approved by the ENGINEER to allow for location by electronic detection devices.

5.5. Valves and other controls on the existing water system shall not be operated for any purpose by the CONTRACTOR without approval and representation by the OWNER or ENGINEER.

5.6. Water mains shall be laid below existing drainage pipes, existing water lines, gas lines, and other utility lines except for sanitary sewer by deflecting pipe downward unless otherwise shown on the plans or approved by the ENGINEER. Any deflection shall be approved by the ENGINEER and in accordance with the pipe manufacturer's recommendations.

5.7. HDPE pipe used for the open cut method shall meet the manufacturer's requirement for the pressure rating required for use.

5.8. HDPE Water Pipe.

5.8.1 Pipe shall be manufactured from a PE 3608 resin listed with the Plastic Pipe Institute (PPI). The resin material will meet the specifications of ASTM D 3350 with a minimum cell classification of 345464C. Pipe shall have a manufacturing standard of ASTM F 714. Pipe shall be supplied in two Classes 150 and 200 based on Factory Mutual Standards. Class 150 shall be used for applications requiring 150 psi or less, and Class 200 will be used for 200 psi or less. The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material.

5.9. HDPE Fittings

5.9.1 Butt Fusion Fittings – Fittings shall be PE3608 HDPE, minimum cell classification of 345464C as determined by ASTM D 3350. Molded butt

fusion fittings shall have a manufacturing standard of ASTM D 3261. Molded and fabricated fittings shall have the same pressure rating as the pipe unless otherwise specified on the plans. All fabricated fittings shall be made using a Data Logger. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the Quality Control records. Fittings will be made and tested to Factory Mutual requirements. The FM logo shall be on the fitting.

5.9.2 Electrofusion Fittings – Fittings shall be PE3608 HDPE, minimum cell classification of 345464C as determined by ASTM D 3350. Electrofusion Fittings shall have a manufacturing standard of ASTM F 1055. Fittings shall have the same pressure rating as the pipe unless otherwise specified on the plans.

5.10. Flanged and Mechanical Joint Adapters – Flanged and Mechanical Joint Adapters shall be PE 3608 HDPE, minimum cell classification of 345464C as determined by ASTM D3350. Flanged and Mechanical Joint Adapters shall have a manufacturing standard of ASTM D 3261. Fittings shall have the same pressure rating as the pipe unless otherwise specified on the plans. These fitting shall be meet Factory Mutual requirements.

6.0 VALVES

6.1. Gate Valves shall be designed for a working pressure of not less than 150 psi. Valve connections shall be as required for the piping in which they are installed. Valves shall have a clear waterway equal to the full nominal diameter of the valve and shall be opened by turning counterclockwise. The operating nut or wheel shall have an arrow, cast in the metal, indicating the direction of opening.

6.2. Valves smaller than 3 inches shall be all bronze and shall conform to Federal. Specification WW-V-54, Type I, Class B.

6.3. Valves 3 inches and larger shall be iron body, bronze mounted, and shall conform to AWWA C500-71.

6.4. Valve Boxes for gate valves shall be cast iron. Cast iron boxes shall be extension type with slide-type adjustment and with flared base. The minimum thickness of metal shall be 3/16 inch. The word “WATER” shall be cast in the cover. The boxes shall be of such length as will be adapted, without full extension, to the depth of cover required over the pipe at the valve location.

PART 3 - EXECUTION

7.0 PREPARATION

7.1. The following shall be identified prior to installation:

7.1.1 Required lines, levels, contours and datum locations.

7.1.2 Utilities to remain shall be located, identified, and protected from damage.

7.2. Work required for the adjustments of a water main and service line shall be performed by the CONTRACTOR in such a manner that shall limit interruption of the service for a minimum period.

7.3. Existing utilities shall not be interrupted without permission and without making arrangements to provide temporary utility services. If interruption is necessary:

7.3.1 The ENGINEER and the OWNER shall be notified not less than three (3) days in advance of proposed utility interruption.

7.3.2 The CONTRACTOR shall not proceed without written permission from the ENGINEER.

8.0 VALVE BOX RESET

8.1. A valve box shall not be reset until approved by the ENGINEER. The box shall be adjusted carefully to make sure that the top is at the designated location and elevation. Backfill shall be tamped around each box located in the pavement area to the required density of the adjacent material. Any box or accessories lost or rendered unfit for re-use due to negligence or improper handling by the CONTRACTOR shall be replaced in kind without additional compensation.

9.0 EXCAVATION AND FOUNDATION

9.1. Trench excavation, backfilling and compaction shall be performed in accordance with Section 02200 – EARTHWORK.

10.0 LAYING

10.1. The laying of pipe in finished trenches shall be started at the outlet end and shall be installed up-grade with the spigot end pointing in the direction of flow. The pipe shall be laid to the line and grade shown on the project plans. The pipe shall then be examined to make sure that it is free of defects. Pipe shall be fitted and matched to form a smooth, uniform invert. The pipe shall be installed in accordance with the pipe manufacturer's recommendations and as directed by the ENGINEER.

10.2. Pipes shall be lowered so as to avoid damage and unnecessary handling in the trench. The hubs and bells shall be clean when laid. The pipe shall be cleaned of debris and dirt when jointing the pipe. The ends of the pipes shall be securely closed when laying is stopped for the night to prevent animals and water from entering the pipe.

10.3. Water Mains shall have a minimum cover of 36 inches under pavement and 36 inches under ditches as shown on the plans. For all mains four (4) inches {100 mm} in diameter or larger, reaction or thrust backing shall be provided at all wyes and tees, plugs, caps and at bends with a deflection angle equal to or greater than 22.5 degrees. Concrete for thrust blocks shall be placed against undisturbed earth.

10.4. Walking and working on or over the completed water line, except as necessary for backfilling and tamping, shall not be permitted until at least 1 foot {0.3 m} of backfill is in place over the top of the pipe.

10.5. Pipe passing through bulkheads shall be provided with PVC sleeves. The annular space between pipe and sleeves shall be fitted with a Pipeseal as manufactured by Fleicraft Industries or an ENGINEER approved equal.

11.0 JOINTS

11.1. All joints shall be sealed for the entire circumference of the pipe providing an acceptable watertight joint.

11.2. The installation of rubber or other type gasket joints shall be in accordance with the pipe manufacturer's recommendations and as directed by the ENGINEER. No joint shall be finished until the two next joints in advance have been placed. Any joint that is disturbed after jointing shall be removed, cleaned, and remade.

11.3. Where a restrained joint is required, locked mechanical joint retainer glands or restrained joint gaskets of adequate strength to prevent movement of the water main shall be used in addition to the concrete thrust block.

12.0 BACKFILLING

12.1. Backfilling shall be in accordance with Section 02200 – EARTHWORK and shall be performed immediately after inspection as directed by the ENGINEER to secure the pipe position prior to proceeding to the next section.

12.2. Where roadways and other crossings are disturbed, the CONTRACTOR shall restore them to their original condition and shall replace all surface material and all paving, sidewalks, sod, or other disturbed surfaces, by furnishing all necessary new materials without extra compensation.

12.3. All pipe shall be pressure tested as noted in this Section before complete backfilling of the pipe will be permitted.

12.4. After completing the backfill, the CONTRACTOR shall promptly remove all surplus material, rubbish, and all equipment, leaving the site and adjacent areas in a neat and presentable condition.

13.0 CONNECTION TO EXISTING WATER SYSTEM

13.1. Where connections are made between new work and existing mains, the connections shall be made by using specials and fittings to suit the actual conditions. Standard methods are available for making connections to various types of pipes, either under pressure or in the dewatered condition.

13.2. Connection to the existing water system shall be made as shown on the plans and as directed by the ENGINEER. The connection shall be made to minimize interruption of service. The CONTRACTOR shall notify the OWNER at least 24 hours prior to connecting to the existing system.

14.0 PRESSURE TESTING OF INSTALLED LINES

14.1. General

14.1.1 All lines installed under this Section shall be pressure tested as noted in this Sub-article, in accordance with AWWA C600. The CONTRACTOR

shall have the option of testing the mains and service lines either uncovered or partially covered with joints and valves exposed.

14.1.2 The cost for this work shall be included in the unit price bid for installing the water pipe.

14.2. Testing

14.2.1 Mains.

a. When a section of pipe is approved by the ENGINEER for testing, the CONTRACTOR shall furnish all materials, equipment, and labor to properly carry out the testing operation. This shall include, as a minimum, a test pump and a means of accurately measuring the volume of water necessary to maintain the required pressure during the prescribed time of testing. A recording pressure gauge shall be used during the pressure test and the charts shall be provided to the ENGINEER. The CONTRACTOR shall furnish, install, and remove any temporary bulkheads, flanges, and plugs, as well as corporation stops at high points in the pipeline and at the test pump, when such are necessary for the testing operation.

b. Unless approved otherwise by the ENGINEER, all water mains, including corporation stops shall be tested before service lines are installed. If, in the opinion of the ENGINEER, the high-pressure testing of the mains must be done after service lines are in place, the service lines shall be shut off at the corporation stops.

c. After necessary joints, corporation stops, bulkheads, etc. have been installed, temporary corporation stops, if no other means can be provided, shall be placed in the high points of the pipeline and at the pumps as required, to remove air from the water system.

d. The test pressure shall be 200 psi. The minimum test period shall be two hours. However, the testing period shall be extended if the ENGINEER deems additional testing is necessary with no additional compensation given for the additional testing. The maximum leakage allowed shall be determined by the following formula:

$$L = \frac{SD\sqrt{P}}{133200} \qquad \left\{L = \frac{SD\sqrt{P}}{2816}\right\}$$

Where:
L = allowable leakage in gallons/hour {liters/hour}
S = length of pipe tested in feet {meters}
P = test pressure in psig {bars}
D = nominal diameter of the pipe in inches {inches}

e. The CONTRACTOR shall provide suitable means for determining the quantity of water lost by leakage under the test pressure.

f. When, in the opinion of the ENGINEER, service lines cannot be shut off from the section to be tested or other conditions exist where pressure testing as described above may cause damage, the ENGINEER may approve that the line be tested under normal operating pressure.

g. The CONTRACTOR, at his expense, shall locate and repair defective joints, sections, or valves until the leakage is within the noted allowances. All observed leaks shall be repaired whether or not the leakage test results are within the requirements specified above. After the CONTRACTOR has made the necessary corrections, the main shall be retested as described above until the line passes the necessary requirements. All tests, and retests, shall be at the CONTRACTOR'S expense.

14.3. Sterilization

14.3.1 Pipelines and appurtenances, both existing and new, which are the responsibility of the CONTRACTOR by being within the overall limits of construction, shall be sterilized before being placed in service. The sterilization process shall be performed and accepted before all pressure tests have been performed to prevent contamination of the existing system.

14.3.2 The sterilization process shall, as a minimum, be that required by the governmental regulatory body having jurisdiction over the utility. It is the responsibility of the CONTRACTOR to contact the Mobile Area

Water and Sewer System (MAWSS). The cost for this work shall be included in the unit price bid for the water pipe installation.

15.0 MEASUREMENT AND PAYMENT

15.1. Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices

END OF SECTION

SECTION 02200 – EARTHWORK

PART 1 – GENERAL

1.0 SCOPE OF WORK

1.1. The work covered by this Section consists of furnishing all the labor, tools, equipment, material, services, and supervision necessary for the grading of entire site; all excavations; backfill; formation of fills; preparation of subgrade for foundations; finishing and dressing of graded earth areas; and stockpiled materials.

2.0 REFERENCES

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 Section:

2.1.1 American Society for Testing and Materials (ASTM):

a. ASTM C136 – Method for Sieve Analysis of Fine and Coarse Aggregates

b. ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))

3.0 PRE-CONSTRUCTION MEETING

3.1. The CONTRACTOR shall convene a pre-construction meeting with the ENGINEER a minimum of at least one week prior to commencing the work of this section.

4.0 SUBMITTALS

4.1. The CONTRACTOR shall provide service records of the source and analysis of the borrow material to be used.

4.2. While placing backfill and fill, the CONTRACTOR shall submit the results of in-place density test per lift of compacted material (per Section 12.0) to the ENGINEER.

5.0 EXCAVATION

5.1. General – The term "excavation" used hereinafter is defined as "unclassified excavation". Excavation of every description, regardless of material encountered within the limits of the project, shall be performed to the lines and grades indicated or specified. Suitable excavated material shall be stockpiled or transported to and placed in fill areas within the limits of the work. (During construction, excavation and filling shall be performed in a manner and sequence that will provide drainage at all times.)

5.2. Stockpiling – Generally, it will be necessary to stockpile excavated materials prior to final placement or disposal. Suitable materials shall be kept segregated from unsatisfactory materials.

5.3. Structures – Excavation for structures shall be made accurately to the lines, grades, and elevations shown or as directed. Trenches and foundation pits shall be of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Excavation to the final grade level shall not be made until just before the concrete is to be placed.

5.3.1 Trenches

a. General

(i) All excavations of every description and of whatever substance encountered shall be performed so that pipe can be laid to the alignment and depth shown on the drawings.

(ii) All trenches, where required, shall be braced and shored in accordance with the Safety and Health regulations for Construction, Occupational Safety and Health Administration, Department of Labor.

(iii) All excavations shall be performed by open cut unless otherwise specified or indicated on the drawings.

b. Width of Trenches – Trenches shall be excavated sufficiently wide to allow proper installation of pipe, fittings, and other materials and not less than 12 inches clear of pipe on either side at any point. Trenches shall not be widened by scraping or loosening materials from the sides. Where supports, sheeting, and bracing are required, trench may be of extra width to permit the placing of the trench supporting material.

c. Trench Excavation in Earth – Earth excavation includes all excavation of whatever substance encountered. In locations where pipe is to be bedded in earth excavated trenches, the bottom of such trenches shall be fine graded to allow firm bearing for the bottom of the pipe on undisturbed earth. Where any part of the trench has been excavated below the grade of the pipe, the part excavated below such grade shall be filled with pipe bedding material and compacted at the CONTRACTOR'S expense.

6.0 SUBSIDIARY OBLIGATIONS

6.1. General – The following operations and construction shall not be measured for direct payment, but shall be considered subsidiary obligations of the CONTRACTOR, and shall be covered under the contract prices for the areas of work involved.

6.2. Excavation – Excavation for drainage structures, foundations, and operations required in connection therewith, including bracing or sheeting, drainage, and pumping, shall be covered under the contract price for drainage structures or the subject structure.

6.3. Backfill – Backfill for drainage structures and other structures below grade, including attendant operations, shall be covered under the contract price for drainage structures or the subject structure.

6.4. Fill – Fill construction including the preparation of ground surface for placement of fill up to the finished subgrade elevation shall be covered under the contract price for the specific areas of work.

6.5. Subgrade Preparation – Subgrade preparation, including dressing, shaping, wetting, aerating, and compacting of the subgrade, shall be covered under the contract price for the specific areas of work.

6.6. Water used for sprinkling and wetting materials during construction in connection with compaction of fills, unless otherwise specified, shall be covered under the contract price for the specific areas of work.

6.7. Disposal of unsuitable material shall be covered under the contract price for the specific areas of work.

PART 2 – PRODUCTS

7.0 BORROW MATERIAL

7.1. General – Borrow material necessary for the work that is more than the suitable material produced from the required excavations shall be supplied by the CONTRACTOR and shall conform to the following specifications.

7.1.1 Structural fill – The "Structural Fill" utilized to obtain design grade elevations shall be an on-site or off-site sandy material free of organics, debris, and otherwise deleterious materials and containing between less than 20 percent passing the No. 200 sieve and between 30 and 95 percent passing the No. 40 sieve, by weight. Materials excavated, if free from organics, debris, coal fines, iron pellets or excessive moisture and meets the above criterion, may be used as structural fill.

7.1.2 Select Sand – "Select Sand" used to backfill within saturated zones should consist of a locally available pit material defined as a medium to coarse sand containing less than 90 percent passing the No. 40 sieve and less than 10 percent passing the No. 200 sieve, by weight. "Select sand" fill may be used to attain a maximum grade level of 12 inches below underside of slab, 12 inches below pre-existing ground surface, or 12 inches below underside of any shallow foundations.

7.1.3 Compaction – Fill materials should be placed in uniform lifts of eight (8) inches, loose measurement, and thoroughly compacted to 95% of its maximum dry density within + 2% of its optimum moisture content in accordance with ASTM D-1557 (Modified Proctor).

8.0 BACKFILL

8.1. Backfill Material – Unless otherwise specified or indicated on the drawings, backfill shall meet the requirements of Section 6.1. Materials excavated if free from organics, debris, coal fines, iron pellets or excessive moisture, and meets the above criterion, may be used as backfill.

8.2. Backfill Around Structures

8.2.1 Material – Material needed in addition to that of construction excavations shall be obtained from approved sites or other approved deposits. All material, whether from the excavation or borrow, shall be placed and compacted to make a dense, stable fill.

8.2.2 Placing Backfill – Backfill shall not be placed against or on structures until they have attained sufficient strength to support the loads (including construction loads) to which they will be subjected without distortion, cracking, or other damage. The best of the excavated materials shall be used in backfilling within two (2) feet of the structure. Unequal soil pressures shall be avoided by depositing the material evenly around the structure. Backfilling shall not be done against concrete without ENGINEER'S approval.

8.2.3 Compaction – Backfill and fill shall be placed and compacted as outlined in Section 6.1.3 above.

8.3. Trench Backfill

8.3.1 General – Backfilling should start as soon as practicable after the pipes have been laid or the structures have been built and are structurally adequate to support the loads, including construction loads, to which they will be subjected, and proceed until its completion.

a. With the exception mentioned below in this paragraph, backfilling of trenches shall not be performed at pipe joints until after that section of the pipeline has successfully passed any specified test required. Should the CONTRACTOR wish to minimize the maintenance of lights and barricades and the obstruction of traffic, he may, at his own risk, backfill the entire trench as soon as practicable after installation of pipe, and the related structures have acquired a suitable degree of strength. He shall, however, be responsible for removing and later replacing such backfill, at his own expense, should he be ordered to do so to locate and repair or replace leaking or defective joints or pipe.

8.3.2 No large masses of backfill material shall be dropped into the trench in such a manner as to endanger the pipeline. Timber grillage shall be used to break the fall of material dropped from a height of more than five (5) feet.

8.3.3 Zone Around Pipe – Bedding material shall be placed to the level shown on the drawings and work material carefully around the pipe to ensure that all voids are filled. For backfill up to a level of two (2) feet over the tops of the pipe, only selected materials, as outlined above shall be used. Backfill shall be placed and thoroughly compacted under the pipe haunches and up to the mid-line of the pipe in layers not exceeding eight (8) inches in depth. Each layer shall be placed and tamped carefully and uniformly to eliminate the

possibility of lateral displacement. Backfill shall be placed in remainder of the zone around the pipe and to a height of 1 ft. above the pipe as outlined in Section 6.1.3 above using power-driven tampers, each weighing at least 20 pounds, for this purpose. Care should be taken that the material close to the bank, as well as in all other portions of the trench, is thoroughly compacted.

8.3.4 When the trench width and the depth to which backfill has been placed is sufficient to make it feasible and can be done effectively and without damage to the pipe, backfill may, on approval, be compacted using suitable rollers, tractors, or similar powered equipment instead of by tamping. For compaction by tamping (or rolling), the rate at which backfill material is deposited in the trench shall not exceed that permitted by the facilities for its spreading, leveling, and compacting as furnished by the CONTRACTOR.

8.3.5 The material may be wetted by sprinkling, if necessary, to ensure proper compaction by tamping (or rolling). No compaction by tamping (or rolling) should be performed when the material is too wet from rain or applied water to be compacted properly.

8.4. Trench Compaction – Backfill shall be compacted in pipe trenches to the maximum density as shown on the drawings or as listed in Section 6.1.3.

8.5. Flowable Fill

8.5.1 Flowable fill may be used as an alternative to compacted soil as approved by the ENGINEER. Applications for this material include beddings, encasements, and general backfill for trenches.

8.5.2 Unless otherwise approved by the ENGINEER, the maximum 28-day compressive strength of flowable fill shall not exceed 200 psi. Flowable fill mixture proportions shall be established by the concrete supplier and approved by the ENGINEER. Flowable fill saturated surface-dry mixture proportions which may serve as an initial trial mixture are as follows:

Material	*Weight, lb/Cu Yd*
Portland Cement	50
Class F Fly Ash	250
Sand	2300
Water	350-400

8.5.3 If Class C fly ash is used, care should be taken to ensure the proportions of cement and fly ash selected are such that the maximum specified strength is not exceeded.

PART 3 – EXECUTION

9.0 INITIAL SAMPLING FOR ENVIRONMENTAL ANALYSIS

9.1. Sample Borings. To determine the need for environmental monitoring, subsurface sampling to a depth of 20 feet will be required in six (6) locations in the upland site and will be accomplished by others. To facilitate this, the CONTRACTOR will be required to clear any site stockpiles or other materials down to approximately EL 10.0 (NAVD 88) to allow access for the drilling equipment. Coordinates for these areas are shown below:

Location	*Geographic*		*State Plane*	
	Latitude	*Longitude*	*Easting*	*Northing*
Site 1	30.6704	-88.0387	1799139.530	244219.055
Site 2	30.6704	-88.0382	1799296.726	244218.301
Site 3	30.6720	-88.0389	1799079.444	244801.292
Site 4	30.6727	-88.0393	1798954.912	245056.492
Site 5	30.6717	-88.0402	1798670.216	244694.142

9.2. Surface Sampling. In addition to the samples by boring, surface samples will be required in the area of a detention pond previously located along the south side of the site. This are will also need to be cleared to EL 8.5 (NAVD 88) to allow hand sampling within the interior of the pond footprint. The coordinates of the corners of the pond are as follows:

Corner	*Geographic*		*State Plane*	
	Latitude	*Longitude*	*Easting*	*Northing*
NW	30.670818	-88.039901	1798774.205	244351.384
NE	30.670761	-88.039369	1798908.066	244336.192
SE	30.670541	-88.039398	1798902.124	244277.298
SW	30.670604	-88.039946	1798771.437	244298.658

9.3. These areas will need to be cleared within four (4) weeks following mobilization. An aerial photograph of the site showing these individual locations is shown below in Figure 1:

Figure 1- Environmental Sampling Sites

9.4. Of the existing materials on site, the stockpiles along the east and north sides of the upland area meet the criteria for backfill and fill and can be used to establish the desired subgrade elevation. The stockpile along the south side does not meet the criteria for use and will need to be removed from the site during construction of the upland area. It can, however, be used for surcharge material once the slip has been filled in and the wick drains put in place. A storage location along Baker Street, along the north side of the APM Intermodal Container Transfer Facility can be used

to store this material during construction. The location of this site is shown below in Figure 2:

Figure 2 - Storage Area for Excess Material

10.0 PREPARATION OF GROUND SURFACE FOR FILL

10.1. Ground surface on which fill is to be placed (subgrade) shall be stripped of organics, rubbish, debris, boulders, and other unsatisfactory material; plowed, disked, or otherwise broken up, pulverized; and moistened or aerated as required just prior to placement of fill materials to assure adequate bond between fill material and the

prepared ground surface. The exposed ground surface of area graded to elevations, as noted above, shall be compacted by means of a heavy vibratory roller working at slow speed and meeting the requirements of Section 6.1.3.

11.0 SUBGRADE PREPARATION

11.1. Construction – The final lift for the subgrade shall not be more than 6 inches in depth. The subgrade shall be shaped to line, grade and cross section, and compacted as specified. This operation shall include plowing, disking, and any moistening or aerating as required to obtain proper compaction. Soft or otherwise unsatisfactory material shall be removed and replaced with satisfactory excavated material or other approved material as directed. After rolling, the surface of the subgrade for base shall not show deviation greater than ¼" when tested with a 10-foot straightedge applied both parallel and at right angles to the centerline of the area. The elevation of the finished subgrade shall not vary more than 0.05 feet from the established grade and approved cross section.

11.2. Compaction – Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

12.0 SLIP FILL

12.1. Fill material for the slip shall be supplied to the site by one of two methods:

12.1.1 Truck. Material will be brought on site by trucks using a ramp on the west side of the upland site and delivered to the west end of the slip. The material may be dumped directly into west end of the slip and then spread as outlined below.

12.1.2 Barge. Material will be brought in by barge on the east side of the bulkhead wall, pumped to the west end of the slip and then spread as outlined in the specifications. Alternately, the material may be spread directly into the slip from the barge if it is applied in a uniform manner as outlined below. Bulk unloading on the west end of the slip or any other method which may cause shear failure of the soft silt in the bottom of the slip ("mud wave") will not be allowed.

12.2. The contractor will be responsible for obtaining, hauling, and spreading the fill material in the slip. As an alternative bid item, the owner may supply the fill material by barge and the contractor would be responsible for removing the material from the barge and spreading it in the slip.

12.3. Initial fill material, meeting the requirements of Section 7.1.2 should be placed within the entire area of the slip. It should be placed as evenly and uniformly as possible across the fill area to a height of approximately EL 10.0. To prevent shear failure of the underlying soft soils, often referred to as "mud wave", the fill should not exceed a slope of 1 vertical to 10 horizontal. Further, once the fill reaches an elevation of -20.0, the difference in elevation across the entire slip should not exceed a maximum of 5 feet. After the fill is placed above the water table, it may be hauled in with trucks and pushed into place with a bulldozer. It should be noted that as much as five (5) feet of settlement could occur in some areas during initial fill due to compression of the silt layer. Additional material, meeting the requirements as outlined above, will be required to achieve the desired subgrade elevation.

12.4. Along the bulkhead, the fill should be sloped down to a maximum of EL 5.0 to allow for drainage along the wall.

12.5. **To prevent overstress of the bulkhead, the elevation of the ground water at the wall shall not exceed EL 5.0.**

13.0 FINISHING

13.1. The surface of all excavations, fills, and subgrades shall be finished to a reasonably smooth and compact surface substantially in accordance with the lines, grades, and cross sections or elevations shown. The degree of finish for all graded areas shall be within 0.1 feet of the grades and elevations indicated except that the degree of finish for subgrades shall be as specified in Paragraph 3.2 above.

14.0 SUBGRADE AND FILL PROTECTION

14.1. During construction, fills and excavations shall be kept shaped and drained. Ditches and drains along subgrade shall be maintained in such a manner as to drain effectively at all times. The finished subgrade shall not be disturbed by traffic or other operation and shall be protected and maintained by the CONTRACTOR in a satisfactory condition until base course is placed. The storage or stockpiling of materials on the finished subgrade shall not be permitted. No base course shall be laid until the subgrade has been checked and approved, and in no case shall base be placed on a muddy, spongy, or frozen subgrade.

15.0 DETERMINATION OF DENSITY

15.1. The CONTRACTOR shall perform one density test per lift at the location and frequency listed below. These tests shall be at the CONTRACTOR'S expense.

15.1.1 Underground piping and electrical duct banks – Every 250 LF

15.1.2 Each side of trench drain – Every 100 LF

15.1.3 Each side of trench drain at junction box locations

15.1.4 General Area – Every 10,000 SF

15.2. The surface of the final subgrade elevation after excavation shall be tested the same as structural fill.

15.3. Results of compaction testing shall be submitted daily to the ENGINEER such that prior to the placement of a lift, the results of the previous lift are known.

16.0 DISPOSAL OF UNSUITABLE OR EXCESS MATERIAL

16.1. General – The CONTRACTOR shall dispose of all unsuitable or excess material resulting from the excavation that are not permitted or required in the fills or required in other features of the work. Materials shall be disposed of off the OWNER'S property.

17.0 MEASUREMENT AND PAYMENT

17.1. Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 02210 – SURCHARGE, VERTICAL DRAINS AND MONITORING

PART 1 – GENERAL

1.0 SCOPE OF WORK

1.1. The work covered by this Section is for the execution of improving the subgrade soils in the slip area by surcharging. The Contractor is responsible for the provision of surcharge material and removal and disposal of excess material on completion of the surcharge period or as directed by the ENGINEER. The scope of work covers the following activities:

1.1.1 Spreading, leveling, and compacting the sand drainage blanket and surcharge material in accordance with this specification and details shown in the drawings.

1.1.2 Installation of Prefabricated Vertical Drains (PVD) to accelerate the consolidation of weak layers and reduce the surcharge period.

1.1.3 Installation of field instrumentation in locations as shown in the drawings and monitoring during the specified surcharge period.

1.1.4 Removal and disposal excess material on completion of the specified surcharge period.

1.1.5 Spreading, leveling, and compacting the subgrade to the lines, levels, and grades in accordance with details shown on the drawings.

1.2. Definitions:

1.2.1 CONTRACTOR will be defined as TBD.

1.2.2 OWNER will be defined as the Alabama Port Authority.

1.2.3 Geotechnical Engineer of Record (ENGINEER) will be defined Aptim Port Services, LLC.

1.2.4 CONTRACTOR'S QA/QC will be defined as TBD

1.2.5 Surcharging is defined as consolidating and strengthening compressible soils by subjecting these layers to higher pressures than normal by using the dead weight of a soil embankment.

1.2.6 Surcharge Load is the additional material placed on top of the subgrade which acts to pre-load the underlying compressible layers and reduce long-term total and differential settlements.

1.2.7 Surcharge Period is defined as the duration in which the surcharge load is applied until the designed settlement and/or pore water pressures is achieved based on the results of the field monitoring. The surcharge period may be shortened or lengthened at the discretion of the ENGINEER based on the interpretation of the field monitoring results.

2.0 REFERENCES

2.1. American Society for Testing and Materials (ASTM):

2.1.1 ASTM D1557-12 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort

2.1.2 ASTM D6938-17 – Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods

2.1.3 ASTM D4632/4632M-15 – Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

2.1.4 ASTM D6241-14 – Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.

2.1.5 ASTM D4533/4533M-15 – Standard Test Method for Trapezoid Tearing Strength of Geotextiles.

2.1.6 ASTM D4355/4355M-21 – Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc-Type Apparatus.

2.1.7 ASTM D4751-21a – Standard Test Methods for Determining Apparent Opening Size of a Geotextile.

2.1.8 ASTM D4491/4491M-22 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

2.1.9 ASTM D4595-17 – Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.

2.1.10 ASTM D4716-08 – Standard Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.

2.1.11 ASTM D422-63 – Standard Test Method for Particle-Size Analysis of Soils.

3.0 SUBMITTALS

3.1. At least 30 days prior to beginning installation of the PVD, the CONTRACTOR shall submit a PVD Installation Plan with the details of the materials, equipment, sequences, and installation methods to the ENGINEER.

3.2. At least 30 days prior to beginning installation of the piezometers, the CONTRACTOR shall submit a Piezometer Installation Plan with the details of the materials, equipment, sequences, and installation methods to the ENGINEER.

3.3. At least 30 days prior to beginning installation of the settlement plates, the CONTRACTOR shall submit a Settlement Plate Installation Plan showing the methods to be used to attach couplings and the means to repair or replace any damaged settlement plate to the ENGINEER.

3.4. Gradation reports of the material proposed for the Sand Drainage Blanket shall be submitted to the ENGINEER prior to the material being placed.

3.5. Compaction of the subgrade shall be performed as outlined in the drawings. Compaction reports shall be submitted to the ENGINEER within five (5) days of the testing.

3.6. The CONTRACTOR will submit daily progress reports to the ENGINEER describing the amount of fill placed, settlement plates installed with elevation of the base plate, PVD installation progress, and any surcharge material placed. Settlement plate and piezometer data shall be submitted within 5 working days after readings have been obtained.

PART 2 – MATERIALS

4.0 PREFABRICATED VERTICAL DRAINS

4.1. General Requirements

4.1.1 PVD, also known as “wick drains”, shall be of newly manufactured materials from an approved manufacturer and consist of a polymer core

enclosed within an external non-woven filter jacket, and shall comply with the requirements as indicated below:

Property	Test Method	MARV[1]
GEOTEXTILE		
Grab Tensile Strength	ASTM D4632	130 lbs.
Grab Elongation	ASTM D4632	50%
CBR Puncture Strength	ASTM D6241	276 lbs.
Trapezoidal Tear Strength	ASTM D4533	60 lbs.
UV Resistance	ASTM D4355	70%/500 hrs.
Apparent Opening Size[2]	ASTM D4751	0.250 mm
Permittivity	ASTM D4491	0.8 sec^{-1}
Water Flow Rate	ASTM D4491	60 gpm/ft^2
CORE		
Tensile Strength	ASTM D4595	225 lbs.
COMPOSITE		
Width	N/A	100 ±2 mm
Thickness	N/A	3 to 5 mm
Tensile Strength	ASTM D4595	620 lbs.
Discharge Capacity	ASTM D4716	1.6 gpm

Notes:

1. MARV – Minimum Average Roll Value (MARV) as defined by ASTM D4439

2. AOS MARV – Maximum Average Roll Value

4.2. Transportation and Storage

4.2.1 Vertical drain materials shall be labelled and tagged for identification with lot number, date of manufacture, and manufacturer product identification.

4.2.2 The drain material shall be wrapped in a protective covering, such as burlap or heavy paper, until preparation for installation. It must be protected from sunlight, dirt, dust, debris and other detrimental substances during transport and storage.

4.2.3 Materials damaged during transportation, handling, or storage such that they do not meet the minimum requirements of this specified by this section shall be rejected by the ENGINEER and shall be replaced by the CONTRACTOR at no cost to the OWNER.

5.0 PIEZOMETERS

5.1. General Requirements

5.1.1 Piezometers shall be a temperature-compensated vibrating wire type enclosed in a stainless-steel housing and shall comply with the requirements listed below:

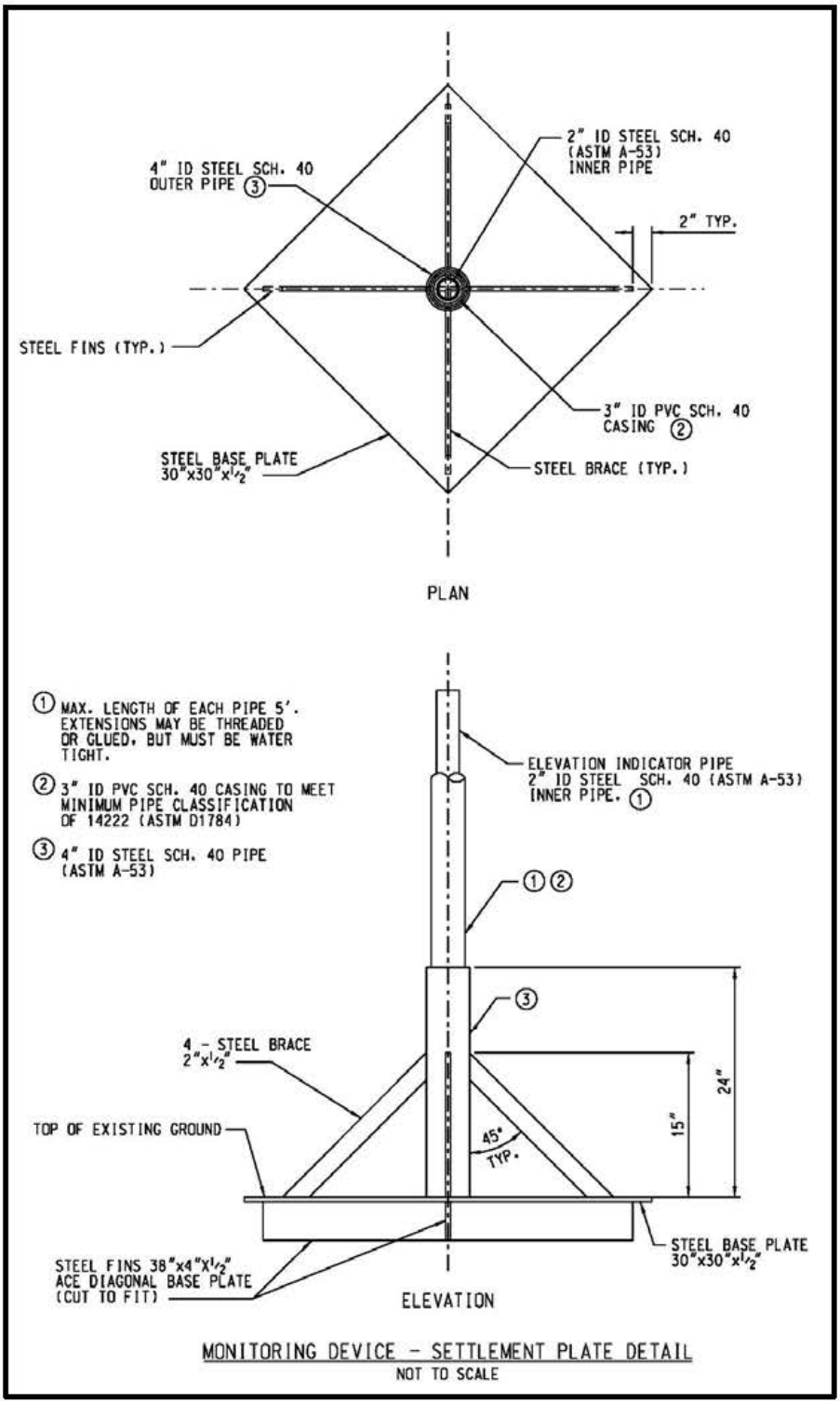
Property	**Specification**
Resolution (minimum)	0.025% F.S.
Accuracy	0.1% F.S.
Linearity	<0.5% F.S.
Thermal Zero Shift	<0.05% F.S./°C

F.S. – Full Scale

5.1.2 Materials damaged during transportation, handling, or storage such that they do not meet the minimum requirements of this specified by this section shall be rejected by the ENGINEER and shall be replaced by the CONTRACTOR at no cost to the OWNER.

6.0 SETTLEMENT PLATES

6.1. The settlement plate shall consist of a 30-inch square, 1/2–inch thick steel plate with a coupling centered on the plate for attaching a central steel riser pipe, or an approved equal. In addition, the plate shall have a means for keeping the protective PVC casing centered on the steel rod, as shown below:


4" ID STEEL SCH. 40
OUTER PIPE (3)
2" ID STEEL SCH. 40
(ASTM A-53)
INNER PIPE
2" TYP.
STEEL FINS (TYP.)
3" ID PVC SCH. 40
CASING (2)
STEEL BASE PLATE
30"x30"x1/2"
STEEL BRACE (TYP.)
PLAN
(1) MAX. LENGTH OF EACH PIPE 5'. EXTENSIONS MAY BE THREADED OR GLUED, BUT MUST BE WATER TIGHT.
(2) 3" ID PVC SCH. 40 CASING TO MEET MINIMUM PIPE CLASSIFICATION OF 14222 (ASTM D1784)
(3) 4" ID STEEL SCH. 40 PIPE (ASTM A-53)
ELEVATION INDICATOR PIPE
2" ID STEEL SCH. 40 (ASTM A-53)
INNER PIPE. (1)
(1) (2)
(3)
4 - STEEL BRACE
2"x1/2"
TOP OF EXISTING GROUND
45° TYP.
15"
24"
STEEL BASE PLATE
30"x30"x1/2"
STEEL FINS 38"x4"x1/2"
ACE DIAGONAL BASE PLATE
(CUT TO FIT)
ELEVATION
MONITORING DEVICE - SETTLEMENT PLATE DETAIL
NOT TO SCALE

6.2. The central steel riser pipe shall be of sufficient diameter to prevent buckling or swaying over the height of the fill but shall have a diameter no smaller than two (2) inches. In addition, the riser pipe will be threaded at both ends to allow for the addition of extensions.

6.3. Schedule 40 PVC protective casing shall be installed around the central steel riser pipe to protect it from compaction operations. The PVC protective casing will have an inside diameter of no less than three (3) inches and should be at least 1 inch greater than the diameter to the central steel riser pipe. The casing may have either glued or threaded joints and should form a watertight seal.

7.0 SAND DRAINAGE BLANKET

7.1. The Sand Drainage Blanket shall be comprised of a free-draining granular material and shall conform to the following gradation requirements as shown below:

Sieve	% Passing No. 200 Sieve
2-inch	100
½-inch	65-100
¼-inch	50-100
No. 10	40-70
No. 40	10-40
No. 200	< 5

8.0 SURCHARGE LOAD

8.1. Material used for the Surcharge Load can be any readily available soil that is free of excessive moisture, debris, organics, or other deleterious material.

PART 3 – INSTALLATION

9.0 PREFABRICATED VERTICAL DRAIN INSTALLATION

9.1. PVD shall be installed following the slip fill operations and prior to placement of the sand drainage blanket, as shown on the drawings.

9.2. The mandrel or sleeve used to install the PVD shall be capable of protecting the drain material from cuts, tears, and abrasion during installation. It shall employ and

anchor plate or similar arrangement to prevent soil from entering the bottom during installation and to anchor the drain tip at the required depth during withdrawal. The dimensions of the anchor plate should conform as closely as possible to those of the mandrel to minimize disturbance.

9.3. The size and shape of the mandrel or sleeve shall be as close as possible to that of the PVD to minimize disturbance of the soil during installation. The length of the mandrel shall not be less than the maximum length of the drain.

9.4. PVD shall be located and marked by the CONTRACTOR in the area as shown in the Drawings. They shall be installed to a tip depth of EL -50.0 or to a point where they encounter resistance due to medium dense sands or obstructions. It is noted that the depths of the underlying sand layer varies across the site, and the installation rig may encounter heavy resistance prior to reaching desired tip elevation, especially on the north and south sides of the site. If this occurs, the ENGINEER shall be notified that modifications to the desired tip elevation have been made.

9.5. Equipment for installing PVD shall be plumbed prior to installing each drain and shall not deviate from the vertical more than 1 in 50.

9.6. The completed PVD shall be cut off at least 12 inches above working grade.

10.0 SETTLEMENT PLATE INSTALLATION

10.1. Settlement plates shall be installed in locations as indicated in the Drawings after completion of the installation of the PVD. Settlement plates shall be installed on firm, level subgrade in accordance with the Settlement Plate Installation Plan Notify the ENGINEER at least 5 working days prior to installation.

10.2. During the placement of fill materials, the casing shall extend a minimum of 1 foot and no more than 5 feet above the ground surface at the base of casing. The locations of the PVC casing should be visibly identified to prevent damage to the casing by equipment.

10.3. The settlement plates must be protected from damage for the duration of the contract or as directed otherwise by the ENGINEER. Immediately notify the ENGINEER if any settlement plate or benchmark is damaged. Repair/replacement of the settlement plate or benchmark shall be in accordance with the previously accepted Settlement Plate Installation Plan. Acceptance of the repair/replacement will be at the discretion of the ENGINEER. Any settlement plate that is rejected by the ENGINEER will be replaced with a piezometer at no cost to the OWNER.

11.0 SAND DRAINAGE BLANKET AND SURCHARGE LOAD INSTALLATION

11.1. The sand drainage blanket will be placed over the subgrade after the installation of the PVD and settlement plates as outlined in the drawings. It should be placed uniformly across the site.

11.2. The surcharge load shall be placed following the installation of the sand drainage blanket as outlined on the drawings. It should be placed in uniform layers, with a difference in vertical height across the surcharge area not to exceed three (3) feet.

12.0 PIEZOMETER INSTALLATION

12.1. Piezometers shall be installed following placement of the final lifts of the surcharge load in accordance with the Piezometer Installation Plan. They shall be installed in locations and to depths as outlined below:

Piezometer	Northing	Easting	Tip EL
P-1	244540.68	1799575.25	-40.0
P-2	244364.17	1799597.05	-44.0
P-3	244634.48	1799735.10	-23.0
P-4	244478.74	1799749.76	-42.0
P-5	244296.07	1799766.81	-43.0
P-6	244527.02	1799922.28	-37.0
P-7	244376.60	1799964.01	-38.0
P-8	244250.08	1800029.43	-40.0
P-9	244593.46	1800098.03	-31.0
P-10	244461.24	1800137.96	-40.0
P-11	244292.24	1800188.40	-40.0
P-12	244147.59	1800240.53	-15.0

PART 4 – SETTLEMENT MONITORING

13.0 SETTLEMENT PLATE MONITORING

13.1. All settlement plates shall be read to within 0.01 feet.

13.2. The steel riser pipe of the settlement plates shall be read immediately after installation as a baseline reference.

13.3. During placement of the sand blanket and the surcharge load, settlement plates shall be read weekly. If indicated settlement is less than anticipated, this interval may be increased by the ENGINEER.

13.4. Approximately one month after final placement of the surcharge load, the settlement plates shall be read every two weeks.

13.5. Each time the settlement plate is read, the elevation of the ground surface at the location of the settlement plate shall be recorded and submitted with the data.

13.6. The length of any addition to the settlement plate steel rod shall be established by reading the settlement plate immediately before and then after the additional rod is connected and shall be reported with the data.

13.7. The length of time between settlement plate readings shall be within ±1 day of the prescribed interval.

13.8. The ENGINEER will be responsible for plotting the settlement plate data.

14.0 PIEZOMETER MONITORING

14.1. Piezometers shall be read in conjunction with the settlement plates, on the same interval and preferably on the same day.

14.2. The length of time between piezometer readings shall be within ±1 day of the prescribed interval.

14.3. The ENGINEER will be responsible for plotting the piezometer data.

PART 5 – COMPLETION OF SURCHARGE

15.0 SURCHARGE LOAD REMOVAL

15.1. After the completion of the settlement period, as validated by the results of the settlement monitoring, the ENGINEER will recommend removal of the surcharge load. The material will be removed and disposed of by the CONTRACTOR.

15.2. After the surcharge material shall be cut to the desired elevation, the remaining surface soils shall then be thoroughly and uniformly compacted to 95% of their maximum dry density, within ±2% of their optimum moisture content, in accordance with ASTM D1557 (Modified Proctor). Field density testing, in

accordance with ASTM D6938-17, should be performed every 10,000 sq. ft. to ensure proper compaction is being achieved.

16.0 INSTRUMENTATION REMOVAL

16.1. Following removal of the surcharge load and prior to placing the Structural Fill, the settlement plate risers and piezometers shall be removed. The casings shall be cut off one foot below grade and filled with neat grout.

17.0 MEASUREMENT AND PAYMENT

17.1. Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 02220 – RIGID INCLUSIONS

PART 1 – GENERAL

1.0 SCOPE OF WORK

1.1. The work covered by this Section consists of the design, installation, quality control, and testing of the Rigid Inclusion elements to the limits and grades as shown on the contract drawings to meet the performance criteria specified herein. Installation of Rigid Inclusions will be performed after removal of the excess surcharge material as specified in Section 02210.

1.2. Definitions:

1.2.1 Ground Improvement Engineer of Record (EOR) will be defined as TBD

1.2.2 Ground Improvement Designer of Record (DOR) will be defined as TBD.

1.2.3 Ground Improvement Subcontractor will be defined as TBD

1.2.4 CONTRACTOR will be defined as TBD

1.2.5 OWNER will be defined as the Alabama Port Authority

1.2.6 Geotechnical Engineer of Record (ENGINEER) will be defined as Aptim Port Services, LLC.

1.2.7 CONTRACTOR'S QA/QC will be defined as TBD.

2.0 REFERENCES

2.1. American Society for Testing and Materials (ASTM):

2.1.1 ASTM D1143 – Standard Test Method for Deep Foundations Under Static Axial Compressive Load

2.1.2 ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3))

2.1.3 ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

2.1.4 ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field

2.1.5 ASTM C33 – Standard Specification for Concrete Aggregates

2.1.6 ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

2.1.7 ASTM C150 – Standard Specification for Portland Cement

2.1.8 ASTM C494 – Standard Specification for Chemical Admixtures for Concrete

2.1.9 ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

2.1.10 ASTM C989 – Standard Specification for Slag Cement for Use in Concrete and Mortars

2.1.11 ASTM C143 – Standard Test Method for Slump of Hydraulic-Cement Concrete

2.1.12 ATM D1143 – Standard Test Methods for Deep Foundation Elements Under Static Axial Compressive Load

2.1.13 ASTM D1633 – Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

3.0 GEOTECHNICAL REPORT

1.1 The site geotechnical investigation can be provided to the CONTRACTOR upon request. The subsurface and groundwater conditions stated in the geotechnical report are reported as observed during the sampling phase of the investigation. The soils information given is intended to provide an indication of the conditions that will be encountered but cannot be given as a guarantee.

4.0 SUBMITTALS

4.1. Design Calculation Report:

4.1.1 The Ground Improvement Subcontractor/EOR shall detail all design assumptions on the stamped Ground Improvement Shop Drawings.

4.1.2 The Ground Improvement Subcontractor should submit a calculation package and design report, stamped by the EOR, at least two (2) weeks prior to the start of installation. The EOR shall be a Registered Professional Engineer in the State of Alabama.

4.2. Ground Improvement Shop Drawings – The Ground Improvement Subcontractor should submit a set of shop drawings, stamped by the EOR, to the OWNER and CONTRACTOR at least two (2) weeks prior to the start of installation. The drawings shall show the layout of the rigid inclusions and details related to the design and construction of the working platform, the Load Transfer Platform (LTP).and the typical sections of the ground improvement system. The drawings shall be in accordance with the requirements of the EOR's stamped Design Calculations Report. The stamped drawings shall be the working document for the project and shall give each rigid inclusions a unique reference number

4.3. Installation Logs:

4.3.1 At least once a week during rigid inclusion installation, the Ground Improvement Subcontractor shall submit to the OWNER and CONTRACTOR a computer log generated by an onboard computer which records the rigid inclusions installation parameters in real time for each element. At a minimum, the log should include:

a. Date and time of installation

b. Rigid inclusion reference number

c. Drilling Start Time

d. Grouting End Time

e. Length of the rigid inclusions from working surface elevation

f. Grout volume

g. General drilling parameters such as torque, rotary head pressure, crowd pressure, etc.

4.3.2 The Ground Improvement Subcontractor should also maintain a complete hand-written drilling log recording the above information for each element for backup and verification, except for continuous, general drilling parameters such as torque or speed. These logs shall also be submitted to the OWNER and CONTRACTOR on a weekly basis.

4.4. Grout:

4.4.1 The Ground Improvement Subcontractor shall submit to the OWNER and CONTRACTOR all proposed mix designs to be used on the project for installation of the rigid inclusions for approval and acceptance by CONTRACTOR and OWNER. Additional mix designs proposed during the project shall be submitted for approval prior to being used onsite.

4.4.2 Copies of all batch tickets for grout shall be submitted to the OWNER.

4.4.3 Copies of all compressive strength test reports shall be submitted to the OWNER.

4.5. Compaction Test Records:

4.5.1 The working platform shall be proof-rolled using a fully-loaded tandem-axle dump truck to check for pumping or rutting as verified by the CONTRACTOR'S QA/QC. The CONTRACTOR'S QA/QC shall prepare reports stamped by a registered Professional Engineer for the Working Platform compaction testing. The reports will be required for final approval of the ground improvement design by the EOR. Record copies shall be submitted to the EOR and the OWNER no later than 14 days from the date of testing being performed. The compaction testing records should include:

a. Reference location corresponding to gridlines, orientation, or station

b. Lift number, testing depth, and approximate elevation of test

c. Compaction results

d. Pass/fail designation

e. If failed and retested, reference location for previously failed test

4.6. Calibration Data:

4.6.1 Calibration data for the hydraulic jack and load cell planned for use shall be submitted to the CONTRACTOR and the OWNER for review prior to load testing.

4.7. Report of Load Test:

4.7.1 The raw data from the static load tests shall be submitted to the OWNER and CONTRACTOR for review and acceptance within five (5) days of test completion.

4.8. Final Report:

4.8.1 After completion of the ground improvement scope of work, the Ground Improvement Subcontractor shall submit the following as a single complete package:

a. A letter stating that all the installed rigid inclusions are acceptable with respect to the requirements of the ground improvement design, signed and stamped by the EOR.

b. A redline, record copy of the Ground Improvement Shop Drawings showing the location of all rigid inclusions including offsets and replacements.

c. Computer logs (or hand logs if necessary) for all rigid inclusions installed.

d. Material testing reports (as applicable).

e. A written report for each load test, stamped by the EOR.

f. Details for remediation of any non-conformances.

PART 2 – GENERAL

5.0 DESIGN ASSUMPTIONS

5.1. The Ground Improvement Subcontractor/EOR shall detail all design assumptions on the stamped Ground Improvement Shop Drawings.

6.0 PERFORMANCE REQUIREMENTS

6.1. The ground improvement design shall target post-construction settlements of three (3) inches total with differential settlements of no more than one (1) inch over 100 feet when subjected to a unit surface loading of 1,000 psf.

PART 3 – MATERIALS

7.0 WORKING PLATFORM

7.1. The Working Platform must be installed by the CONTRACTOR before the installation of rigid inclusions may begin. The CONTRACTOR shall prepare and maintain a stable working platform consisting of a minimum of 12 inches of the Load Transfer Platform (LTP) material over the ground improvement installation area to accommodate project-specific construction equipment and maintain site stability. This work may include subbase excavation and related grading for equipment access, possible use of additional geotextile/geogrid at the CONTRACTOR'S discretion and expense to achieve and maintain a stable working platform. In addition, it may require collection, diversion, and containment of runoff water as necessary. CONTRACTOR shall contact the Ground Improvement Subcontractor should instability concerns exist during construction of the working platform.

7.2. The Working Platform shall be constructed in a way to maintain positive drainage from the platform. The working platform shall extend at least five (5) feet beyond the limits of the ground improvement treatment area where access allows.

7.3. The working platform shall have no slopes greater than 3% and shall contain no compound sloping schemes.

7.4. Access roads to the working platform shall be constructed by the CONTRACTOR in a similar manner as the working platform and shall contain simple slopes with none greater than 10%. The width of the access road should be adequate to pass all required traffic without encroaching the sides of the access road.

7.5. Material used in the Working Platform and the access road shall be compacted to at least 95% of its maximum dry density, within ± 2% of its optimum moisture content, in accordance with ASTM D1557 (Modified Proctor). Compaction testing shall be performed at the frequencies stated on the Ground Improvement Shop Drawings.

8.0 LOAD TRANSFER PLATFORM (LTP)

8.1. The Load Transfer Platform must be installed by the CONTRACTOR after the installation of rigid inclusions. The CONTRACTOR shall place approved LTP material over the ground improvement area as identified on the Ground Improvement Shop Drawings. Specifications for the LTP are outlined in SECTION 02230.

9.0 GROUT

9.1. The design strength of the grout shall be as identified on the Ground Improvement Shop Drawings.

9.2. Every load of grout delivered to site shall have a batch ticket detailing mix proportion by weight (theoretical and actual), admixture dosage, time of batching, design slump, and allowable trim water.

9.3. Trim water is added prior to any placement of grout from the mixer drum. Allowable water is to be listed on batch ticket and shall not exceed the design water-to-cement ratio. The mixer truck must have adequate means to measure amount of trim water added to the mix. No water is to be added by ready mix truck operator unless directed by Ground Improvement Subcontractor and in accordance with allowable amounts.

9.4. The maximum allowable installation time is 150 minutes (2.5 hours) from grout batch time. Grout that has reached the 2.5-hour limit past batch time may be held only to aid in maintaining fluid, moving grout in hoses until arrival of next truck, and shall not be used for placement of rigid inclusions. Grout that has timed out shall be deemed rejected and shall be discharged from the lines into a temporary washout pit.

9.5. QC Testing

9.5.1 Slump Testing:

a. Slump testing shall be performed per ASTM C143 by the CONTRACTOR'S QA/QC at the rate of one (1) test per 100 cubic yards or once per working shift. Additional slump testing may be performed on any batch as requested by the Ground Improvement Subcontractor.

9.5.2 Compressive Strength Testing:

a. The CONTRACTOR'S QA/QC shall cast 3" x 6" or 4" x 8" cylinders using the process as listed in ASTM C31. A minimum of eight (8) cylinders will constitute one (1) set of cylinders. Cylinders should be taken at the rate of one (1) set per 100 cubic yards of grout installed or once per working shift. Cylinders are to be tested in accordance with ASTM C39, as follows:

(i) Two (2) cylinders at seven days

(ii) Two (2) cylinders at fourteen days

(iii) Two (2) cylinders at twenty-eight days

(iv) The remaining two (2) cylinders will be held as reserve and tested at the discretion of the EOR, if required.

9.5.3 Additional results (e.g., three-day or ten-day breaks) will require the casting of two (2) additional cylinders per set and shall be taken at the discretion of the Ground Improvement Subcontractor.

10.0 STEEL REINFORCEMENT

10.1. If required by the design and/or construction sequence, steel reinforcement shall be provided to meet the minimum dimensions and frequency as shown in the Ground Improvement Shop Drawings.

PART 4 – CONSTRUCTION

11.0 CONSTRUCTION SEQUENCE

11.1. Working Platform:

11.1.1 Following the placement of fill soils to desired subgrade elevation, the Working Platform shall be constructed by the CONTRACTOR per Section 7.

11.2. Survey/Layout:

11.2.1 Each of the rigid inclusion's locations shall be located and flagged by the CONTRACTOR as shown on the Ground Improvement Shop Drawings. Each rigid inclusions shall be laid out within five (5) inches of plan location.

11.2.2 Layout may take place in multiple efforts to allow for sufficient available work areas while minimizing the probability of destroying the marked locations during rigid inclusions installation activities.

11.2.3 Around the perimeter of the ground improvement zone, a minimum of four (4) control points shall be provided by the CONTRACTOR with known elevations.

11.3. Rigid Inclusion Installation:

11.3.1 Rigid inclusions shall be installed from atop the working platform to the design criteria required to found the elements in a suitable bearing stratum. The drilling parameters during penetration into the competent substratum (torque, rotation speed, vertical speed of penetration, downward thrust, etc.) shall be compared with the soil data to verify adequacy of the target values. Load test(s) will be used to validate the final selection of production rigid inclusions termination criteria.

11.3.2 The minimum diameter of the installed rigid inclusions shall be as required diameter per the Ground Improvement Shop Drawings.

11.3.3 Deviance from the vertical shall remain within 2%. This shall be controlled, confirmed, and documented by the operator.

11.3.4 When the prescribed installation criteria are reached, pull-down will be stopped, but rotation may continue after the operator records relevant parameters. Once grout flow is started, the tooling will be lifted approximately 6 to 12 inches above the bottom of hole. The pumping of grout at this elevation shall continue until a nominal positive pressure is achieved. This pressure signifies that the soil at the elevation of greatest penetration has been adequately grouted.

11.3.5 The tooling shall be then gradually extracted at a consistent pull rate while the grout is pumped through the stem. The grout filling process shall be continuous to ensure the integrity of the column.

11.3.6 Grout placement shall be completed in a single pour. If grout supply runs out mid-element, the drill shall re-penetrate the fresh grout at least three (3) feet before resuming grouting operations with another ready-mix truck. The tooling shall be gradually and consistently withdrawn while maintaining rotation. The speed of extraction is controlled by the operator in conjunction with the monitoring device to ensure that the required diameter is maintained, and that the column is continuous.

11.3.7 At the end of extraction, pumping can be stopped when the volume of material remaining in the drill string is sufficient to finish the filling of the column by gravity to the elevation of the Working Platform.

11.3.8 Following completion of the installation process, the Ground Improvement Subcontractor will cut-off the top of the fresh column to the

correct elevation and backfill the open hole to the top elevation of the Working Platform.

11.4. Finishing:

11.4.1 Execution of the final part of the fill operation by CONTRACTOR to reach final grade includes re-grading / re-compaction of working platform and installation of the Load Transfer Platform by the CONTRACTOR per the requirements outlined on the Ground Improvement Shop Drawings.

12.0 HOT WEATHER GROUT PLACEMENT

12.1. Once ambient air temperatures are greater than 95°F or mix temperatures exceed 95°F, hot weather grout placement provisions must be put into place at the discretion of the Ground Improvement Subcontractor. This would include, but not be limited to, ice or chilled water or other means of maintaining temperature of the grout.

12.2. Grout with batch temperatures above 95°F shall use a set retarder or equivalent admixture capable of keeping the grout fluid and workable for 2.5 hours from batch time to prevent flashing in the lines.

12.3. Where a prolonged period of hot weather grout placement is anticipated, a pre-production batch trial program will be put into place to measure workability and compressive strength at elevated temperatures.

13.0 COLD WEATHER PROTECTION

13.1. When the average of daily high and nightly low temperature is anticipated to be less than 40 degrees Fahrenheit, rigid inclusions with a top elevation above the frost depth shall be covered/insulated to allow for proper curing of the grout. At a minimum, rigid inclusions should be covered with a concrete curing blanket on the first night after installation. Test rigid inclusions shall receive extra protection in cold weather and should remain completely enclosed and protected from the elements during the entire curing period. In addition, the contained area should be warmed by an electric heater or similar.

14.0 OBSTRUCTIONS

14.1. If obstacles are encountered that prevent penetration of the tooling, a procedure shall be discussed and approved on-site between the representatives of the OWNER, EOR, the Ground Improvement Subcontractor and the CONTRACTOR.

This could include relocation of the element, installation of additional elements, or removal of the obstruction(s). Any removal of obstructions (by the CONTRACTOR) must be performed in a manner that minimizes damage to adjacent columns.

14.2. The typical corrective action for an obstructed rigid inclusion is to make one (1) additional attempt to the side of the obstructed point. If this does not resolve the issue, the rig shall move to a different location while a remedial plan is formulated. If the amount of obstructed rigid inclusions becomes excessive, either complete removal of the obstruction(s) may be required, or additional points will need to be added while bridging the obstruction using grade beams or other structural units. Design of any additional structural elements would be the responsibility of Others.

14.3. Obstructed rigid inclusion locations that do not reach the required termination will be filled with grout to the elevation of the working platform prior to the end of the working shift.

15.0 SPOILS

15.1. Spoils generated by the installation of rigid inclusions shall be stockpiled by the Ground Improvement Subcontractor at a location adjacent to the work area. The disposal of these spoils shall be the responsibility of the CONTRACTOR.

16.0 CUT-OFFS

16.1. All rigid inclusions shall be cut-off a minimum of six (6) inches below the top of working platform elevation for the purpose of protection. If a different cut-off elevation is necessary for construction (e.g., utility support, footings, etc.), the Ground Improvement Subcontractor shall submit a cut-off chart with the planned final elevation of each element for review at least two (2) weeks prior to mobilization. The cut-off elevations shall match the detail of the Ground Improvement Shop Drawings. Rigid inclusions shall be cut-off using an auger attached to a skid steer or by hand-shovel. The auger shall be advanced to the intended top of element elevation and shot with a laser level and grade rod. Alternate cut-off methods may be required based on grout composition and/or ground conditions.

16.2. If any rigid inclusion top is found to be at an improper elevation (greater than 3 inches high or 6 inches low compared to the design cut-off elevation) prior to the placement of the LTP, the EOR shall immediately be notified and LTP placement shall be stopped in the area. The EOR will provide a remediation plan within 24 hours. If the rigid inclusion's top is inadvertently broken, the EOR shall

immediately be notified and will review and recommend repair procedures to be performed by Others.

17.0 HEAVE

17.1. Depending on the stiffness and nature of the soil stratum through which the rigid inclusions are installed, upward vertical movement of the working platform can occur. This phenomenon, known as heave, occurs when displacement elements are installed with a high area replacement ratio. The amount of heave typically varies from a few inches to more than a foot and is difficult to predict. The effect of heave on the ground improvement system will be accounted for in the design. Should it be deemed necessary by the EOR, the CONTRACTOR shall re-grade the site after rigid inclusion installation to the top of working platform elevation as shown on the Ground Improvement Shop Drawings. It is imperative that the final rigid inclusions and LTP configuration(s) match the sections provided in the stamped Ground Improvement Shop Drawings.

18.0 PROTECTION OF INSTALLED RIGID INCLUSIONS

18.1. Waiting period:

18.1.1 Follow-on work by the CONTRACTOR / Others including working platform re-compaction, LTP placement, excavation, re-leveling or re-grading, or general use of the rigid inclusion installation area shall not commence until approval is given by the EOR.

18.2. Adjacent Excavations:

18.2.1 Excavation and general earthwork around rigid inclusions shall not commence until rigid inclusion installation approval is received from the EOR.

18.2.2 If excavation efforts require the removal or disturbance of the working platform, LTP, matrix soil surrounding the rigid inclusions, and/or installed rigid inclusions, the EOR shall be notified, and a remediation plan shall be developed. This may include additional testing of the Working Platform or LTP to verify that all material has been replaced and re-compacted per the requirements indicated on the Ground Improvement Shop Drawings and the assumptions of the design.

18.2.3 Water:

a. Care should be taken to prevent ponding of water around exposed rigid inclusion elements and appropriate dewatering should be performed if necessary.

PART 5 – QUALITY CONTROL

19.0 STATIC LOAD TEST

19.1. Static compressive load tests shall be performed in accordance with ASTM D1143 (Procedure A - Quick Test) by Ground Improvement Subcontractor to verify the rigid inclusion design. The rigid inclusions to be tested shall be non-production elements.

19.2. Test Location and Schedule – The load test shall be installed in an area designated by the EOR and in agreement with the Ground Improvement Subcontractor and DOR. The Contractor should confirm with the Ground Improvement Subcontractor that each test location is prepared with suitable working platform prior to test installation. Prior to running the load tests, the rigid inclusion installer shall notify the Contractor a minimum of two (2) days before the test date so that all appropriate parties may be in attendance for the performance of the test.

19.3. Test Column Details:

19.3.1 The maximum load allocated to any individual rigid inclusion shall be determined by the EOR and shall be designated as the design load. The rigid inclusion test element shall be installed in a manner that is representative of the rigid inclusion design.

19.3.2 A lightly-reinforced rebar cage may be installed in the upper five (5) to ten (10) feet of the test rigid inclusion to avoid structural damage of the rigid inclusion due to eccentricities of the load test.

19.4. Setup and Instrumentation – The modulus test reaction frame shall be constructed using a steel reaction beam supported by walers and tied down with reaction anchors. A hydraulic jack and load cell will be set on the test element directly beneath the reaction beam. As pressure is applied in predetermined increments to the reaction beam by the hydraulic jack, pile top displacement shall be manually monitored and recorded utilizing a minimum of three (3) analog dial gages, or similar acceptable methods. Load cell readings and jack hydraulic pressure will also be recorded. Calibration data for the hydraulic jack and load cell planned for

use is included shall be submitted for review prior to the testing. Should the load testing equipment need to be substituted, the calibration records for the substitute equipment shall be submitted prior to the testing

19.5. Strain Gages – Strain gages may be installed in the freshly grouted test column at the discretion of the EOR to aid in determining the load vs. depth of the rigid inclusion throughout the test. Strain gage data shall be considered supplemental and is not necessary for final load test analysis.

19.6. Loading Procedures

19.6.1 The test will be performed in general accordance with ASTM D1143 (Procedure A – Quick Test). From the load test data, load versus displacement curves for each load test will be constructed. These shall be included in the final reporting.

19.6.2 The rigid inclusion compressive test element shall be tested to a minimum load 1.5 times the design load. The Ground Improvement Subcontractor may elect to continue the test beyond 1.5 times the design load to obtain additional information on the performance of the rigid inclusion at higher loads, provided that the setup remains safe throughout the test duration.

19.6.3 The raw data from the testing shall be submitted for review and for acceptance by the ENGINEER. A written report for each test, sealed by a Professional Engineer licensed in State of Alabama, will be submitted within 14 days of the completion of that test

20.0 QA/QC

20.1. Installation Logs:

20.1.1 As outlined in the SUBMITTALS section of this specification, installation logs shall be submitted to the OWNER/Contractor on a weekly basis. The Ground Improvement Subcontractor shall designate any replacement rigid inclusion due to the rejection of an initial production element in this weekly log submittal, under the direction of the EOR. In the event that a computer-generated installation log shows incomplete or partial information, the hand logs recorded by the operator installing rigid inclusions shall be deemed an acceptable substitute.

20.2. Cut-Off Verification:

20.2.1 The cut-off elevation shall be verified by the Ground Improvement Subcontractor in the field with a laser level or equivalent.

20.3. Materials Testing:

20.3.1 The materials shall be tested at the frequencies indicated in the MATERIALS section of this specification. The Ground Improvement Subcontractor should verify proper testing is being performed by the CONTRACTOR'S QA/QC regardless of whether that agency is contracted directly to the OWNER, DOR, the Ground Improvement Subcontractor, or CONTRACTOR.

20.4. Rigid Inclusion Element Rejection:

20.4.1 Rigid inclusions improperly located, installed beyond the maximum allowable tolerances, or reported to be defective as a result of quality control testing shall be abandoned and replaced with new rigid inclusions unless the EOR proposes a remedial measure which is acceptable to the CONTRACTOR and DOR, either of which will be done at no additional cost to the OWNER.

21.0 MEASUREMENT AND PAYMENT

21.1. Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 02230 – LOAD TRANSFER PLATFORM

PART 1 – GENERAL

1.0 SCOPE OF WORK

1.1. The work shall consist of the design, installation, and quality control of a Load Transfer Platform (LTP), to the limits and grades as shown on the contract drawings to meet the performance criteria specified herein. The LTP will be part of a Column Supported Embankment (CSE). The design concept of the entire CSE involves constructing a pattern of rigid inclusions using an approved soil improvement technique which will be installed prior to the construction of the LTP. The CMC are constructed to bear on a firm stratum and take advantage of available friction of competent soil strata. The LTP shall be designed to efficiently distribute the embankment load plus any surcharge live and dead loads onto the CMC.

1.2. Definitions:

1.2.1 Ground Improvement Engineer of Record (GIEOR) will be defined as TBD.

1.2.2 Ground Improvement Subcontractor will be defined as TBD.

1.2.3 CONTRACTOR will be defined as TBD.

1.2.4 Design Engineer will be defined as TBD.

1.2.5 OWNER will be defined as the Alabama Port Authority

1.2.6 OWNER'S Engineer will be defined as Aptim Port Services, LLC.

1.2.7 Engineer of Record (ENGINEER) will be defined as Aptim Port Services, LLC.

1.2.8 CONTRACTOR'S QA/QC will be defined as TBD.

1.3. Contractor Qualifications:

1.3.1 The CONTRACTOR constructing the LTP shall have a minimum 5+ years' experience installing LTPs or other structures with geosynthetic reinforcement.

1.3.2 The CONTRACTOR shall provide documentation for three (3) recent, successful projects completed with similar site conditions and improvement criteria. The CONTRACTOR shall provide names and contact information of individuals who can attest to the adequacy of the work performed. This information shall be submitted in the CONTRACTOR'S bid proposal.

1.3.3 The final LTP design shall be conducted by the Design Engineer, a Professional Engineer licensed in the State of Alabama with experience in the design of at least three successfully completed LTP projects. The Design Engineer may be either an employee of the CONTRACTOR or a separate Consultant Design Engineer meeting the stated experience requirements.

1.3.4 The CONTRACTOR must assign a Project Manager and a full-time Superintendent, both of whom have been responsible for similar work on at least three (3) projects. They shall have been in full-time employment of the CONTRACTOR for at least two of those projects. A Design Engineer that is a consultant on this project cannot be the Project Manager.

1.3.5 Written requests for substitution of these key personnel must be submitted prior to personnel changes. Documentation must be submitted to the OWNER that demonstrates the substitute meets the requirements listed above. Substitution may not be made until written approval is provided by the OWNER.

2.0 REFERENCES

2.1. Federal Highway Administration (FHWA):

2.1.1 FHWA NHI-06-020 Ground Modification Methods: Reference Manual – Volumes I & II

2.2. American Society for Testing and Materials (ASTM):

2.2.1 ASTM C 136 / AASHTO T 27 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

2.2.2 ASTM C 117 / AASHTO T 11 Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing

2.2.3 ASTM D4318 / AASHTO T 89 & T90 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

2.2.4 ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3))

2.2.5 ASTM D6938 - Standard Test Methods for In-Place Density by Nuclear Methods (Shallow Depth)

2.2.6 ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

2.2.7 ASTM D 6637 Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method

2.2.8 ASTM D 4595 Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method

2.2.9 ASTM D 5262 Standard Test Method for Evaluating the Unconfined Tension Creep and Creep Rupture Behavior of Geosynthetic

2.2.10 ASTM D 5321 Standard Test Method for Determining the Shear Strength of Soil-Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear

3.0 SUBMITTALS

3.1. Following award of the contract and prior to the start of construction, the CONTRACTOR shall submit to the ENGINEER for his approval, all required details, specifications, drawings, construction sequence, design calculations, quality control plan, monitoring plan, and any other required information for the LTP system. The OWNER'S Engineer has the right to require changes as he/she deems necessary to satisfy the performance specification of the LTP with no additional cost to the OWNER. The CONTRACTOR shall allow a minimum of 30 days for the review of the initial submission and shall also account for the subsequent review and approval process which will depend on the accuracy and quality of the submission documents.

3.2. The following shall be submitted to the ENGINEER at least 30 days prior to beginning work:

3.2.1 Proposed LTP construction sequence and schedule.

3.2.2 Working drawings and design to the ENGINEER for review and approval prior to starting the work indicating the embankment details (material types, elevations, geosynthetic reinforcement, etc),

3.2.3 Gradation, Atterberg limits, and the resulting USCS classification for all fill materials used.

3.2.4 The CONTRACTOR shall submit a certificate stating that the geosynthetic reinforcement meets the design requirements for ultimate strength, creep, durability, installation damage, and coefficient of interaction for sliding in accordance with the design submittal.

3.2.5 A detailed written procedure of plans to protect the adjacent wall structure from damage. This should also include precautions to prevent equipment from damaging the geosynthetic reinforcement or settlement to the subgrade between CMC.

3.3. Compaction Test Records:

3.3.1 The CONTRACTOR'S QA/QC shall prepare reports stamped by a registered Professional Engineer for the LTP compaction testing. The reports will be required for final approval of the ground improvement design by the EOR. Record copies shall be submitted to the EOR and the OWNER no later than 14 days from the date of testing being performed. The compaction testing records should include:

a. Reference location corresponding to gridlines, orientation, or station

b. Lift number, testing depth, and approximate elevation of test

c. Compaction results

d. Pass/fail designation

e. If failed and retested, reference location for previously failed test

4.0 SUBSIDIARY OBLIGATIONS

4.1. General:

4.1.1 The following operations and construction shall not be measured for direct payment, but shall be considered subsidiary obligations of the

CONTRACTOR, and shall be covered under the contract prices for the areas of work involved.

4.1.2 Fill. Fill construction including the preparation of ground surface for placement of fill up to the finished subgrade elevation shall be covered under the contract price for the specific areas of work.

4.1.3 Subgrade preparation. Subgrade preparation, including dressing, shaping, wetting, aerating, and compacting of the subgrade, shall be covered under the contract price for the specific areas of work.

4.1.4 Water used for sprinkling and wetting materials during construction in connection with compaction of fills, unless otherwise specified, shall be covered under the contract price for the specific areas of work.

PART 2 – MATERIALS

5.0 LTP MATERIALS

5.1. Definitions:

5.1.1 D_{10} – Diameter in the soil-particle distribution curve corresponding to 10% finer.

5.1.2 D_{30} – Diameter in the soil-particle distribution curve corresponding to 30% finer.

5.1.3 D_{60} – Diameter in the soil-particle distribution curve corresponding to 60% finer.

5.1.4 T_a – Allowable long term geosynthetic design tensile strength

5.1.5 T_g – Required long term geosynthetic design tensile strength

5.1.6 T_{ult} – Ultimate tensile strength from single or multi-rib tensile strength tests (ASTM D 6637)

5.1.7 T_{CR} – Creep limited strength

5.1.8 RF_D – Geosynthetic Durability Reduction Factor

5.1.9 RF_{ID} – Geosynthetic Damage Reduction Factor

5.1.10 RF_{CR} – Geosynthetic Creep Reduction Factor

5.1.11 FS_{UNC} – Geosynthetic overall factor of safety or load factor reduction to account for uncertainties in the geometry of the structure, fill properties, reinforcement properties, and externally applied loads.

6.0 SELECT FILL

6.1. Gradation Requirements

Sieve Size	*% Passing No, 200 Sieve*
4 in.	100
#4	15-70
#40	10-60
#200	5-15

6.2. Qualifiers

6.2.1 Select fill material passing the No. 40 sieve shall have a Liquid Limit less than 40 and a Plasticity Index less than 20.

6.2.2 Select Fill shall be free from organics, excessive moisture, or deleterious materials.

6.2.3 Coefficient of Curvature:

$$C_c = \frac{D_{30}^2}{D_{60} \times D_{10}} = 1 \; to \; 3$$

6.2.4 Coefficient of Uniformity

7.0 GEOSYNTHETICS

7.1. Allowable long term geosynthetic design tensile strength:

$$T_g \leq T_a$$

Where:

$$T_a = \frac{T_{ult}}{RF_D \times RF_{ID} \times RF_{CR} \times FS_{UNC}}$$

7.2. Serviceability:

$$T_g \leq T_{CR(@5\%\ strain)}$$

PART 3 – EXECUTION

8.0 CONSTRUCTION

8.1. Pre-Construction Meeting – A pre-construction meeting shall be held among the OWNER, ENGINEER, and CONTRACTOR, and Design Engineer prior to mobilizing equipment to the project site. At the meeting, the LTP installation means/methods, observation, acceptance/rejection procedures, and testing shall be discussed and formalized.

8.2. Working Drawings – The CONTRACTOR shall provide working drawings which shall show the top and bottom elevations, detail on the select fill, geosynthetic reinforcement, and general embankment fill.

8.3. Site Preparation:

8.3.1 The CONTRACTOR shall ensure a firm base on which any necessary heavy equipment can be operated safely under its own power.

8.3.2 The CONTRACTOR shall accurately locate the limits of CMC installation and embankment extents in accordance with the contract plans.

8.3.3 The CONTRACTOR shall exercise caution to avoid settlement or damage to existing wall or installed CMC, and settlement, undermining, or instability to the subgrade between CMC.

8.3.4 The CONTRACTOR shall exercise caution and account for the temporary instability that may be caused by ground improvement techniques used for installation of the CMC until the ground improvement features gain strength with time.

8.4. Select Fill Placement – QC/QA

8.4.1 No geosynthetic reinforcement or fill materials shall be placed prior to completing installation of the CMC, unless the fill material is required as a working platform for CMC installation.

8.4.2 Prior to construction of the load transfer platform, the CONTRACTOR shall prepare subgrade, and remove any deleterious materials. The foundation soil shall be observed and approved by the Design Engineer and the ENGINEER or Inspector prior to placement of select reinforced fill.

8.4.3 If cementitious ground improvement methods are used, placement of fill material shall not start until the columns have gained adequate strength to support the fill materials and fill installation and construction equipment.

8.4.4 Select reinforced fill shall be placed in horizontal layers not exceeding 12-inch thickness, loose measurement, for heavy compaction equipment. For zones where compaction is accomplished with hand-operated compaction equipment, fill shall be placed in horizontal layers not exceeding 6 inches in thickness, loose measurement.

8.4.5 Heavy compaction equipment shall not be operated within 15 feet of the bulkhead.

8.4.6 Select reinforced fill shall be compacted to a minimum 95% maximum dry density, within ±2% of its optimum moisture content, as determined in accordance with ASTM D-1557 (Modified Proctor). Compaction testing shall be performed at the frequencies stated on the Ground Improvement Shop Drawings.

8.5. Geosynthetic Placement – QC/QA

8.5.1 The reinforcement shall be placed at the locations and elevations shown on the CONTRACTOR'S working drawings. No changes to the geosynthetic reinforcement layout, including, but not limited to length, reinforcement type (i.e., strength), direction of reinforcement, or elevation shall be made without the explicit written approval of the ENGINEER.

8.5.2 Construction equipment shall not be operated directly on the geosynthetic reinforcement. A minimum fill thickness of 6 inches is required for operation of vehicles over the reinforcement. Turning of vehicles should

be kept to a minimum to prevent tracks or tires from displacing the fill and/or geosynthetic reinforcement.

8.5.3 Minimum overlap of adjacent rolls of reinforcement shall be per the construction Plans or as approved in the Working Drawings.

8.5.4 Each roll of geosynthetic reinforcement should be inspected by the ENGINEER or his representative to ensure that it is undamaged prior to covering with fill material.

8.5.5 Care shall be taken to prevent excessive mud, wet concrete, epoxy, or other deleterious materials from coming in contact with and affixing to the geogrid materials.

8.5.6 Geosynthetic reinforcement shall not be left directly exposed to sunlight for a period longer than recommended by the manufacturer or one month, whichever is shorter.

8.5.7 Any roll or portion of a roll of geosynthetic damaged before, during, and/or after installation shall be replaced by the CONTRACTOR at the CONTRACTOR'S expense.

8.5.8 Large piles of fill material shall not be placed on the geosynthetic reinforcement.

8.5.9 If geotextile seams are specified, the seams should be placed up and every stitch should be inspected.

8.5.10 The CONTRACTOR shall remove slack and wrinkles from the geosynthetic prior to placing fill.

8.5.11 The CONTRACTOR shall submit the lot numbers and roll numbers along with their locations within the embankment for all geosynthetic reinforcement.

9.0 ACCEPTANCE CRITERIA

9.1. The Load Transfer Platform is considered acceptable when the construction and QC/QA requirements are completed in accordance with Section 8.0 and no damage to adjacent facilities is found. If damage is discovered, the LTP will be accepted when compensation is made for damaged caused or damage is repaired at CONTRACTOR'S expense.

10.0 MEASUREMENT AND PAYMENT

10.1. Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 02374 – EROSION / SEDIMENT CONTROL

PART 1 – GENERAL

1.0 SCOPE OF WORK

1.1. This work shall cover providing, establishing, maintaining, and installing erosion / sediment controls as determined by the CONTRACTOR and approved by the ENGINEER or as directed by the OWNER. This may include, but not be limited to; seeding, sodding, silt fences, berms, dikes, drains, netting, hay bales, sandbags, wattles, etc. as specified herein.

1.2. The CONTRACTOR is responsible for obtaining and implementing all measures necessary to control erosion and sedimentation on the site to comply with the National Pollutant Discharge Elimination System (NPDES) rules and regulations and the Alabama Department of Environmental Management (ADEM) Administrative Code 335-6-12.

1.2.1 All erosion/sediment controls shall be maintained by the CONTRACTOR during the contract period, and until contract acceptance.

1.2.2 The CONTRACTOR shall examine the site and site conditions to determine the type of equipment that may be required to complete the scope of work.

1.2.3 Once the work has begun on a section it will be the responsibility of the CONTRACTOR to continuously control erosion / sediment that should develop during construction.

1.2.4 The CONTRACTOR shall review all specifications included in the Contract Documents for related work referenced in but not covered by this section.

2.0 REFERENCES

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 Section:

2.1.1 USEPA, 1992, *"Storm Water Management for Construction Activities – Developing pollution Prevention Plans and Best Management Practices".*

2.1.2 Alabama Soil and Water Conservation Committee, July 2018, “Alabama

Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas", Vols. 1 & 2.

2.1.3 Alabama Department of Transportation (ALDOT) "Standard Specification for Highway Construction", (latest edition).

2.1.4 Alabama Department of Environmental Management (ADEM), Water Division – Water Quality Program, Volume I, Division 335-6.

3.0 SUBMITTALS

3.1. Construction Best Management Practices Plan (CBMPP)

3.2. ADEM NPDES Notice of Intent (NOI)

3.3. ADEM NPDES Termination Request

PART 2 – PRODUCTS

4.0 MATERIALS

4.1. All materials shall comply with the plans and specifications. Certain materials can be substituted if authorized by the ENGINEER.

4.2. Temporary pipe may be constructed of any type of material which will carry water.

4.3. Temporary wire fence and post may be any type fencing that will adequately serve the intended purpose as determined by the ENGINEER.

4.4. Polypropylene sheets may be of any size or color capable of serving the intended purpose but not less than 4 mils in thickness.

4.5. Hay bales may either be hay or straw containing approximately five (5) cubic feet of material.

4.6. Sandbags may be of cotton or burlap which will confine the sand inside the bag and be of a volume of approximately one (1) cubic foot.

4.7. Silt barriers shall consist of ALDOT Type "B" silt fence.

4.8. Wattles. A wattle is a tubular shaped or other elongated shaped sediment filter that is a manufactured product specifically produced for sediment control. It is made

from interwoven biodegradable plant material such as straw, coir, or wood shavings in biodegradable or photodegradable netting. Wattles are also known as sediment logs and are designed to provide intimate contact with the soil, which prevents undermining and blowouts. They are porous and this property allows water to pass through the matrix of biodegradable plant material (straw, coir, or wood shavings) which slows velocity and filters sediment as it passes through the log. Wattles and sediment logs may be placed across channel bottoms or on slopes. Wattles used in a tidal environment should be made of coir or another matrix which is not as likely to float

PART 3 – EXECUTION

5.0 DELIVERY AND STORAGE

5.1. Laydown and storage areas shall be coordinated as required for the scope of work.

6.0 PERFORMANCE AND WORKMANSHIP

6.1. Temporary pipe will be of the size as required for the application. Special bedding requirements are not required.

6.2. Temporary wire fences shall be constructed with the wire securely attached to the post.

6.3. Polypropylene sheets shall be placed only in areas where water flow and silt must be contained.

6.4. Sandbags shall be securely fastened when placed. The bags shall have a thickness of approximately six (6) inches.

6.5. Hay bales shall be securely anchored using stakes and wire or other approved methods.

6.6. Silt fences shall be constructed at locations as required. Field splices can be made by overlapping the fabric a minimum of three (3) feet and securely fastening the fabric to the wire fence. CONTRACTOR shall maintain the fence until the contract has been accepted.

6.7. If the fabric should become damaged an additional layer of fabric can be attached with at least a three (3) foot overlap.

6.8. Temporary drainage sumps or sediment basins can be constructed near the ends of drainage structures or ditches to control silting.

6.9. Sumps shall be cleaned periodically by the removal of the silt to keep the sump functional.

7.0 INSPECTIONS, TESTING AND QUALITY ASSURANCE

7.1. The CONTRACTOR shall be solely responsible for protecting the site from any and all erosion.

7.2. If erosion does occur, the CONTRACTOR shall repair all damage and provide all additionally needed topsoil at the CONTRACTOR'S expense.

7.3. The CONTRACTOR shall ensure that regular, comprehensive site and receiving water inspections are conducted in accordance with ADEM Admin. Code R. 335-6-12.28. CONTRACTOR shall be responsible for all inspections, monitoring, recordkeeping, and reporting as required by NPDES regulations (Chapter 335-6-12). All inspection reports shall document the following information:

7.3.1 Date and time of inspection.

7.3.2 Signatures of Qualified Credentialed Professional (QCP) or Qualified Credentialed Inspector (QCI) and Responsible Official.

7.3.3 Site conditions, including any BMP deficiencies and maintenance needs.

7.3.4 Details of any corrective actions that should be implemented to ensure compliance.

7.4. The CONTRACTOR shall be responsible for the preparation and filing of the Construction Site NPDES Notice of Intent (NOI) and Termination Request as per the regulations of the Alabama Department of Environmental Management (ADEM) Chapter 335-6-12. The NPDES regulations require that a Construction Best Management Practices Plan (CBMPP) be prepared and certified by a Qualified Credentialed Professional (QCP). This CBMPP shall include the design of Best Management Practices (BMPs), monitoring and maintenance procedures; hazardous materials (petroleum products, etc.) spill prevention, containment and cleanup procedures shall contain other considerations as specified herein or as appropriate to this Work.

7.5. All inspections required by the NPDES Registration must be performed by a QCP, qualified personnel working under the direct supervision of a QCP, or a Qualified Credentialed Inspector (QCI). Qualification requirements for QCPs and QCIs are as defined in ADEM Chapter 335-6-12.

7.6. CONTRACTOR shall be responsible for Best Management Practices (BMPs) for erosion and sediment control on construction sites. CONTRACTOR shall be responsible for implementing and maintaining all required BMPs as necessary for erosion and sediment control until completion of the project and until a Notice of Termination (NOT) for the NPDES Registration has been submitted to and approved by ADEM. The CONTRACTOR shall be responsible for all required inspections, record keeping, and reports.

7.7. Before commencement of construction, the CONTRACTOR shall submit copies of the ADEM NPDES NOI and the CBMPP to the ENGINEER. During construction, the CONTRACTOR shall make available to the ENGINEER, upon request, all records pertaining to the NPDES registration. After completion of the project and approval of the NOT by ADEM, the CONTRACTOR shall submit a complete copy of all NPDES Registration records to the ENGINEER.

8.0 MEASUREMENT AND PAYMENT

8.1. Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 02400 – PORTLAND SOIL CEMENT STABILIZED BASE

PART 1 – GENERAL

1.0 SCOPE OF WORK

1.1. The work covered by this Section consists of furnishing all labor, tools, equipment, materials, services, and supervision necessary for the construction of a cement stabilized base using a combination of Portland cement and soil.

2.0 REFERENCES

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 Section:

2.1.1 American Association of State Highway and Transportation Officials:

a. AASHTO T134 – Standard Method of Test for Moisture-Density Relations of Soil-Cement Mixtures

2.1.2 American Society for Testing and Materials:

a. ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

b. ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

c. ASTM C150/C150M – Standard Specification for Portland Cement

d. ASTM D1241 – Materials for Soil-Aggregate Subbase, Base, and Surface Courses

e. ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)

f. ASTM D1632 – Making and Curing Soil-Cement Compression and Flexure Test Specimens in the Laboratory

g. ASTM D1633 – Compressive Strength of Molded Soil-Cement Cylinders

h. ASTM D2166 – Unconfined Compressive Strength of Cohesive Soil

i. ASTM D422 – Particle-Size Analysis of Soils

j. ASTM D4318 – Liquid Limit, Plastic Limit, and Plasticity Index of Soils

k. ASTM D558 – Moisture-Density (Unit Weight) Relations of Soil-Cement Mixtures

l. ASTM D6938 – Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

m. ASTM D75/D75M – Standard Practice for Sampling Aggregates

n. ASTM E11 – Wire Cloth and Sieves for Testing Purposes

3.0 DEFINITION

3.1. Portland cement-stabilized base course, as used herein, is a mixture of Portland cement and in-place or select granular material uniformly blended and thoroughly compacted to produce a pavement course which meets the criteria set forth in the drawings and specifications.

4.0 SYSTEM DESCRIPTION

4.1. Plant, equipment, machines, and tools used in the work shall be subject to approval and shall be maintained in a satisfactory working condition at all times. The CONTRACTOR shall provide equipment with the capability of producing the required compaction, meeting grade controls, thickness control and smoothness requirements specified. One of two methods may be employed:

4.1.1 Central-Plant. The CONTRACTOR shall provide a central plant or Pug Mill capable of producing a uniform cement-treated mixture at the required cement and moisture contents. Soils and cement shall be dry-mixed sufficiently to prevent cement balls from forming when water is added.

4.1.2 Mix-in-Place. Mixing of the soil-cement shall be accomplished in place. Mixing of the soil, cement (including fly ash if specified), and water shall be accomplished by a single or multiple transverse shaft mixer, a traveling pugmill, or similar equipment approved by the ENGINEER. A motor grader or similar equipment is not acceptable in lieu of the mixing equipment specified.

5.0 SUBMITTALS

5.1. Prior to the start of stabilization, the CONTRACTOR shall submit the following information for approval to the OWNER:

5.1.1 Soil Identification. The CONTRACTOR shall include a soil identification and classification of each different type of existing in place material to be stabilized. Laboratory tests shall be performed on each different material with the proposed percentage of cement based upon the dry weight of the material to be stabilized.

5.1.2 Mix Design. The CONTRACTOR shall submit a mix design for the soil cement stabilization activities that clearly shows the mix is capable of achieving a minimum of 250 psi compressive strength after seven (7) days of curing. The proposed mix design must clearly indicate that each different type of material encountered during stabilization is capable of meeting or exceeding the 250-psi compressive strength test requirement after seven (7) days of curing with the proposed cement content to be utilized during stabilization.

5.1.3 Proctor Tests. The CONTRACTOR Standard proctor tests meeting the requirements of ASTM D558 or AASHTO T-134 shall be performed on each different mix design identifying the optimum moisture and maximum compaction for each different type of material to be stabilized.

5.1.4 Certifications. The CONTRACTOR shall provide the following:

a. The type of binder material to be utilized and all manufacturers test reports for the proposed material meeting the requirements as outlined in Section 8.0.

b. A certificate stating the soil is free of contaminates.

5.1.5 The testing laboratory to be utilized shall be submitted in the bid documents.

5.1.6 During stabilization, the CONTRACTOR shall submit all lab testing, field testing and QA/QC reports to the OWNER.

6.0 ENVIRONMENTAL REQUIREMENTS

6.1. Cement shall not be applied when the atmospheric temperature is less than 35 degrees F or to soils that are frozen or contain frost, or when the underlying material is frozen. If the temperature falls below 35 degrees F, completed cement - treated areas shall be protected against detrimental effects of freezing. Any areas of completed base that are damaged by freezing, rainfall, or other weather conditions shall be brought to a satisfactory condition in conformance with this specification without additional cost to the OWNER.

7.0 FIELD QUALITY CONTROL

7.1. The CONTRACTOR shall provide all quality control (QC) testing that is deemed necessary to properly control the quality, consistency, and uniformity of the stabilized base produced and placed. Any information from the CONTRACTOR'S quality control tests shall be available to the client upon request for the information. This request may be done verbally and/or in writing to the CONTRACTOR'S quality control representative and/or on-site construction manager.

7.1.1 Straightedge. The CONTRACTOR shall furnish and maintain at the site, in good condition, one 12-foot straightedge for each paver, for use in the testing of the finished surface. Straightedges shall be constructed of aluminum or other lightweight metal with blades of box or box-girder cross section with flat bottom reinforced to insure rigidity and accuracy. Straightedges shall have handles to facilitate movement on pavement

7.1.2 Grade Control . Underlying material shall be excavated to sufficient depth for the required stabilized-course thickness. The finished stabilized course with the subsequent surface course shall meet the fixed grade. Finished and completed stabilized area shall conform to the lines, grades, cross section, and dimensions indicated.

7.1.3 Smoothness (Flatness) Test. The surface of a stabilized layer shall show no deviations in excess of 1/2 inch when tested with the straightedge before compaction is complete. Deviations exceeding this amount shall be corrected by adding new material and remixing the full depth and compaction, provided the rework is completed within the time limit as outlined in Section 3.6 for the initial mixing. Otherwise, remove the

material the full depth and replace with new material as directed. Measurements for deviation from grade and cross section shown shall be taken in successive positions parallel to the centerline with a straightedge. Smoothness shall be checked on each lift a minimum of 10,000 SF of surface area.

7.1.4 Thickness Control. The completed thickness of the stabilized course shall not be more than 1 inch deficient than the thickness indicated. Where the measured thickness is more than 1 inch deficient, such areas shall be corrected by removing and replacing the full depth. Average job thickness shall be the average of all thickness measurements taken for the work area but shall be at least the thickness indicated. The thickness of the stabilized course shall be measured at intervals which ensure at least one measurement for each 2,500 square yards of stabilized course, and at least two (2) per work area. Measurements shall be made in 3-inch diameter or larger test holes penetrating the stabilized course.

7.1.5 Field Density. Field density tests shall be performed in accordance with ASTM D6938. ASTM D6938 results in a wet unit weight of soil and shall be used to determine the moisture content of the mix. Calibration curves furnished along with the density gauge shall be checked as described in ASTM D6938. Calibration checks of the density gauge shall be made at the beginning of a job on each type of material encountered. At least one (1) field density test shall be performed for each 500 square yards of each layer of base material.

PART 2 – PRODUCTS

8.0 MATERIALS

8.1. Cement. Provide cement conforming to ASTM C150/C150M, Type I, IA, II, or IIA.

8.2. Material to be Stabilized – Stabilize material using in-place granular material or select granular material conforming to AASHTO M147 or ASTM D1241 Type I. Remove stones with a mean diameter greater than 2 inches along with any deleterious substances such as sticks, debris, and organic matter.

8.3. Water. Provide water, which is clean, fresh, and free from injurious amounts of oil, acid, salt, alkali, organic matter, and other substances deleterious to the hardening of soil-cement, and subject to approval by the ENGINEER.

9.0 SAMPLING AND TESTING

9.1. Testing Facilities.

9.1.1 Initial sampling and testing is to be completed by the CONTRACTOR. All sampling and testing shall be conducted using an approved commercial testing laboratory. The OWNER has the right to inspect and approve/reject testing laboratory.

9.2. Test Results.

9.2.1 Results shall verify that materials comply with the specification. When deficiencies are found, the initial analysis shall be repeated, and the material already placed shall be retested to determine the extent of unacceptable material. All in-place unacceptable material shall be replaced or repaired to conform to the contract requirements at no additional cost to the OWNER.

9.3. Soil Mixture.

9.3.1 Tests for determining the suitability of soil shall include, but not be limited to sieve analysis in accordance with ASTM C136 and ASTM D422 using sieves conforming to ASTM E11, as well as liquid limits and plasticity index in accordance with ASTM D4318. Take soil samples for laboratory tests in accordance with ASTM D75/D75M. Specimens to be used for unconfined compression tests shall be prepared in accordance with ASTM D1632; a 4-inch diameter by 8-inch-high mold may be used to prepare specimens when more than 35 percent of the material is retained on the No. 4 sieve. Certified copies of soil test results shall be submitted to the OWNER.

9.4. Mix Design Testing Requirements.

9.4.1 Laboratory Density – Moisture-density tests of the soil-cement mixture shall be conducted in accordance with the procedure contained in AASHTO T134 or ASTM D558; using Method A for fine grained materials and Method B for coarse grained materials (both use 4-inch molds).

9.4.2 Unconfined Compression Testing – Samples shall be cured at a constant moisture content and temperature for seven (7) days in accordance with ASTM D1632. Three (3) unconfined compression tests shall be

performed, in accordance with ASTM D1633, for each mix design tested, using the stress/strain recording of ASTM D2166.

9.4.3 Sieve Analysis – A minimum of one analysis shall be performed, in accordance with ASTM D422, for each 4,000 tons of material to be stabilized.

9.4.4 Atterberg Limits – One Liquid Limit and Plastic Limit shall be performed for each sieve analysis in accordance with ASTM D4318.

PART 3 – EXECUTION

10.0 GENERAL REQUIREMENTS

10.1. Do not apply cement if the soil moisture content exceeds optimum moisture content specified for the cement-treated mixture by more than one percentage point (1%). After mixing is completed, the proportions of the mixture shall be in accordance with the approved mix design. When application of water and mixing are completed, on the basis of dry weight, moisture shall not be more than one percentage point (1%) below the optimum moisture content of the mixture, nor shall it be more than two percentage points (2%) above the optimum moisture content. Provide line and grade stakes as necessary for control. Place grade stakes in lines parallel to the centerline of the area under construction and suitably spaced for string lining.

11.0 DRAINAGE

11.1. Adequate drainage shall be provided during the entire construction period to prevent water from collecting or standing on the areas to be stabilized or on pulverized, mixed, or partially mixed material.

12.0 STOCKPILING OF MATERIALS

12.1. Before stockpiling of material, the storage sites shall be cleared, drained, and leveled. Materials obtained from different sources shall be stockpiled separately.

13.0 PREPARATION OF AREA TO BE STABILIZED

13.1. The area to be stabilized shall be cleaned of debris, inspected for adequate compaction, and shall be capable of withstanding, without displacement, the compaction specified for the soil-cement mixture. Debris and removed unsatisfactory in-place material shall be disposed of as specified.

13.2. In-Place Material to Be Stabilized – The entire area to be stabilized shall be graded and shaped to conform to the lines, grades, and cross sections shown in the plans, prior to being processed. Soft or yielding areas shall be made stable before construction is begun.

13.3. In-Place Materials to Receive Stabilized Course – Soft, yielding areas and ruts or other irregularities in the surface shall be corrected. Material in the affected areas shall be loosened and unsatisfactory material removed. Approved select material shall be added where directed. The area shall then be shaped to line, grade, and cross section, and shall be compacted to the specified density.

13.4. Select Material – Sufficient select material shall be utilized to provide the required thickness of the soil-cement layer after compaction and shall be processed to meet the requirements specified before cement stabilization is undertaken.

14.0 INSTALLATION

14.1. Edges of Stabilized Course.

14.1.1 Approved material shall be placed along the edges of the stabilized course in such quantity as will compact to the thickness of the course being constructed, or to the thickness of each layer in a multiple-layer course. It should be placed such that at least a 1-foot width of the shoulder shall be rolled and compacted simultaneously with the rolling and compacting of each layer of the stabilized course.

14.2. Mixed-in-Place Method.

14.2.1 Scarifying and Pulverizing of Soils – Prior to the application of cement the soil material shall be scarified. Scarification should be carefully controlled such that the layer beneath the layer to be stabilized is not disturbed.

14.2.2 Application of Cement – The material shall be shaped approximately to the cross section indicated. Cement shall be applied such that when uniformly mixed with the soil, the specified cement content is obtained, and a sufficient quantity of cement-treated soil is produced to construct a compacted cement-treated course conforming to the lines, grades, and cross section indicated. Equipment, except that used in spreading and mixing operations, shall not pass over the freshly spread soil cement.

14.2.3 Dry Mixing – Immediately after the cement has been distributed, it shall be mixed with the soil, but will not be mixed below the required depth. Mixing shall continue until the cement has been sufficiently blended with the soil to prevent the formation of cement balls when water is applied.

14.2.4 Water Application and Moist Mixing – The moisture content of the mixture shall be determined immediately after completion of mixing of the soil and cement. Water-supply and pressure distributing equipment shall be provided that will permit the continuous application within three (3) hours of all water required on the section being processed. Water shall be incorporated into the mix so that concentration of water near the surface does not occur. After all the mixing water has been added, mixing will continue until the water is uniformly distributed throughout the full depth of the mixture, with no portion of the mixture remaining undisturbed during mixing for more than 30 minutes. Any portion of the mixture remaining undisturbed more than 30 minutes during mixing shall be disposed of as specified. Satisfactory moisture distribution shall occur along the edges of the section.

14.3. Central-Plant Method.

14.3.1 The mixture shall be transported to the job site in trucks equipped with protective covers. The underlying course shall be thoroughly moistened, and the material placed on the prepared area in a quantity that will produce a compacted base of uniform density to the required grade and cross section. Spreading or spreading-trimming equipment shall be constructed and operated to produce a layer of material which is uniform in thickness and surface contour and free from irregularities in density. Spreading or spreading-trimming equipment shall be used in sufficient numbers and in staggered formation to obtain full-width spreading in one (1) continuous construction operation. Not more than 60 minutes shall elapse between the start of the mixing and the start of compaction of the treated layer.

14.4. Layer Thickness.

14.4.1 Compacted thickness of the stabilized course shall not be less than the thickness indicated on the plans nor exceed the maximum lift thickness shown on plans.

14.5. Compaction.

14.5.1 Compaction shall begin immediately after mixing is completed. Density of compacted soil-cement mixture shall be at least 95 percent of the

maximum density obtained from the laboratory prepared samples. Loose mixture shall be uniformly and continuously compacted until the entire depth and width of the area are compacted to the density specified. The moisture content at the surface shall be maintained near optimum at all times through the rolling but shall be less than that quantity which will cause the soil-cement mixture to become unstable during compaction. Rolling will begin at the outside edge of the surface and proceed to the center, overlapping on successive trips at least one-half the width of the roller. Alternate trips of the roller shall be slightly different lengths. Displacement of the mixture shall not occur due to the speed of the roller. Areas inaccessible to rollers shall be compacted with mechanical tampers.

14.6. Multiple Lifts.

14.6.1 Compaction and finishing of final lift in multiple lift installations shall be completed within the finishing time as outlined in Section 15.0. For upper lifts, the lower lift shall be scarified prior to application of plant mixed material, or the mixing shall extend into the lower lift by one (1) inch for mix-in-place material.

15.0 FINISHING

15.1. The surface shall be moistened, if necessary, and shaped to the required lines, grades, and cross section. The surface should be lightly scarified, if necessary, to eliminate any imprints made by the compacting or shaping equipment. The surface shall then be thoroughly compacted to the specified density with rubber-tired rollers and smooth- wheel tandem rollers to the extent necessary to provide a smooth, dense, uniform surface that is free of surface checking, ridges, or loose material, and that conforms to the grade and line indicated. Finishing operations should be completed within two (2) hours after completion of mixing operations. In places not accessible to finishing and shaping equipment, the mixtures shall be compacted with mechanical tampers to the density specified and shall be shaped and finished by hand methods. Any portion of the compacted mix that has density less than that specified, that has not properly hardened, or that is improperly finished shall be corrected.

16.0 CONSTRUCTION JOINTS

16.1. At the end of each day's construction, a straight transverse construction joint shall be formed by cutting back into the completed work to form a true vertical face free of loose or shattered material. Material along construction joints not properly

compacted shall be removed and replaced with soil-cement that is mixed, moistened, and compacted as specified.

17.0 CURING AND PROTECTION

17.1. Concrete Curing Compound.

17.1.1 Concrete curing compound, conforming to the requirements of ASTM C309 of the type specified shall be applied at a rate of not less than 1 gallon per 150 square feet of surface using constantly agitating, pressure spray equipment. This compound shall form a uniform, continuous, adherent film that does not check, crack, or peel. The surface of each section of soil-cement to be treated with curing compound shall be moistened with a light spray of water immediately after the section has been compacted. As soon as the surface film of moisture disappears, but while the surface still has a damp appearance, the curing compound shall be applied. Special care shall be implemented to ensure ample coverage with the compound at edges, corners, and around rough spots. After application of the curing compound has been completed and the coating is dry to the touch, any required repair of the soil-cement surface shall be performed. To ensure a clean bonding surface, all curing compound or other foreign substances shall be removed from the area before additional soil-cement is applied. Each repair, after being finished, shall be moistened and coated with curing compound in accordance with the foregoing requirements.

17.2. Water Curing.

17.2.1 Curing moisture shall be maintained by sprinkling, flooding, fog spraying, or covering with continuously moistened canvas, cloth mats, straw, sand, or other approved material. Water or covering, or both, shall be applied so that the soil-cement surface is not eroded or otherwise damaged.

18.0 MAINTENANCE

18.1. Maintain the stabilized area in a satisfactory condition until the completed work is accepted. Maintenance shall include immediate repairs to any defects and shall be repeated as often as necessary to keep the area intact. Defects shall be remedied as specified.

18.2. Traffic.

18.2.1 Completed portions of the cement-treated soils area may be opened immediately to light traffic provided the curing is not impaired. After the curing period has elapsed, completed areas may be opened to all traffic provided that the cement- stabilized course has hardened sufficiently to prevent marring or distorting of the surface by equipment or traffic. Heavy equipment will not be permitted on the area during the curing period. Cement and water may be hauled over the area with pneumatic-tired equipment as approved by the ENGINEER. Finished portions of cement-stabilized soil that are traveled on by equipment used in constructing an adjoining section shall be protected in a manner that prevents equipment from marring or damaging the completed work.

18.3. Subsequent Paving Operations.

18.3.1 Paving of subsequent RCC layers may begin seven (7) days after completion of all cement stabilized base compaction. Some minor fracturing of the cement stabilized base is expected and acceptable.

19.0 MEASUREMENT AND PAYMENT

19.1. Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 02450 - STEEL PILING

PART 1 – GENERAL

1.0 SCOPE OF WORK

This section covers furnishing all plant, equipment, labor and materials and performing all operations in connection with the installation of the steel pipe/sheet piling system. The CONTRACTOR is responsible to unload and stockpile all delivered materials.

2.0 SUBMITTALS

Equipment Description – The CONTRACTOR shall submit complete description of pile driving equipment, including hammers, extractors, protecting caps and other appurtenances to the ENGINEER for approval prior to commencement of work.

3.0 MATERIALS

3.1 Materials to be furnished shall be as shown on the drawings (or approved equal) and shall include but not be limited to the following:

3.1.1 Combination wall as required to achieve the in place dimensional requirements of the wall system as shown on the drawings.

3.1.2 Any other miscellaneous items (corner pieces, tie-in pieces, etc.) as required for a complete system installation as shown on the Drawings and Specifications.

3.1.3 All material shall be coated as specified.

3.2 Sheet Piling.

3.2.1 Steel for sheet piling shall conform to the requirements of ASTM A-572, Grade 60 and steel for the pipe shall conform to the requirements of A252 Grade 3 (60 ksi).

3.2.2 Piling shall be of the type indicated on the drawings (or approved equal) and be of a design such that when in place they will be continuously interlocked throughout their length.

3.2.3 All piling shall be provided with standard pulling holes located approximately four (4) inches below the top of the pile unless otherwise shown or directed.

3.2.4 Minimum system width shall be 108.5 inches to allow for storm drainpipe penetrations through the wall.

3.2.5 Piling shall be new and shall have properties equivalent to those listed in the following table:

Combination Wall

Type of Section	Nominal Web Thickness (Inches)	Section Modulus Per Lin. Ft. of Wall (in^3)	Weight Per Sq. Ft. of Wall (psf)	Length of Pile
Combination PNZ54/NZ19	–	154	51.8/49.1	–
54" Dia. Pipe	0.625 (Wall)	–	–	85 ft./ 90 ft./ 85 ft.
NZ19	0.375	–	–	68 ft./ 72 ft./ 85 ft.

3.3 Structural Steel – All structural steel for plate washers and wales shall conform to current requirements of ASTM A-572 Grade 60.

3.4 Certification – Certified copies of mill test reports including names and locations of mills and shops shall be furnished for all piling.

PART 2 – PRODUCTS

4.0 PROTECTIVE COATING

4.1 General Requirements – The Supplier shall provide the protective coating on the sheet piles of all pipe piles, including all associated steel attachments, as well as both sides of the sheet piles for the top 45 ft of the piles. In the designated areas the coating shall be applied to all surfaces of the steel sheet piling except the interior contacting surfaces of the interlocks.

4.2 Materials.

4.2.1 Protective coating shall be Bitumastic No. 300M coal tar epoxy manufactured by Carboline, or an approved equal. All protective coating material shall be new stock.

4.2.2 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.

PART 3 – EXECUTION

5.0 PREPARATION

5.1 Surface Preparation.

5.1.1 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.

5.1.2 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 workday, shall be whip-blasted before the application of the coating.

5.1.3 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.

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

5.2 Application of Coating.

5.2.1 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.

5.2.2 The two components of the coal tar epoxy coating shall be thoroughly mixed with the heavy-duty mechanical stirrer just prior to use, and the mixed material shall be used before unreasonable increases in viscosity take place.

5.2.3 The use of not more than one pint Xylene thinner per gallon of coal tar epoxy paint will be permitted 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.

5.2.4 Spray guns shall be of the conventional type, with 0.086" diameter fluid top 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 1/2" inside diameter.

5.2.5 The drying time between coats shall be not less than 12 hours. In no case shall more than 72 hours elapse between coal tar epoxy paint coats.

5.2.6 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.

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

5.2.8 **The CONTRACTOR shall exercise extreme care in the handling of all steel piling to avoid damaging the coated surfaces. Any damage resulting from handling operations shall be repaired to the satisfaction of the ENGINEER at no change in Contract Price.**

6.0 INSTALLATION

6.1 Placing and Driving

Placing – Piling shall be carefully located as shown on the drawings or as directed by the ENGINEER. Piles shall be placed in a plumb position with each pile interlocked with adjoining piles of its entire length to form a continuous diaphragm throughout the length of each run of wall. Interlocks shall be properly engaged with the thumb of each pile gripped by the thumb and finger of the adjacent pile. All piles shall be placed as true to line as possible. A lateral tolerance of two (2) inches will be permitted. Suitable temporary wales or guides structures shall be provided to ensure that the

piles are driven to correct alignment. In addition to driving templates, it is the CONTRACTOR'S complete responsibility to maintain the proper alignment of the sheet piles until encased in concrete.

6.1.1 Driving – All piles shall be driven to depths shown on the drawings and shall extend to the elevation indicated for the top of piles. A tolerance of two (2) inches above the indicated tip elevation will be permitted. Piles shall be driven by approved methods in such manner as not to subject the piles to serious damage and to insure proper interlocking throughout the length of the piles. Pile hammers shall be maintained in proper alignment during driving operations by use of suitable leads or by guides attached to the hammer. A protecting cap shall be employed in driving when required to prevent damage to the tops of piles. The CONTRACTOR shall remove all out-of-plumb piles and redrive them to the satisfaction of the ENGINEER. Piles shall be driven to grade progressively from the start and no pile shall be driven to a lower grade than those behind it cannot be driven deeper. If the pile next to the one being driven tends to follow below final grade, it may be pinned to the next adjacent pile. Should some obstructions render it impracticable to drive a pile to the specified penetration, the CONTRACTOR shall make such changes in design or alignment of the pile structure as may be deemed necessary by the ENGINEER to insure the adequacy and stability of the structure. Piles driven out of interlock with adjacent piles or otherwise injured shall be removed and replaced by new piles at the CONTRACTOR'S expense. Piles shall not be driven within 100 feet of concrete less than seven (7) days old, unless otherwise authorized by the ENGINEER.

6.2 Splicing and Cutting – Splicing of piles will not be permitted unless otherwise directed by the ENGINEER. Should splicing of piles be necessary, the splice shall be made by an approved butt weld making full penetration of the web. The CONTRACTOR shall trim the tops of piles excessively battered during driving, when directed to do so, at no cost to the OWNER. Cut-offs shall become the property of the CONTRACTOR and shall be removed from the work. The CONTRACTOR shall not cut holes in the piles unless shown on the drawings or specifically authorized by the ENGINEER. All cutting shall be done in a neat and workmanlike manner.

6.3 Pulling and Re-Driving – The CONTRACTOR may be required to pull certain selected piles after driving, for test and inspection, to determine the conditions of the piles. Any pile so pulled and found to be damaged to such extent as would impair its usefulness in the structure shall be removed from the work and the CONTRACTOR shall furnish and drive a new pile to replace the damaged pile.

Piles pulled and found to be in a satisfactory condition shall be re-driven and payment therefore will be made in accordance with paragraph 50-04 of Division IV.

7.0 WELDING FOR ELECTRICAL CONTINUITY

7.1 Steel sheet piling, tie rods, couplers, and nuts shall be welded for electrical continuity as shown and noted on the drawings. Protective coatings damaged by welding shall be repaired by coating as specified for the original coating.

8.0 MEASUREMENT AND PAYMENT

8.1 Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 02460 - PRESTRESSED CONCRETE PILING

PART 1 – GENERAL

1.0 SCOPE OF WORK

The work covered by this section consists of furnishing all labor, tools, equipment, materials, services and supervision necessary to install the prestressed concrete piles as indicated on the Contract Drawings.

2.0 REFERENCES

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 Section.

2.1.1 ASTM A416/A416M – Standard Specification for Low-Relaxation, Seven-Wire Steel Strand for Prestressed Concrete.

2.1.2 ASTM C150 – Standard Specification for Portland Cement

2.1.3 AASHTO - Standards Specifications for Highway Bridges

2.1.4 ACI 318 – Building Code Requirements for Structural Concrete and Commentary

2.1.5 ACI 543 – Guide to Design, Manufacture, and Installation of Concrete Piles

3.0 SUBMITTALS

3.1 Prior to installation, the CONTRACTOR shall submit the following to the ENGINEER:

3.1.1 Shop Drawings which shall provide plan view, elevation, length, dimensions, shape, cross section, types of reinforcement, prestress release and concrete compressive strength.

3.1.2 The concrete design mix shall be submitted for approval prior to casting.

3.1.3 Results of concrete cylinder compressive strength tests. Testing shall be in accordance with ACI 318, “Concrete Quality”.

3.1.4 Wave Equation Analysis Summary Report including an Inspector’s Chart showing minimum blows per foot for rated capacity.

3.1.5 Pile driving records shall be submitted within one day of installation of the individual piles.

3.1.6 Pile reinforcing stress calibration data

3.1.7 Pile template details

3.2 Preconstruction Wave Equation Analysis

3.2.1 The CONTRACTOR shall have a wave equation analysis performed based on the soil conditions and equipment to be employed. 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.

3.2.2 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 – $0.85f'c - fpe$

Tension Stresses – $3(f'c)\ 0.5 + fpe$

Where:

$f'c$ = Concrete Compressive Strength in psi

fpe = Effective Prestress After Losses in psi

3.2.3 The CONTRACTOR will retain a testing consultant to monitor pile driving and record data during installation. Pile Driving Records shall include:

a. Project name and number

b. Contractor Name

c. Pile location and designation

d. Pile dimensions

e. Final tip and cut off elevation of piles after driving the pile group

f. Depth of pre-auguring or jetting

g. Records of re-driving

h. Elevation of splices

i. Type, make, model, weight and energy of hammer

j. Actual hammer stroke and blow rate

k. Type of pile driving cap used

l. Cushion material and thickness

m. Pile driving start and finish times and total driving time

n. Number of blows for every 12 inches of penetration and number of blows per inch for the last six (6) inches of driving

o. Pile deviation from design location and plumb/batter angle

p. Special procedures or unusual circumstances during pile driving

q. As-built drawing indicating piling location, batter, tip elevation and cut off elevation.

PART 2 – MATERIALS

4.0 MANUFACTURE

4.1 General – Except as otherwise specified herein, the piles shall be manufactured, handled and driven in accordance with ACI 543. The piles shall be cast of concrete controlled, made, placed, and cured in accordance with SECTION 03300 – CAST-IN-PLACE CONCRETE, unless otherwise specified.

4.2 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 6,000 psi at 28 days. The design mix shall be submitted to the ENGINEER for approval prior to casting.

4.3 Materials.

4.3.1 Portland cement shall conform to ASTM C150, "Portland Cement", Type II or IIA.

4.3.2 Prestressing reinforcement shall conform to ASTM A416 "Uncoated Seven-Wire Stressed-Relieved Strand for Prestressed Concrete" (Grade 270).

4.3.3 Aggregate, bar reinforcement, water and air-entraining admixture shall conform to the applicable provisions of SECTION 03300 – CAST IN PLACE CONCRETE.

4.4 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 as described in ACI 543.

4.5 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 1/4 inch. 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 pounds per square inch. Piles shall be cast with 1” chamfer on all edges.

4.6 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. Pick up points shall be marked on each pile. Concrete test cylinders shall be taken during the time of casting by the CONTRACTOR.

4.7 Stressing Requirements.

4.7.1 The prestressing force and friction losses in the reinforcing members shall be measured by both jacking gages and by elongations of the reinforcement

in accordance with ACI 318. All jacks shall be equipped with accurate and calibrated gages for registering jacking pressures.

4.7.2 Means shall be provided for measuring the elongation of reinforcement at least to the nearest 1/32 inch. 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. It is anticipated and acceptable that there will be a difference in indicated stress between jack pressure and elongation of up to five percent 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 discrepancy between gage pressure and elongation exceeds five percent (5%), the entire operation shall be discontinued until the source of error is determined and corrected.

4.7.3 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.

4.7.4 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.

4.8 Stressing Procedure.

4.8.1 The amount of stress to be given each cable shall be shown on the supplier's fabrication 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 1,000 pounds shall be measured by some suitable means so that this amount can be used as a check against elongation computed and measured.

4.8.2 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 3.7 "Stressing Requirements".

4.8.3 Individual tensioning of the cables will be acceptable in lieu of the group tensioning specified above provided the required accuracy is maintained.

4.8.4 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 pounds per square inch, 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.

4.9 Curing – Concrete piles shall be carefully cured until the concrete has reached a compressive strength of 4,000 pounds per square inch in accordance with the provisions of SECTION 03300 – CAST-IN-PLACE CONCRETE. Pile casting shall not commence until the ENGINEER has approved, in writing, the method of curing. Piling may be steam cured in accordance with Section 7.5 of ACI 543. 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.

4.10 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 and in accordance with Section 7.7 of ACI 543. 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 damaged 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.

4.11 Provisions for Jetting – At the CONTRACTOR'S option, in accordance with Section 7.4.2 of ACI 543, P.V.C. and iron pipe and fittings may be cast in piles for jetting purposes. These details shall be submitted to the ENGINEER for approval if the CONTRACTOR elects this option

5.0 LENGTH OF PILES

5.1 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.**

PART 3 – EXECUTION

6.0 PLACING

6.1 Piles shall be driven accurately in correct locations, true to line both laterally and longitudinally and to vertical, batter and skew lines as indicated on the drawings and in accordance with the requirements of ACI 543. A lateral deviation from correct location at the cut-off elevation shall not exceed two (2) inches without pulling. A variation in slope from that specified of not more than 1/4 inch 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 no later than seven (7) days prior to driving piles

6.2 **In addition to driving templates, placing and maintaining piles within acceptable limits until encased in concrete shall be the CONTRACTOR'S complete responsibility. Special attention shall be paid in regard to adequate support for batter piles after driving. Any pile out of position shall be pulled and re-driven as directed at no additional cost to the OWNER. The CONTRACTOR shall provide access for the monitoring personnel to observe the pile installation.**

7.0 GEOTECHNICAL REPORT

7.1 The site geotechnical investigation is included in Appendix A and is provided as a reference to the CONTRACTOR. The subsurface and groundwater conditions stated in the geotechnical report are reported as observed during the sampling phase of the investigation. The soils information given is intended to provide an indication of the conditions that will be encountered but cannot be given as a guarantee.

8.0 PRECONSTRUCTION WAVE EQUATION ANALYSES

6.1 A minimum of fourteen (14) days prior to driving the piles, the CONTRACTOR shall have a wave equation analysis performed based on the soil conditions and equipment to be employed. 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.

6.2 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:

$$Compression\ stresses - 0.85 * f'_c - f_{pe}$$

$$Tension\ stresses - 3 * \sqrt{f'_c} + f_{pe}$$

Where:

$f'_c = concrete\ compressive\ strength\ in\ psi$

$f_{pe} = effective\ prestress\ after\ losses\ in\ psi$

9.0 DRIVING

9.1 The CONTRACTOR shall use a hammer of a size and type suitable for the driving conditions to be encountered with the general requirements of a ram weight to pile weight ratio of at least 1:5 and a rated energy of not less than 75,000 ft.-lbs. The hammer shall be always operated at the pressure and at the speed recommended by the manufacturer. Compressor capacity shall be sufficient to operate the hammer continuously at full rated speed.

9.2 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.

9.3 A pile shall not be driven until conditions and material characteristics have been approved for driving. Approval will be based upon the condition of curing and on a minimum of 6,000 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 tip elevation 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.

9.4 A pile which cannot be driven to the required depth because of an underground obstruction shall be pulled and re-driven if the obstruction can be removed or penetrated or the pile shall be cut-off, whichever is directed by the ENGINEER.

9.5 Water jets will be permitted to assist in driving the piles with depths of jetting as directed by the ENGINEER. The jetting equipment shall be of a type and capacity acceptable to the ENGINEER. Jetting of the pile shall be terminated at a depth such that the pile can be driven the final fifteen (15) feet to its designated tip elevation, or as otherwise directed by the ENGINEER. However, in all cases the

CONTRACTOR shall be required to have means for accurately measuring the depth of such jetting.

9.6 Piles which have uplifted after driving shall be re-driven to design tip elevation after conclusion of other driving activity in that general area. Unless otherwise authorized by the ENGINEER, no pile shall be driven within 100 feet of concrete less than seven (7) days old.

9.7 Pile Installation Monitoring – In addition to maintaining records of installation, the CONTRACTOR shall retain the services of a Dynamic Testing Consultant to perform Dynamic Strain Testing on a number of piles as sown in the Drawings. Dynamic Strain Testing is outlined in Section 02480.

10.0 HEAD ADAPTER

10.1 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.

11.0 DAMAGED AND MISPLACED PILES

11.1 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.

11.2 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 re-driven.

12.0 CUT-OFFS.

12.1 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.

12.2 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.

12.3 Cut-off segments and other debris generated while cutting off piles shall not be left in the Mobile River or the MRT slip.

13.0 SPLICING

13.1 Splices may only be made at locations noted on the drawings or as directed by the ENGINEER. At such locations, 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.

13.2 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.

13.3 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.

13.4 Immediately prior to placing the concrete, the top of the pile shall be prepared and coated with a bonding material as provided by Section 03300 – CAST-IN-PLACE Concrete, paragraph 4.6. 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 03300 – CAST-IN-PLACE, paragraph 10.0 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.

14.0 MEASUREMENT AND PAYMENT

14.1 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 one-tenth foot.

14.2 Payment Piles – Payment for each permanent pile acceptably driven will be made in accordance with the applicable Schedule of Prices, which price shall include all items incidental to furnishing and driving the piles, redriving uplifted piles, 2-foot pile cut-offs or alternate 2-foot 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.

14.3 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 seventy-five percent (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-foot cut-offs or the alternate 2-foot exposed reinforcement section which will be a subsidiary obligation of the CONTRACTOR covered under the unit prices for the in-place piles.

14.4 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.

14.5 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 twenty-five percent (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.

END OF SECTION

SECTION 02470 – AUGER CAST-IN-PLACE PILING

PART 1 – GENERAL

1.0 SCOPE OF WORK

1.1 The work covered under this Section includes furnishing all labor, equipment, materials and incidentals necessary to complete all augured (nondriven) cast-in-place concrete (typically grout) bearing pilings indicated on the Drawings and required by these specifications.

1.2 Auger-cast pilings shall be installed by a piling contractor regularly engaged in auger cast piling work for a minimum of five (5) years. The piling contractor shall have satisfactory history of auger-cast piling work on projects of this magnitude and larger. Submit a list of similar completed projects.

1.3 The Piling Contractor shall examine the areas and conditions under which piles are to be installed and notify the CONTRACTOR and the ENGINEER in writing of conditions detrimental to the proper and timely completion of the work.

1.4 Soil borings have been performed on the construction site. However, it shall be noted that these borings are made available for the CONTRACTOR'S convenience only and neither the OWNER nor the ENGINEER states or implies any guarantee as to differences that may occur between soil conditions on the site and those indicated by the boring logs.

1.5 The design bearing capacity for each piling and the designated piling length shall be as shown on the drawings.

2.0 REFERENCES

2.1 American Society for Testing and Materials (ASTM)

2.1.1 ASTM A615/A615M – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

2.1.2 ASTM C33/C33M – Standard Specification for Concrete Aggregates

2.1.3 ASTM C109/C109M – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)

2.1.4 ASTM C150/C150M – Standard Specification for Portland Cement

3.0 SUBMITTALS

3.1 The CONTRACTOR shall submit to the ENGINEER for approval the mix which he proposes to use for the Auger Cast Pile Grout and all requisite literature and product records no later than one (1) week prior to commencing the pile installation work.

3.2 A trial batch of the mix shall have been made and tested in accordance with ASTM C109 by a Testing Laboratory, approved by the OWNER, and test results shall be submitted to the ENGINEER. The Testing Laboratory shall be hired by the CONTRACTOR, who shall make the necessary arrangements with the testing laboratory to facilitate concrete sampling and testing

3.3 The installation of all piling will be monitored by the Testing Laboratory and daily logs shall be kept for all piling installed. Copies of the daily logs shall be furnished submitted to the ENGINEER. The daily logs shall contain the following information regarding all piles placed.

3.3.1 Pile number

3.3.2 Diameter of pile

3.3.3 Elevation of the pile tip

3.3.4 Elevation of top of pile (cut off elevation)

3.3.5 Length of pile

3.3.6 Volume of grout placed in pile

3.3.7 Grout pressure used in casting pile

PART 2 – MATERIALS

4.0 MATERIALS

4.1 High strength grout shall be a mix of Portland Cement, pump aid and retarder, sand and water so proportioned as to provide a grout capable of maintaining solids suspension without appreciable water gain, yet which may be placed without difficulty, and which will laterally penetrate and fill any voids in the foundation material. Fly ash shall not be used.

4.2 The high strength grout shall be designed to have a minimum compressive strength of 4,000 psi at 28 days.

4.3 The grout shall consist of the following:

4.3.1 Portland cement meeting ASTM C150, Type-1.

4.3.2 Fine aggregate conforming to ASTM C33, except that percentages passing #30 sieve can vary from 15% to 60%.

4.3.3 Aggregate shall consist of dense, hard, clean uncoated particles free of injurious amounts of silt, loam, lumps, soft or flaky particles, shale, alkali, organic matter, loam, mica and other deleterious materials.

4.3.4 If washed, the washing method shall be such that desirable fines are not removed; after washing, sand shall be allowed to dry until the residual moisture is uniform and stable.

4.3.5 The sand shall be well graded from fine to coarse with a fineness modulus of between 1.40 and 3.40. The "fineness modulus" is defined as the total divided by 100 of the cumulative percentages on U.S. Standard sieves, Nos. 16, 30, 50 and 100.

4.3.6 Water used in high-strength grout shall be clean, potable and free of all deleterious materials.

5.0 EQUIPMENT

5.1 Auger equipment shall meet the following requirements:

5.1.1 The hole through which the high strength grout is pumped during placement of the pile shall be located at the bottom of the auger head, below the bar containing the cutting teeth.

5.1.2 The auger flighting shall be continuous from the auger head to the top of the auger without gaps or other breaks.

5.1.3 The auger tip shall have a knockout point with a steel plug. All grout pumped into the pile shall go through this tip only.

5.1.4 The main drive on the crane shall be equipped with a torque converter.

5.1.5 The auger shall be supported by suitable leads including a center guide which shall be braced as required to prevent twisting and/or bending and to maintain proper alignment of the auger.

PART 3 – EXECUTION

6.0 EXECUTION

6.1 Installation.

6.1.1 Piles must be installed prior to construction of the Modular Concrete Retaining Wall. During construction of the wall, the geogrid will be placed around the piles.

6.1.2 Prior to initiating installation of any piling, calibration of the pump and discharge hose shall be performed in the field using a suitable drum (55-gallon nominal capacity) to determine the volume of concrete placed per pump stroke. The amount of concrete placed in each piling shall be recorded based on the calibration test results (volume per stroke value); the volume of concrete placed in each piling shall not be less than the theoretical volume of the augured hole plus 10 percent.

6.1.3 The continuous hollow shaft flight auger shall be rotated into the ground to the required depth of penetration as shown on the plans and specified herein.

6.1.4 When the auger has penetrated to the required depth, concrete shall be pumped through the shaft under a pressure at discharge of about 50 psi. The minimum pressure recorded at the pump shall be 175 psi. The auger shall continue to be rotated slowly (3-5 RPM) in a forward (digging) direction and then shall be slowly withdrawn, allowing the concrete under pressure to fill the shaft and to penetrate laterally into any porous soils as the auger is withdrawn. The auger shall not be allowed to advance ahead of the concrete and allow soils to cave into the augured shaft such as may be detected by a drop in pressure at the pump. This procedure shall continue without break from bottom to top of piling. Reinforcement as required by the plans shall be installed from the top after placement of concrete is completed and while concrete is fluid except for center reinforcement bars where required which may be installed, prior to pumping, through the hollow auger stem.

6.1.5 A head of at least several feet of grout above the injection point shall be carried around the perimeter of the auger flighting at all times during the raising of the auger so that the high strength grout has displacing action removing any loose material from the hole.

6.1.6 This method of placement shall be used at all times and not be dependent on whether the hole is sufficiently stable to retain its shape without support from the earth-filled auger.

6.1.7 Reinforcement shall be placed while grout is fluid.

6.1.8 Any unusual conditions shall be brought to the attention of the ENGINEER immediately.

6.1.9 Installation of piling shall be ceased, if at any time, the equipment is not operating properly to the satisfaction of the Testing Laboratory.

7.0 MEASUREMENT AND PAYMENT

7.1 Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 02480 – HIGH STRAIN DYNAMIC TESTING OF PILE FOUNDATIONS

PART 1 – GENERAL

1.0 SCOPE OF WORK

1.1 Dynamic monitoring involves attaching at least two (2) strain transducers and two (2) accelerometers to the pile near the pile head during initial driving and during restrike testing. A cable or wireless transmission connects the sensors near the pile head with the Pile Driving Analyzer located a safe distance from the pile, but not more than 300 ft from the pile. Monitoring will be conducted as follows:

1.1.1 Dynamic Pile Monitoring – Monitoring consists of obtaining dynamic measurements with a Pile Driving Analyzer (PDA) of monitor piles during initial pile driving and during pile restrikes.

1.1.2 Pile Restrike – Pile restrikes are performed a given time after initial drive to assess the time dependent changes in pile capacity.

1.2 The CONTRACTOR shall employ a Dynamic Testing Consultant (DTC) to furnish equipment, materials, and labor necessary for conducting dynamic pile monitoring and analyses shown below. The minimum requirement of the DTC shall be a Master Level PDA tester as certified by Pile Dynamics / Pile Driving Contractors Association.

1.3 The location of piles to be tested is shown on the drawings. Additional production piles may be monitored if deemed necessary by the ENGINEER.

2.0 REFERENCES

2.1 ASTM D4945 – Standard Test Method for High-Strain Dynamic Testing of Deep Foundations

3.0 SUBMITTALS

3.1 Field Report – Within two (2) days of dynamic pile monitoring, the CONTRACTOR shall prepare a daily field report summarizing the dynamic monitoring results. As a minimum, the daily reports shall include the calculated driving stresses, transferred energy, and estimated pile capacity at the time of testing. Daily field reports shall be transmitted to the ENGINEER.

3.2 Following the CAPWAP analysis, the DTC shall submit two (2) copies of the results to the ENGINEER within one (1) week of receiving the data unless otherwise directed by the ENGINEER.

PART 2 – EQUIPMENT

4.0 EQUIPMENT

4.1 Pile Driving Analyzer – The Pile Driving Analyzer (PDA) shall be capable of four (4) channels of strain data and four (4) channels of acceleration data acquisition. The PDA shall conform to the requirements of ASTM D-4945.

PART 3 – EXECUTION

5.0 INSTALLATION

5.1 Accelerometers and strain transducers should be properly mounted near the pile head and connected to the PDA.

6.0 DYNAMIC TESTING

6.1 Initial Pile Installation – During initial pile driving, the PDA should continuously record the hammer blows, force, acceleration, and other relevant data.

6.2 Restrike – A restrike test should be conducted on each monitored pile within three (3) to seven (7) days following pile installation. The PDA should record the restrike data, including force, acceleration, and any other relevant parameters.

7.0 ANALYSIS

7.1 Case Pile Wave Analysis Program (CAPWAP) – A CAPWAP analysis will be conducted for each occurrence of dynamic monitoring. The DTC shall use the results from the CAPWAP data for the following:

7.1.1 Assess pile installation stresses and integrity, as well as to predict the pile's static bearing capacity and resistance distribution.

7.1.2 Verify the Pile Driving Analyzer's Case pile capacity assumptions and to determine the distribution of soil static resistance, quakes, and damping factors used in the wave equation analysis.

7.1.3 Establish the relationship between stroke, energy, and blow count in the wave equation.

7.1.4 Make any necessary changes to the inspector's chart to be used during pile driving.

8.0 MEASUREMENT AND PAYMENT

8.1 Dynamic Pile Monitoring – The number of dynamic monitoring to be paid for will be the number of dynamic monitoring occurrences on monitor piles ordered and completed. Dynamic monitoring during initial pile driving shall be considered as a single monitoring occurrence. Additionally, monitoring during pile restrike shall be considered as a separate monitoring occurrence. Dynamic monitoring occurrences that are necessary because of CONTRACTOR error shall not be measured for payment. Quantities of dynamic pile monitoring and dynamic analysis will be shown on the Drawings. Payment for monitoring will be made in accordance with the applicable Schedule of Prices.

8.2 Dynamic Analysis – The number of dynamic analyses to be paid for will be the number of dynamic analysis occurrences on test piles or monitor piles. Dynamic analysis occurrences that are necessary because of Contractor error shall not be measured for payment. Payment for monitoring will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 02510 – CHAIN LINK FENCE AND GATES

PART 1 – GENERAL

1.0 SCOPE OF WORK

1.1. The work covered by this specification consists of furnishing all labor, tools, equipment, materials, services and supervision necessary to install the chain link fence and gates. The CONTRACTOR shall furnish, fabricate, deliver, and erect chain link fence complete with posts, gates, and other accessories in accordance with the specification and drawings. Excavate all post foundations and construct concrete foundations for chain link fence and gates.

2.0 REFERENCES

2.1. American Society for Testing and Materials (ASTM)

2.1.1 ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

2.1.2 ASTM A90/A90M – Standard Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings

2.1.3 ASTM A121 – Standard Specification for Metallic-Coated Carbon Steel Barbed Wire

2.1.4 ASTM A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

2.1.5 ASTM A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

2.1.6 ASTM A392 – Standard Specification for Zinc-Coated Steel Chain Link Fence Fabric

2.1.7 ASTM F626 – Standard Specification for Fence Fittings

2.1.8 Chain Link Fence Manufacturers Institute (CLFMI) – Product Manual

3.0 FENCE STYLE

3.1. Fencing shall be chain link fabric with top and bottom tension wire. Fencing shall be 2-inch mesh "Standard Industrial" grade in accordance with the Chain Link Fence Manufacturers Institute Product Manual.

4.0 SUBMITTALS

4.1. The CONTRACTOR shall submit the following to the ENGINEER for review and approval.

4.1.1 Shop drawings with details

4.1.2 Touch-up paint procedure.

PART 2 – PRODUCTS

5.0 MATERIALS

5.1. The fencing shall consist of an 8-ft. fabric height with top and bottom tension wire. Line posts shall be spaced equidistant at intervals not exceeding 10 ft. Terminal (corner, gate, and pull) posts shall be set at abrupt changes in vertical and horizontal alignment. Fabric shall be continuous between terminal posts. For details of gates refer to the Contract Drawings.

5.2. All fence and gate materials shall be supplied and installed in accordance with the CLFMI Product Manual unless otherwise specified herein or as detailed on the Contract Drawings.

5.3. Galvanized Steel Fence Material

5.3.1 Chain link fence fabric shall be in accordance with ASTM A392.

a. Chain link fabric shall be woven of No. 9 gauge good commercial quality steel wire hot-dipped galvanized after weaving to Class I weight of coating, not less than 1.20 oz/sf of actual wire surface covered. Excessive roughness, blisters, salammoniac spots, bruises, or flaking may provide a basis for rejection. The fabric shall have a uniform diamond mesh approximately two (2) inches between the

parallel sides. Top selvages shall have a twisted and barbed finish, and bottom selvage shall be knuckled.

b. Brace rails shall be furnished with rails of galvanized steel, Nominal Pipe Size, (NPS) 1-1/4, 2.28 lb/ft conforming to ASTM A53.

c. Brace assembly shall be completed with 3/8-inch diameter galvanized steel truss rod and adjustable take-up. Zinc coating shall be 2 oz/sf of uncoated rod surface as determined by ASTM A90.

d. Posts shall be furnished as:

(i) Line posts shall be galvanized steel pipe, NPS 2, 3.66 lb/ft, conforming to ASTM A53.

(ii) End, corner, angle, and intermediate braced posts shall be galvanized steel pipe, NPS 2-1/2, 5.80 lb/ft, conforming to ASTM A53.

(iii) Gate posts shall be galvanized steel pipe conforming to ASTM A53 in sizes as shown below:

Type of Gate	***Single Gate Opening (ft)***	***Double Gate Opening (ft)***	***NPS***	***Weight (lb/ft)***
Swing	6 to 13	12 to 26	3½	9.20
Swing	13 to 20	26 to 40	8	28.58

(iv) Post tops shall fit over the outside of posts and shall exclude moisture from posts.

e. Swing gates shall be the same height as the fence, complete with latches, stops, and keepers.

(i) Gate frames shall not be less than NPS 1½, 2.72 lb/ft, conforming to ASTM A53, with galvanized pressed steel or galvanized malleable iron riveted or bolted corner fittings or

alternate welded connection. Gates shall have 3/8-in diameter galvanized steel truss rods and adjustable take-ups where necessary to provide gate rigidity without sag or twist.

(ii) Gates shall be provided with the same fabric used for the fence and shall be furnished with additional horizontal and/or vertical members to ensure proper operation and for attachment of fabric, hardware, and accessories.

(iii) Gates shall be hung by at least two galvanized steel or malleable iron hinges, three (3) inches or more in width, which allow the gate to swing 180 degrees.

(iv) Single swing gates shall have a fork latch. Double gate latches shall have a plunger-bar arranged to engage the center stop. Provide padlocking device for all latches, but padlocks shall not be furnished.

(v) Gate frames shall not be less than NPS 1½, 2.72 lb/ft, conforming to ASTM A53, with galvanized pressed steel or galvanized malleable iron riveted or bolted corner fittings or alternate welded connection. Gates shall have 3/8-in diameter galvanized steel truss rods and adjustable take-ups where necessary to provide gate rigidity without sag or twist.

(vi) Gates shall be provided with the same fabric used for the fence and shall be furnished with additional horizontal and/or vertical members to ensure proper operation and for attachment of fabric, hardware, and accessories.

(vii) Gates shall be hung by at least two galvanized steel or malleable iron hinges, three (3) inches or more in width, which allow the gate to swing 180 degrees.

(viii) Single swing gates shall have a fork latch. Double gate latches shall have a plunger-bar arranged to engage the center stop. Provide padlocking devices for all latches, but padlocks shall not be furnished.

f. Barbed wire shall be two-strand 12½ gauge or 15½ gauge with four-point barbs spaced at five (5) inch intervals conforming to ASTM A121. Galvanizing shall be Class 3.

g. Miscellaneous items shall be furnished as:

(i) Tension bars shall be 3/4-in by 1/4-in. galvanized steel, and not less than 2-in. shorter in length than the nominal height of the fabric.

(ii) Bands for fastening tension bars to terminal, corner, and gate posts and frames shall be 12 gauge, 7/8-in wide galvanized steel.

(iii) Miscellaneous hardware such as bolts, nuts, washers, clips, etc., shall be galvanized in accordance with ASTM A153.

PART 3 – EXECUTION

6.0 FENCE ERECTION

6.1. Line posts shall be evenly spaced 10 ft or less apart. Erect fence so that it is plumb, taut, true to line and grade, and complete in all detail. Stake down fence, where required. Fabric shall be installed on outside of fence posts and outside face of fabric shall be on the lines shown on the drawings. Fence installation shall be in accordance with fence manufacturers written installation instructions.

7.0 GRADING

7.1. In ungraded areas, the fence shall follow the existing ground line. Minor irregularities shall be removed or filled by grading 2 ft on each side of the fence. The bottom of fence shall be within 2-in of finished grade line.

8.0 ANGLES

8.1. Changes in line where the vertical angle of deflection exceeds 20 degrees, or the horizontal angle exceeds 10 degrees, shall be considered as corners, and corner posts shall be installed.

9.0 BRACING

9.1. Brace all end, corner, angle and gate posts. Brace the line posts in both directions at intervals not exceeding 500 ft.

9.2. Locate brace assembly between top rail and bottom rail. Secure brace assembly to posts with suitable galvanized steel or malleable iron fittings.

9.3. Extend brace assembly from end post to the first adjacent line post, and truss back to the base of end post with rod.

10.0 FOUNDATIONS

10.1. All posts shall be set in concrete or grout with a minimum compressive strength per Section 03300 – CAST-IN-PLACE CONCRETE. All posts, except gate posts, shall be embedded 36 inches into the concrete foundation. Gate posts shall be embedded 42 inches into the foundation. The use of mechanical devices for anchoring fence posts in the ground will not be allowed. Line post foundations shall be 12 inches in diameter. End and corner post foundations shall be 16 inches in diameter. Gate post foundations shall be 16 inches in diameter or four times the outside diameter of the post, whichever is greater.

10.2. Center stops shall be embedded in a concrete foundation. The top of the foundation shall be shaped to permit the stop to drain to the surrounding ground. No vertical edges of concrete or steel shall be exposed to traffic.

11.0 FABRIC

11.1. No. 9 gauge galvanized wire ties shall be used to fasten the fabric to line posts at a spacing not to exceed 15 inches, and to the top and bottom rails at a spacing not to exceed 24 inches.

11.2. Gate fabric shall be attached to gate frames in a manner similar to that used to attach the fence fabric.

12.0 GATE ERECTION

12.1. Gate installation shall include gate frames, tension bars, fabric, latches, stops, locking devices, hinges, gate posts with braces, tie rod, take-ups, caps, and all fittings and details for gates and gate posts, all as specified, shown on the drawings

and as required to make up a complete installation. Gates shall be carefully aligned with posts vertical. Clamps used for attaching hardware shall be made up tight. The bottom of each gate shall clear the ground by 2½ in. maximum and 1½ in. minimum at all points in its swing. The Supplier shall modify the existing grade to meet this requirement, if necessary, as directed by the OWNER.

12.2. Stops shall be provided for all gates to prevent damage to the gate or fence by overswing, and to arrest the swing of a closed gate at the centerline of the fence. Keepers shall be provided to automatically catch the gate when swung open, and to hold it in this position.

13.0 FIELD TOUCH-UP OF GALVANIZING

13.1. Repairs of galvanized coating shall be made with Cold Galvanizing Compound, as manufactured by ZRC Worldwide, or equal when approved by the OWNER. Damaged surface shall be cleaned of all rust and prepared in accordance with manufacturer's instructions prior to application of compound. CONTRACTOR to submit touch up paint submittal.

14.0 MEASUREMENT AND PAYMENT

14.1. Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 02630 – TRENCH DRAINS

PART 1 – GENERAL

1.0 SCOPE OF WORK

1.1. This work covered by this Section consists of furnishing all labor, tools, equipment, materials, services and supervision necessary for the complete installation of the trench drains. The drains shall be cast-in-place concrete drains or prefabricated drainage channels encased in cast-in-place concrete. The drains shall be constructed to form a channel for the collection and flow of storm water. Grates shall be installed to allow water to pass into the channel and to allow vehicular traffic to move over the drains. All trench drain components shall conform to (CLASS F) of Standard, Drainage Channels for Vehicular and Pedestrian Areas (Classification, design and testing requirements, marking and evaluation of conformity) English version of DIN EN 1433:2002 + AC:2004 + A1:2005.

2.0 REFERENCES

2.1. ASTM International:

2.1.1 ASTM A36 – Standard Specification for Carbon Structural Steel

2.1.2 ASTM A48 – Standard Specification for Gray Iron Castings

2.1.3 ASTM A123 – Standard Specification for Zinc (Hot-Dip-Galvanized) Coatings on Iron and Steel Products

2.1.4 ASTM A536 – Standard Specification for Ductile Iron Castings

2.1.5 ASTM B117 – Standard Practice for Operating Salt Spray (Fog) Apparatus

2.2. Deutsche Norm

2.2.1 DIN EN 1433 – Drainage Channels for Vehicular and Pedestrian Areas

3.0 SUBMITTALS

3.1. The CONTRACTOR shall submit the following items to the ENGINEER prior to beginning work outlined in this section:

3.1.1 Product Data – Submit data for the trench drain channel, grates and frames and a listing of all materials required for the construction of the trench drain.

3.1.2 Manufacturer's Certificate – Certification that the products meet or exceed specified requirements.

PART 2 – PRODUCTS

4.0 DRAIN CHANNEL

4.1. The minimum width and depth of the drain channel below the drain grate is shown on the plans. The drain channel shall have a rounded bottom. Connections to structures shall not restrict the hydraulic flow of the drain channel. Drainage channel shall be of reinforcement concrete with adequate strength to withstand a compressive load of 13 ksi and a bending load of 3.2 ksi.

5.0 DRAIN CHANNEL ROUGHNESS COEFFICIENT.

5.1. The drain channel shall have a smooth interior face. The roughness coefficient for the interior face of a prefabricated drain channel shall not be greater than 0.010. The interior face of a cast-in-place drainage channel shall have a troweled surface finish in accordance with the requirements of Section 03300 – CAST-IN-PLACE Concrete.

6.0 CONCRETE

6.1. The concrete shall be Class AA concrete in accordance with the requirements given in Section 03300 – CAST-IN-PLACE Concrete, Item 2.3.B. The minimum amount of concrete around the drain channel will be shown on the plans. Concrete shall be placed in a monolithic pour between inlet structures. Construction joints will only be allowed if approved by the ENGINEER. If joints are allowed, they shall be constructed with a water stop and a concrete lug or keyway approved by the ENGINEER.

7.0 GRATES AND FRAMES.

7.1. The grates, and the frames for supporting the grates, shall be made from ductile iron conforming to ASTM A536, Grade 65-45-12 or cast-iron conforming to ASTM A 48 Class 38B.

7.2. The opening in the grate shall be a minimum of 60% of the open area at the top of the drain.

7.3. The CONTRACTOR shall submit results from an independent laboratory verifying the grates meet the requirements given in DIN EN 1433 A1:7.15.2 (CO/9.84) x (test load) (202 Kips), for "Proof Load Testing". The testing must also verify the grates adequacy of permissible permanent set per DIN EN 1433 A1:7.16 Table 11.

7.4. Grate retaining devices shall not obstruct the flow of water into the channel or through the channel.

7.5. A grate shall fit into the frame without rocking. It shall be held in place by stainless steel tamper resistant locking devices.

7.6. The CONTRACTOR shall submit results from an independent laboratory verifying the grates will withstand a minimum repetitive pullout resistance of 200 pounds per foot {5 kN per meter} after the completion of 1,000 hours of salt spray in conformance with ASTM B 117. The grate retaining device shall withstand, without maintenance, cyclic vertical loads of 500 pounds {2.2 kN}.

7.7. Frames shall be independent of the channel and shall be anchored into the surrounding concrete by metal extensions attached to the frame at all four corners.

7.8. Anchors that are cast into the concrete shall be ASTM A36 structural steel, post fabrication galvanized per ASTM A123.

8.0 PREFABRICATED DRAIN CHANNEL

8.1. Prefabricated drain channels shall be made from components that are anchored by the placement of concrete to encase the anchoring lugs that are integral to the channel components.

8.2. The physical properties of the prefabricated drain channel shall be compatible with the physical properties of the concrete. The thermal coefficient of expansion shall be similar to that of the concrete so that separation does not occur between the prefabricated drain channel and the encasement concrete.

8.3. Prefabricated drain channels shall interlock with adjoining channels.

PART 3 – EXECUTION

9.0 GENERAL

9.1. A representative of the trench drain manufacturer shall be present to advise the ENGINEER of the adequacy of the first trench drain units that are installed. The installation of the trench drain units shall not begin until the manufacturer's representative is present at the site of installation.

9.2. Connection to an existing structure may require the use of a transitional fitting and/or sections of pipe to provide a suitable connection without damage to the grate, drain and structure. Connections to structures shall be approved by the ENGINEER prior to construction.

9.3. When the trench drain begins or terminates without a connection to other pipes or drainage structures, the trench drain end shall be sealed or plugged with a suitable cap as shown on the plans. The seal shall provide a waterproof connection.

10.0 TRENCH EXCAVATION

10.1. Excavation shall be kept as nearly as possible to the minimum width, depth, and length shown on the plans.

11.0 DRAIN PLACEMENT AND PROTECTION

11.1. Precast drains shall be installed to the lines and grades shown on the plans or as directed by the ENGINEER. A representative of the trench drain manufacturer shall be present to advise the ENGINEER of the adequacy of the first trench drains that are installed.

11.2. The trench slot shall be protected during installation by a removable wood strip, heavy duty tape, or other suitable material, affixed to the slot to prevent infiltration of material into the drain. After finishing the surface, the protective covering shall be removed and any debris that entered the trench shall be removed.

12.0 CONCRETE PLACEMENT

12.1. The furnishing and placement of the concrete shall be in accordance with the requirements given in Section 03300 – CAST-IN-PLACE CONCRETE.

12.2. The prefabricated trench drain components shall be supported or held in place in such a manner as to permit flow of the concrete backfill material around the drain.

12.3. The concrete encasement adjacent and beneath the drain channel shall be a minimum thickness of 6 inches. Drain channels shall be positioned in the excavated trench so that, when finished, the surrounding concrete backfill will encase the channel.

12.4. Concrete backfill shall be placed in the trench against undisturbed material at the sides and bottom of the trench and in a manner that will prevent floating or shifting of the trench drain components and voids in, or segregation of, the concrete. Where necessary, earth plugs shall be constructed and compacted at the ends of the planned concrete backfill to contain the concrete within the trench.

12.5. Concrete shall be finished flush with adjacent surfacing. The surface of the concrete shall be textured with a broom or burlap drag to produce a durable skid-resistant surface.

12.6. Under no circumstances shall any portion of the trench drain slot extend above the paving material or curb and gutter section.

13.0 JOINTING OF DRAINAGE CHANNEL UNITS

13.1. The joint between channel units shall be designed in such a way that it may be durably sealed. When tested in accordance with DIN EN 1433 A1:2002: 9.3.6, the joint and the bodies shall not show leakage. The manufacturer shall state the method of installation in his instructions.

14.0 MEASUREMENT AND PAYMENT

14.1. Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 02763 – PAVEMENT MARKINGS

PART 1 – GENERAL

1.0 SCOPE OF WORK

1.1. The work covered by this section consists of furnishing all labor, tools, equipment, materials, services and supervision necessary for the pavement markings including but not limited to traffic lines and markings, legends, paint and glass beads.

2.0 REFERENCES

2.1. Alabama Department of Transportation (ALDOT)

2.1.1 Standard Specifications for Highway Construction

a. Section 701 – Traffic Stripe

b. Section 856 – Traffic Marking Materials

2.2. American Society for Testing and Materials International (ASTM):

2.2.1 ASTM D34 – Standard Guide for Chemical Analysis of White Pigments.

2.2.2 ASTM D476 – Standard Classification for Dry Pigmentary Titanium Dioxide Products

2.2.3 ASTM D562 – Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer.

2.2.4 ASTM D711 – Standard Test Method for No-Pick-Up Time of Traffic Paint.

2.2.5 ASTM D1475 – Standard Test Method for Density of Liquid Coatings, Inks and Related Products.

2.2.6 ASTM D2369 – Standard Test Method for Volatile Content of Coatings

2.2.7 ASTM D2486 – Standard Test Methods for Scrub Resistance of Wall Paints.

2.2.8 ASTM D3723 – Standard Test Method for Pigment Content of Water-Emulsion Paints by Low-Temperature Ashing.

2.2.9 ASTM D3960 – Standard Practices of Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.

2.2.10 ASTM E70 – Standard Test Method for pH of Aqueous Solutions With the Glass Electrode.

2.2.11 ASTM E1349 – Standard Test Method for Reflectance Factor and Color by Spectrophotometry Using Bidirectional (45°:0° or 0°:45°) Geometry.

3.0 SUBMITTALS

3.1. Prior to beginning work covered under this section, the CONTRACTOR shall submit the following to the ENGINEER:

3.1.1 Product Data – ALDOT BMT-178 Traffic Marking Materials Certificate of Compliance and BMT-180 Report on Analysis of Traffic Marking Materials paint formulation for each type of paint.

3.1.2 Samples:

a. Submit sample plates for each color of material. Prepare four (4) plates for each different batch of material. After approval, OWNER will retain these plates for field comparisons of applied paint.

b. Submit one (1) quart paint samples accompanied by properly executed test reports.

3.2. Manufacturer's Installation Instructions – Submit instructions for application temperatures, eradication requirements, application rate, line thickness, and any other data on proper installation.

3.3. Manufacturer's Certificate – Certification that products meet or exceed specified requirements.

3.4. Manufacturer's qualifications.

3.5. Installer's qualifications.

3.6. Maintain one (1) copy of each submittal on site.

4.0 QUALITY ASSURANCE

4.1. Perform work in accordance with ALDOT Standard Specifications for Highway Construction, Division 700.

5.0 QUALIFICATIONS

5.1. Manufacturer – Company specializing in manufacturing products specified in this section with minimum three (3) years' experience.

5.2. Applicator – Company specializing in performing work of this section with minimum three (3) years' experience.

6.0 DELIVERY, STORAGE, AND HANDLING

6.1. Containers shall be inverted several days prior to use when paint has been stored more than three (3) months. Exposure to air shall be minimized when transferring paint. Drums and tanks should be sealed when not in use.

7.0 ENVIRONMENTAL REQUIREMENTS

7.1. Materials shall not be applied when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.

7.2. Exterior coatings shall not be applied during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.

7.3. Paint shall not be applied when temperatures are expected to fall below 60 degrees F for 24 hours after application.

7.4. Volatile Organic Content (VOC) – State or Environmental Protection Agency maximum VOC regulations shall not be exceeded for traffic paint.

8.0 WARRANTY

8.1. A three (3) year manufacturer's warranty shall be provided for traffic paints.

PART 2 – PRODUCT

9.0 PAINTED PAVEMENT MARKINGS

9.1. Furnish materials in accordance with ALDOT Standard Specifications for Highway Construction, Division 700.

9.2. Paint – Class 1H High Build Paint.

10.0 EQUIPMENT

10.1. Continuous Longitudinal Line Application Machine – Use application equipment with following capabilities.

10.1.1 Dual nozzle paint gun to simultaneously apply parallel lines of indicated width in solid or broken patterns or various combinations of those patterns.

10.1.2 Pressurized bead-gun to automatically dispense glass beads onto painted surface, at required application rate.

10.1.3 Measuring device to automatically and continuously measure length of each line placed, to nearest foot (tenth of meter).

10.1.4 Device to heat paint to 130 degrees F for fast dry application.

10.2. Machine Calibration:

10.2.1 Paint Line Measuring Device – Calibrate automatic line length gauges to maintain tolerance of ± 25 feet per mile.

10.2.2 Cycle Length/Paint Line Length Timer – Calibrate cycle length to maintain tolerance of ± 6 inches per 40 feet calibrate paint line length to maintain tolerance to ± 3 inches per 10 feet.

10.2.3 Paint Guns – Shall be calibrated to simultaneously apply paint binder at uniform rates, as specified, with an allowable tolerance of ±1 mil.

10.3. Other Equipment:

10.3.1 For application of crosswalks, intersections, stop lines, legends and other miscellaneous items by walk behind stripers, hand spray or stencil

trucks, apply with equipment meeting requirements of this section. Hand brushes or rollers shall not be used.

11.0 SOURCE QUALITY CONTROL

11.1. Traffic paints shall be tested and analyzed in accordance with ALDOT Standard Specifications for Highway Construction.

PART 3 – EXECUTION

12.0 EXAMINATION

12.1. Paint shall not be applied to concrete surfaces until concrete has cured for at least 30 days.

13.0 PREPARATION

13.1. Maintenance and Protection of Traffic:

13.1.1 Provide short-term traffic control.

13.1.2 Prevent interference with marking operations and prevent traffic on newly applied markings before markings dry.

13.2. Surface Preparation:

13.2.1 Clean and dry paved surface prior to painting.

13.2.2 Blow or sweep surface free of dirt, debris, oil, grease or gasoline.

13.2.3 Curing Compound on concrete surfaces shall be removed by grinding, wire brushing, sand blasting or other effective means.

13.2.4 Spot location of final pavement markings as specified and as indicated on Drawings by applying pavement spots 25 feet on center.

13.3. Notify ENGINEER after placing pavement spots and minimum three (3) days prior to applying traffic lines.

14.0 APPLICATION

14.1. Agitate paint for 1 – 15 minutes prior to application to ensure even distribution of paint pigment.

14.2. Dispense paint at 130 degrees F to wet-film thickness of 30 mils (0.8 mm).

14.3. Apply markings to indicate dimensions at indicated locations.

14.4. Prevent splattering and overspray with applying markings.

14.5. Unless material is track free at end of paint application convoy, use traffic cones to protect markings from traffic until track free. When vehicle crosses a marking and tracks it or when splattering or over spray occurs, eradicate affected marking and resultant tracking and apply new markings.

14.6. Collect and legally dispose of residues from painting operations.

15.0 APPLICATION TOLERANCES

15.1. Maximum variation from Wet Film Thickness: 1 mil.

15.2. Maximum Variation from Wet Paint Line Width: ± 1/8 inch.

15.3. Maintain cycle length for skip lines at tolerance of ±6 inches per 40 feet and line length of ± 3 inches per 10 feet.

15.4. Maximum Variation from Specified Application Temperature: ± 5 degrees F.

16.0 FIELD QUALITY CONTROL

16.1. Inspect for incorrect location, insufficient thickness, line width, coverage, retention, uncured or discolored material, and insufficient bondings.

16.2. Repair lines and markings, which after application and curing do not meet following criteria.

16.2.1 Incorrect Location – Remove and replace incorrectly placed patterns.

16.2.2 Insufficient Thickness, Line Width, Paint Coverage or Retention – Prepare defective material by acceptably grinding or blast cleaning to remove substantial amount of beads and to roughen marking surface.

Remove loose particles and debris. Apply new markings on cleaned surface in accordance with this Section.

16.2.3 Uncured or Discolored Material, Insufficient Bonding – Remove defective markings in accordance with this Section and clean pavement surface one foot beyond affected area. Apply new markings on cleaned surface in accordance with this Section.

16.3. Replace defective pavement markings as specified throughout the 3-year warranty period. When markings are damaged by pavement failure or by OWNER'S painting, crack sealing, or pavement repair operations, CONTRACTOR is released from warranty requirements for such damaged work.

16.4. Prepare a list of defective areas and areas requiring additional inspection and evaluation to decide where material may need replaced. Provide traffic control as necessary if markings require more detailed evaluation.

16.5. Replace failed or defective markings in entire section of defective markings within 30 days after notification when any of the following exists during a warranty period:

16.5.1 Average retroreflectivity within any 500-foot section is less than 300 mcd/lux/sq m for white pavement markings and 200 mcd/lux/sq m for yellow markings.

16.5.2 Marking is discolored or exhibits pigment loss and is determined to be unacceptable by a three (3) member team based on visual comparison with beaded color plates.

16.5.3 More than 15% of area of continuous line, or more than 15% of combined area of skip lines, within any 500-foot section of pavement is missing.

16.6. Replace pavement marking material under warranty using original or better type material. Continue warranty to end of the original 3 year period even when replacement materials have been installed as specified.

16.7. When eradication of existing paint lines is necessary, eradicate by shot blast or water blast method. Do not gouge or groove pavement more than 1/16 inch during removal. Limit area of removal to area of marking plus 1 inch on all sides. Prevent damage to transverse and longitudinal joint sealers.

16.8. Maintain daily log showing work completed, results of above inspections or tests, pavement and air temperatures, relative humidity, presence of any moisture on pavement, and any material or equipment problems. Make legible entries in log in ink, sign and submit by end of each workday. Enter environmental data into log prior to starting work each day and at two additional times during day.

17.0 PROTECTION OF FINISHED WORK

17.1. Protect painted pavement markings from vehicular and pedestrian traffic until paint is dry and track free. Follow manufacturer's recommendations or use minimum of 30 minutes. Consider barrier cones as satisfactory protection for materials requiring more than two (2) minutes dry time.

18.0 MEASUREMENT AND PAYMENT

18.1. Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 03100 - CONCRETE FORMWORK

PART 1 - GENERAL

1.0 SCOPE OF 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

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.

2.2. American Concrete Institute (ACI)

2.2.1 ACI PRC-347 – Guide to Formwork for Concrete

PART 2 - PRODUCTS

3.0 FORM MATERIALS

3.1. Exposed Concrete

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

a. Plywood forms shall be minimum 5/8-inch thickness, not less than 5-ply, and specially cured moisture-resistant.

b. Form lining shall be one of the following:

(i) Fiberboard, not less than 3/16-inch thickness'

(ii) Specially cured moisture resistant exterior plywood, minimum 3 ply or 1/4-inch thickness,

(iii) Plywood, minimum 5 ply, and minimum ¾ inch thickness for 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 six (6) 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 manufacturers specifications and shall be applied with a brush or spray 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-inch x 1-inch 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 3/8 inch, no more than one (1) inch in diameter and of depth not less than one (1) inch.

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.

PART 3 - EXECUTION

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.

5.3. 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.

5.4. Juncture of formwork panels shall occur at architectural lines, vertical control joints, including alignment with masonry control joints, and construction joints.

5.5. Forms placed on successive units for continuous surfaces shall be fitted to accurate alignment to assure smooth completed surfaces free from irregularities.

5.6. Temporary openings shall be arranged in wall forms and where otherwise required to facilitate cleaning and inspection.

5.7. Wall forms shall extend a minimum of six (6) inches 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 ensure 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 with 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.

Centering and Forms under Beams and Pile Caps..... 5 Days

Bottom of Deck Slab..... 5 Days

Vertical Faces of Beams, Pile Caps, Deck Slab, Walls, and Curbs....48 Hours

Construction Joint Faces.....24 Hours

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

7.0 MEASUREMENT AND PAYMENT

7.1. Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 03150 – ANCHOR BOLTS AND EMBEDS

PART 1 - GENERAL

1.0 SCOPE OF WORK

1.1. The work covered by this Section consists of furnishing all equipment, materials, and labor, and performing all operations required to fabricate, furnish, and install anchor bolts and embedded items in concrete.

2.0 REFERENCES

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 Section.

2.1.1 American National Standards Institute / American Institute of Steel Construction (ANSI/AISC)

a. ANSI/AISC 360 – Specification for Structural Steel Buildings

b. ANSI/AISC 302 – Code of Standard Practice for Steel Buildings and Bridges

2.1.2 American Society of Mechanical Engineers (ASME)

a. ASME B1.1 – Unified Inch Screw Threads (UN, UNR, and UNJ Thread Forms)

b. ASME B18.2.2 – Nuts for General Applications: Machine Screw Nuts; and Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)

c. B18.22.1 - Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series)

2.1.3 American National Standards Institute/American Welding Society (ANSI/AWS)

a. AWS A5.1/A5.1M – Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding

b. AWS D1.1/D1.1M – Structural Welding Code – Steel

2.1.4 American Society for Testing and Materials (ASTM)

a. ASTM A36/A36M – Standard Specification for Carbon Structural Steel

b. A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

c. ASTM A123A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

d. ASTM A143/A143M – Standard Recommended Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement

e. ASTM A193/A193M – Standard Specification for Alloy-Steel and Stainless-Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications

f. ASTM A194/A194M – Standard Specification for Carbon Steel, Alloy Steel, and Stainless-Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both

g. ASTM A307/A307M – Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 psi Tensile Strength

h. ASTM A563 – Standard Specification for Carbon and Alloy Steel Nuts

3.0 SUBMITTALS

3.1. The CONTRACTOR shall submit the following to the ENGINEER prior to beginning work covered by this Section:

3.1.1 Shop drawings for anchor bolts indicating the size, material, coating, system, length, nuts, washers, anchor plates, etc.

3.1.2 Shop drawings for embedded frames indicating the size, material, coating system and details of the anchorage attachment.

PART 2 – PRODUCTS

4.0 GENERAL

4.1. This Section shall govern if there is conflict with referenced specifications. Any conflict shall be immediately brought to the attention of the OWNER.

4.1.1 Anchor bolt and embedded item fabrication, whether performed in the shop or field, shall conform to the requirements of this Section and referenced Specification Sections.

4.1.2 Machine bolts and fabricated anchor bolts are covered by this Section.

4.1.3 Materials for anchor bolts and embedded items shall be new.

4.1.4 Embedded items covered by this Section shall include, but not be limited to, the following items:

a. Embedded angles for curbs, floor plate, and floor grating.

b. Miscellaneous embedded plates, angles, channels, and other shapes

5.0 MATERIALS

5.1. Anchor Bolts

5.1.1 Anchor bolt material shall conform to the requirements of ASTM A307, ASTM A36, or ASTM A193, Grade B7. Material for anchor bolts shall be as indicated on the drawings.

5.2. Nuts

5.2.1 Nuts for A36 anchor bolts shall be in accordance with ASME B18.2.2, heavy hex, and shall conform to ASTM A563.

5.2.2 Nuts for A193 anchor bolts shall be heavy series, hex, and shall conform to ASTM A194, Grade 2H.

5.2.3 Nuts for machine bolts shall be hex nuts, conforming to ASTM A307.

5.3. Washers

5.3.1 Washers for A36 anchor bolts and A307 machine bolts shall be plain washers conforming to ASME B18.22.1, Paragraph 1.4.2.

5.3.2 Washers for A193 anchor bolts shall be hardened washers conforming to ASME B18.22.1.

5.4. Anchor Plates

5.4.1 Anchor plate material shall conform to ASTM A36 for A36, A307 and A193 bolts.

5.5. Embedded Plates, Shapes, and Bars

5.5.1 Plates, shapes, and bars for embedded steel items shall conform to the requirements of ASTM A36, unless otherwise shown on the drawings

5.6. Embedded Steel Anchors

5.6.1 Anchors for embedded steel items shall conform to the requirements of ASTM A36.

5.7. Welding Electrodes

5.7.1 Welding electrodes shall conform to ANSI/AWS A5.1 with a minimum electrode tensile strength of 70 ksi.

5.8. Specialty items

5.8.1 Specialty embedded items shall be furnished as indicated on the drawings.

5.9. Fabrication

5.9.1 Anchor bolts and embedded steel shall be fabricated in accordance with the details shown on the drawings.

5.9.2 Threads for anchor bolts shall be coarse thread series (UNC) except for bolts that are to be post-tensioned. All post-tensioned bolts shall be eight-thread series.

5.9.3 Welding shall conform to ANSI/AWS D1.1 using Class E70XX electrodes conforming to ANSI/AWS A5.1. Do not weld anchor plate to A193 bolts. Tack welds to prevent rotation are acceptable.

5.9.4 Hooks for anchor bolts shall be bent cold.

5.9.5 Fabrication shall be accomplished in a workmanlike manner. Poor workmanship even though structurally sound shall be cause for rejection on items where appearance is a justifiable consideration.

5.10. Coatings

5.10.1 When galvanizing is specified, anchor bolts, plates, nuts, washers and embedded items shall be hot-dip galvanized in accordance with the requirements indicated on the drawings and ASTM A123 and ASTM A143. However, hot-dip galvanizing of high-strength bolts (A193) will be prohibited. Use of electrical or mechanical zinc depositing will be acceptable.

5.10.2 When coating other than galvanizing is specified, anchor bolts, plates, nuts, washers and embedded items shall be coated in accordance with the drawings and the project coating specification.

PART 3 - EXECUTION

6.0 INSTALLATION

6.1. Anchor bolts and embedded items shall be installed in the locations shown on the drawings.

6.2. Anchor bolts and embedded items shall be thoroughly cleaned of dust, oil, grease, grout, or other undesirable coating which would be detrimental to proper bonding with concrete.

6.3. Anchor bolts shall be set with templates or by other means for placement in the proper location and to ensure protection against bolt displacement or misalignment during placing of concrete.

6.4. Anchor bolt nuts shall be brought to a “snug tight” condition to ensure that the bottom of base is in good contact with the bearing surface of concrete or shims.

6.5. Special care shall be taken to place embedded items in their proper locations and to ensure protection against displacement or misalignment during placing of concrete.

7.0 MEASUREMENT AND PAYMENT

7.1. Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 03166 – MODULAR CONCRETE RETAINING WALL

PART 1 - GENERAL

1.0 SCOPE OF WORK

1.1. The work covered in this Section consists of furnishing all labor, tools, equipment, materials, services and supervision necessary for the construction of a mechanically stabilized earth (MSE) retaining wall system with high-density polyethylene or polypropylene geogrids positively connected to modular concrete facing units.

2.0 RELATED SECTIONS

2.1. Section 02200 Earthwork

2.2. Section 02400 Portland Soil Cement Stabilized Base

2.3. Section 02510 Chain Link Fence and Gates

2.4. Section 03100 Concrete Formwork

2.5. Section 03300 CAST-IN-PLACE Concrete

2.6. Section 03500 Roller Compacted Concrete (RCC)

3.0 REFERENCES

3.1. American Association of State Highway and Transportation Officials (AASHTO)

3.1.1 AASHTO M288 – Standard Specification for Geosynthetic Specification for Highway Applications.

3.1.2 AASHTO T289 – Standard Method of Test for Determining pH of Soil for Use in Corrosion Testing.

3.1.3 American Society for Testing and Materials (ASTM)

3.1.4 ASTM C33 – Standard Specification for Concrete Aggregates.

3.1.5 ASTM C90 – Standard Specification for Loadbearing Concrete Masonry Units.

3.1.6 ASTM C1372 – Standard Specification for Dry-Cast Segmental Retaining Wall Units.

3.1.7 ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))

3.1.8 ASTM D6938 – Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

3.1.9 ASTM D6637 – Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method.

3.1.10 ASTM D7737 – Standard Test Method for Individual Geogrid Junction Strength.

3.1.11 ASTM F904 – Standard Practice for Separation of Plies for Bond Strength of Laminated Flexible Materials.

3.2. National Concrete Masonry Association (NCMA)

3.2.1 NCMA TEK 02-4C - Specification for Segmental Retaining Wall Units.

3.2.2 NCMA – Design Manual for Segmental Retaining Walls.

3.3. Tensar Corporation

3.3.1 MESA Retaining Wall Systems – Installation and Special Considerations Manual.

4.0 SUBMITTALS

4.1. The CONTRACTOR shall submit specifications for all materials to be used in construction of the retaining wall system prior to construction.

5.0 QUALITY ASSURANCE

5.1.1 Manufacturer – mechanically stabilized earth (MSE) wall system components shall be manufactured by Tensar Earth Technologies, Inc. and its Licensees and by companies approved and authorized by Tensar Earth Technologies, Inc. or an equivalent system approved by the ENGINEER.

5.1.2 Installer – Shall be a firm with documented experience of at least five projects of similar construction and scope. A brief description of each project and name and phone number of OWNER'S representative knowledgeable in each listed project shall be included.

6.0 PRE-CONSTRUCTION MEETING

6.1. The CONTRACTOR shall conduct a meeting at the site with the retaining wall materials supplier, the retaining wall installer, to review the retaining wall requirements at least two (2) weeks prior to beginning work on this section. The ENGINEER shall be notified at least three (3) days in advance of the time of the meeting.

7.0 DELIVERY STORAGE AND HANDLING

7.1. All products shall be stored in manufacturer's unopened packaging until ready for installation.

7.2. Excessive mud, fluid concrete, epoxy, or other deleterious materials shall be prevented from coming in contact with retaining wall materials.

7.3. All polymeric materials shall be stored at temperatures above minus 20 degrees F and covered. Materials exposed to direct sunlight for a time exceeding 14 days may be rejected by the ENGINEER and replaced at no additional cost to the OWNER.

7.4. Rolled materials may be laid flat or stood on end.

7.5. All solvent-based materials and materials used with solvent-based materials shall be stored and disposed of in accordance with requirements of local authorities having jurisdiction.

PART 2 - PRODUCTS

8.0 MANUFACTURERS

8.1. The following are approved manufacturers for products specified in this section. Other suppliers shall be approved by the ENGINEER.

8.1.1 Geogrid – Tensar International Corporation, 2500 Northwinds Parkway, Suite 500, Alpharetta, GA 30009. 770-344-2090. www.tensarcorp.com.

8.1.2 Modular Concrete Facing Units – approved MESA licensee or an authorized manufacturer of the MESA retaining wall system.

8.1.3 MESA Connectors – companies approved and authorized by Tensar Earth Technologies, Inc.

9.0 MATERIALS

9.1. Modular Concrete Retaining Walls – consists of an MSE wall system of engineered backfill reinforced with high-density polyethylene or polypropylene geogrids that are positively connected to modular concrete facing units.

9.2. Modular Concrete Facing Units – concrete masonry units certified by an independent laboratory to meet ASTM C 1372 and specified absorption, compressive strength and dimensional tolerances.

9.3. Load-Bearing Masonry Units – produced by an approved MESA system licensee. They shall be normal weight, Type II, with a minimum compressive strength of 4,000 psi and conform to ASTM C90 and NCMA TEK 02-4C, Section 3.1.

9.3.1 Maximum water absorption rate – 8% by weight.

9.3.2 MESA standard unit:

a. Size – 8 inches by 18 inches by 11 inches.

b. Weight – 80 to 90 pounds, nominal.

9.3.3 MESA cap unit:

a. Size – 4 inches by 18 inches by 11 inches, minimum.

b. Weight – 40 pounds, nominal.

9.3.4 MESA Corner Unit:

a. Size – 8 inches by 18 inches by 9 inches.

b. Weight – 75 pounds, nominal.

9.4. Structural geogrid – Tensar UX1500MSE polymeric grid formed by regular network of integrally connected tensile elements with apertures of sufficient size to

allow interlocking with surrounding soil, rock or earth and function primarily as reinforcement.

9.4.1 Ultimate tensile strength – 7,810 pounds per linear foot, minimum average roll value, when tested in accordance with ASTM D 6637.

9.4.2 Junction Strength – 7,200 pounds per linear foot, minimum average roll value, when tested in accordance with ASTM D7737.

9.5. Connectors – High-density polyethylene or polypropylene with fiberglass inclusions.

9.5.1 MESA DOT connectors (19 teeth per 21 openings and 8 flags) to connect the geogrid to standard facing units and MESA Standard connectors to serve as alignment and shear connectors between facing courses that do not require geogrid reinforcement.

9.5.2 One MESA DOT connector shall be used per facing unit with the four teeth at each end of the connector driven through the geogrid apertures into the connection slots of the facing unit and the four flags at each end extending into the core of the overlying facing unit. Two Standard connectors shall be driven into the connector slots of all facing units that are not connected to geogrid.

9.6. Reinforced backfill – granular fill with a pH range of 2 to 12, when tested in accordance with AASHTO T 289, and graded as follows:

9.6.1 Less than 95 percent passing a No. 40 sieve.

9.6.2 Less than 10 percent passing a No. 200 sieve.

9.7. Geotextile – non-woven geotextile, AASHTO M288, Class 3.

9.8. Adhesive – exterior, waterproof concrete bonding adhesive

PART 3 - EXECUTION

10.0 PREPARATION

10.1. Installation shall not begin until excavation, foundation preparation and leveling pad have been completed and properly prepared.

10.2. If subgrade preparation is the responsibility of another installer, notify ENGINEER of unsatisfactory preparation. Do not begin work until unsatisfactory conditions have been rectified.

10.3. Excavation:

10.3.1 Excavate the subgrade vertically to the plan elevation and horizontally to the extent of the geogrid lengths.

10.3.2 Excavate trench for leveling pad to the dimensions indicated on the approved shop drawings.

10.3.3 Remove soils not meeting required strength and replace with approved materials by the ENGINEER.

10.3.4 Protect excavated materials to be used for backfilling the reinforcement zone from the weather.

10.4. Foundation Preparation:

10.4.1 Over-excavated areas of the subgrade and leveling pad trench shall be filled in loose lifts of eight (8) inches maximum and be compacted to at least 95% of its maximum dry density within + 2% of its optimum moisture content in accordance with ASTM D-1557 (Modified Proctor).

10.4.2 The ENGINEER will inspect the subgrade soil for the reinforced zone and leveling pad to ensure proper bearing strength in accordance with Section 12.0.

10.5. Leveling Pad:

10.5.1 Material – reinforced concrete

10.5.2 Dimensions – six (6) inches minimum thickness, 24 inches minimum width.

10.5.3 The surface of the leveling pad shall be smooth and horizontal both side-to-side and front-to-back to ensure the first and subsequent courses of units are level.

11.0 CONSTRUCTION

11.1. Modular concrete retaining walls shall be constructed in accordance with the approved shop drawings, the MESA Retaining Wall Systems Installation and Special Considerations Manual and the MESA Retaining Wall Systems Installation Guide.

11.2. Facing unit installation:

11.2.1 Place the first course of modular concrete facing units on the leveling pad.

11.2.2 Verify the first row of units are level from side-to-side and from front-to-back.

11.2.3 A string line to align a straight wall and use flexible pipes to establish a smooth convex or concave curved wall.

11.2.4 Use rear edges of the facing units for alignment and measurement.

11.2.5 Sweep tops of modular concrete facing units clean of all debris before installing the next course of units or placing geogrid materials.

11.2.6 Pull a string line after each course has been set to ensure maintenance of the wall's geometry. Reference the string line from the connector slot, the edges of the interior void, or the rear edges of the facing unit.

11.3. Geogrid Connection and Connector Installation:

11.3.1 Unroll geogrid and cut to length indicated, minus distance between front face of the unit and the front of the connector. Cut geogrid ribs immediately in front of the transverse bar.

11.3.2 Place the geogrid on the facing unit. Insert the connector teeth through the apertures of the geogrid into the slot in the underlying unit. Pull the grid snug against the teeth. Hammer the connector into the slot.

11.3.3 One (1) DOT connector shall be used per facing unit to connect the geogrid reinforcement to the facing unit and two Standard connectors shall be used per facing unit where no geogrid reinforcement is required:

a. Position the geogrid laterally on the facing units such that the four teeth at each end of the connector are driven into each of the two

connector and the 11 intermediate teeth extend into the core of the facing unit. The DOT connector does not extend over the space between adjacent facing units. The DOT connector may be broken into three pieces if required for better alignment of its teeth with geogrid apertures.

b. Position the flags of the connectors forward for vertical walls and rearward for battered walls.

c. In the next course, center each facing unit over the two underlying units such that the 8 flags of the connectors extend up into the core of the overlying facing units.

d. Between facing courses where no geogrid reinforcement is required, insert two Standard Connectors into connector slots in the top of each facing to align and provide resistance to sliding of the overlying unit. Orient Standard Connector flags in same direction as above.

11.4. Drainage fill:

11.4.1 Place drainage fill between the units and to a distance of 12 inches behind the rear edges of the units.

11.4.2 Place drainage fill behind the wall before placing the geogrid materials.

11.4.3 Cover the drainage fill with geotextile to separate it from the reinforced fill as indicated on the drawings.

11.4.4 Provide drainage fill to final grade.

11.5. Reinforced backfill:

11.5.1 Place the reinforced backfill material in maximum loose lifts of eight (8) inches and compact to at least 95% of its maximum dry density within ±2% of its optimum moisture content in accordance with ASTM D-1557 (Modified Proctor).

11.5.2 Use only hand-operated compaction equipment within three (3) feet of the rear edges of the facing units. Use a minimum of three (3) passes to compact this zone.

11.5.3 Soil density testing is not required within three (3) feet of the rear edges of the facing units.

11.5.4 Smooth and level or slope the backfill as indicated so that the geogrid lays flat.

11.6. Geogrid placement:

11.6.1 Unroll the geogrid on the compacted backfill and cut to the length indicated.

11.6.2 Pull the geogrid taut to remove slack in the geogrid and at the connectors.

11.6.3 Stake or pin the geogrid near the end to maintain alignment and tension during filling.

11.6.4 Place a minimum of three (3) inches of fill between overlapping layers of geogrid where overlapping occurs behind curves and corners of a wall.

11.6.5 Rubber-tired vehicles may travel on the geogrid at low speeds, less than five (5) miles per hour. Turning of vehicles should be avoided to prevent dislocation or damage to the geogrid and the connected wall facing units.

11.6.6 Tracked vehicles shall not be operated directly on the geogrid. A minimum of eight (8) inches of fill cover over the geogrid is required for operation of tracked construction vehicles in the reinforced zone.

11.6.7 Place geogrid shims on the front flange of all facing units connected to geogrid as indicated or as shown in the MESA Retaining Wall Systems Installation and Special Considerations Manual and the MESA Retaining Wall Systems Installation Guide.

11.7. Toe Fill:

11.7.1 Toe fill shall be placed in loose lifts of eight (8) inches and shall be compacted to at least 95% of its maximum dry density within ± 2% of its optimum moisture content in accordance with ASTM D-1557 (Modified Proctor).

11.8. Cap Installation:

11.8.1 Clear cap units and modular concrete facing units of all debris and standing water before applying the approved adhesive

11.8.2 Install the cap units by bonding them to the units below using an approved exterior concrete adhesive.

11.8.3 Place cap units to achieve a nominal 1-inch overhang.

11.8.4 Use string line or flexible pipes to align cap units.

11.9. Tolerances:

11.9.1 Variation from overall wall batter measured between top and bottom of the wall shall be a maximum of ±1/8 inch per foot.

11.9.2 Horizontal and vertical alignment – 3/4 inch per 10 feet excluding variations due to facing unit shape or split face irregularities

12.0 FIELD QUALITY CONTROL

12.1. Testing and Inspection shall be provided by an independent laboratory provided by the CONTRACTOR and acceptable to the ENGINEER.

12.2. Perform laboratory material tests in accordance with ASTM D1557.

12.3. Perform in place density and moisture content tests in accordance ASTM D6938.

12.4. Frequency of Tests:

12.4.1 Leveling Pad Trench – A minimum of one test per 100 feet of trench.

12.4.2 Subgrade Soil – A minimum of one test per 50 feet length of wall.

12.4.3 Reinforced Backfill – Provide one test for every 50 cubic yards of fill placed.

13.0 PROTECTION

13.1. Protect installed products until completion of project.

13.2. Repair or replace damaged products before Substantial Completion.

14.0 MEASUREMENT AND PAYMENT

14.1. Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 03200 - REINFORCING STEEL

PART 1 – GENERAL

1.0 SCOPE OF 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 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 & Health Regulations.

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

PART 2 – PRODUCTS

3.0 REINFORCING MATERIALS

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

3.2 Unless otherwise noted, all reinforcing steel shall be new, deformed billet-steel bars conforming to ASTM A-615. Grade of reinforcing steel shall be 60 ksi. All reinforcing indicated to be welded, shall be new, deformed billet-steel bars conforming to ASTM A-706, Grade 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.

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 ENGINEER.

4.2 The CONTRACTOR shall submit to the ENGINEER three (3) copies of the steel lists and placing plans of all reinforcing steel used in the job. Reproductions of Contract drawings are unacceptable.

PART 3 – EXECUTION

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.

5.3 Minimum pin bending diameter will be as follows:

Bar Size	Minimum Pin Diameter (inches)
#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

5.4 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.

5.5 No heating, welding, or tack welding of reinforcing steel will be permitted unless directed by the ENGINEER.

5.6 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.

5.7 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.

5.8 The minimum lap splice shall be 12 inches.

Bar Size	Minimum Lap Splice (inches)
#3	17
#4	22
#5	28
#6	33
#7	49
#8	55
#9	63
#10	70
#11	78

5.9 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.

5.10 Reinforcing in pile caps and slabs shall be supported at the proper level.

5.11 Reinforcing other than that mentioned in 5.7 shall be securely positioned at required distances from forms by supports of coated or non-corrodible material spaced in accordance with recommendation of the Concrete Reinforcing Steel Institute.

5.12 Unless otherwise indicated on drawings, steel reinforcement shall have a minimum protection of concrete as follows:

	Minimum Cover (inches)
(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	1 1/2
#11 and smaller	3/4
Beams, columns, Primary reinforcement, ties, stirrups, spirals	1 1/2

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

5.13 Exposed bars intended for bonding with future work shall be protected from corrosion by concrete or other adequate covering.

5.14 No reinforcing bars shall be forced or driven into concrete after the concrete has attained its initial set.

5.15 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 45º to the corner.

6.0 MEASUREMENT AND PAYMENT

6.1 Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 03300 – CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.0 SCOPE OF 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.

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:

a. ACI 211 – Recommended Practice for Selecting Proportions for Nominal Weight Concrete.

b. ACI 214 – Recommended Practice for Evaluation of Compression Test Results of Field Concrete.

c. ACI 304 – Recommended Practice for Measuring, Mixing, and Placing Concrete.

d. ACI 305 – Recommended Practice for Cold Weather Concreting.

e. ACI 306 – Recommended Practice for Hot Weather Concreting.

f. ACI 315 – Manual of Standard Practice for Detailing Reinforced Concrete Structures.

g. ACI 318 – Building Code Requirements for Reinforced Concrete.

h. 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 PRODUCT SUBMITTALS

3.1 Product information and mix designs shall be submitted to the ENGINEER for approval for all materials specified in Sections 4, 5 and 6.

PART 2 – PRODUCTS

4.0 CONCRETE MATERIALS

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

4.2 Cement - Cement shall be Portland cement conforming to the requirements of ASTM C-150, Type II, and be free from dirt and damp set.

4.3 Fine Aggregate:

4.3.1 Fine Aggregate for normal weight concrete shall be clean sand, conforming to the requirements of ASTM C-33.

4.4 Coarse Aggregate:

4.4.1 Coarse aggregate for normal weight concrete shall be crushed stone, gravel, or a combination of crushed stone and gravel, conforming to ASTM C-33, size number 67, 3/4 inch to No. 4.

4.5.1 Water - Water shall be fresh clean, clear and free from oil, acid, alkali, organic material, and any other deleterious matter in injurious quantities in accordance with the requirements of ASTM C1602 - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.

4.5 Admixtures:

4.5.1 Air-entraining materials shall conform to ASTM C-260 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.

4.5.2 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 C-494. Testing for air content shall be in accordance with ASTM C-231.

4.5.3 Any other admixtures proposed shall be approved by the OWNER in writing before using and shall conform to ASTM C-494. Calcium chloride shall not be used.

4.6 Bonding Material – ASTM C881. Provide Type I for bonding hardened concrete to hardened concrete; Type II for bonding freshly mixed concrete to hardened concrete. Provide Grade 1 or 2 for horizontal surfaces and Grade 3 for vertical surfaces. Provide Class A if placement temperature is below 40 degrees Fahrenheit; Class B if placement temperature is between 40 degrees Fahrenheit and 60 degrees Fahrenheit; or Class C if placement temperature is above 60 degrees Fahrenheit."

4.7 Expansion Joint Filler - Preformed expansion joint filler, 1/2 inch thick, unless otherwise indicated, shall be non-extruding, and resilient type conforming to ASTM D-994, ASTM D-1751, or ASTM D-1752, unless noted otherwise.

4.8 Joint Sealer - Joint sealer shall be cold applied, elastomeric sealant, conforming to ASTM D-1850. 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.

4.9 Curing Compound - Liquid membrane-forming curing compound shall conform to ASTM C-309, Type 1-D (clear or translucent with fugitive dye), or OWNER approved equal, and to the testing requirements of ASTM C-156.

4.10 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 42o Baume Sodium Silicate).

4.11 Grout:

4.11.1 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" manufactured by Masterbuilders Company, or OWNER approved equal is recommended.

4.11.2 Non-shrink Non-metallic grout shall meet the requirements of ASTM C1107, salt and seawater resistant with a compressive strength of 5,500 psi at 7 days in accordance with ASTM C109 and a bond strength of 2000 psi per ASTM C882.

4.12 Waterstops – Waterstops, except where otherwise indicated, shall be 9 inch 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 3/8" for web thickness and 5/8" 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.

5.0 CONCRETE MIX

5.1 Mix Design – The mix design shall produce concrete having a slump of not more than 3 inches for slabs and not more than 4 inches for all other work, and a minimum 28-day compressive strength of 5,000 psi. Outside concrete shall have an air content of 4% to 5% plus or minus 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.

6.0 PROPORTIONING CONCRETE

6.1 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.

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

Class	*Max. Water Per Bag Cement*	*Min. Bags of Cement per cu. yd.*	*Cement*	*Min. Compressive Strength @ 28 Days*	*Range in Slump*
AA	5.0 Gallons	6.5	Type II	5000	2" – 4"

6.3 Class "AA" concrete shall be "air entrained concrete" and the concrete shall have an air content as determined in accordance with these specifications. The testing for air content will be performed by an independent laboratory paid by the OWNER. Class "AA" concrete shall be used for all construction in the project. The water cement ratio shall not exceed 0.40.

PART 3 – EXECUTION

7.0 CONCRETE PLACEMENT

7.1 The placing of all concrete shall be in accordance with the requirements of ACI Standard 304.

7.2 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.

7.3 Excessive water and debris shall be removed from forms and excavations before concrete is placed therein.

7.4 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.

7.5 Unless otherwise noted on the drawings all vertical surfaces of the concrete work must be formed.

7.6 All concrete materials, reinforcement, forms and fillers with which concrete is to come in contact shall be free from frost. When concrete is poured during freezing

weather, adequate protection against frost action shall be approved by the OWNER before any concreting is done.

7.7 Dropping of the concrete in excess of four (4) feet, 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 four (4) feet. Concrete shall be placed monolithically between construction joints indicated.

7.8 Between construction joints concreting shall be a continuous operation such that concrete is always plastic 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.

7.9 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.

7.10 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.

7.11 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.

7.12 Concrete shall not be carried in or transported through any aluminum items.

8.0 JOINTS

8.1 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.

8.2 In general, formed construction joints or keys shall be: in width one-third (1/3) of the thickness of the concrete and, in depth, one sixth (1/6) the thickness of the concrete. All keys shall be continuous and none smaller than two (2) inches in width and two (2) inches in depth shall be used.

9.0 EMBEDDED ITEMS

9.1 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.

9.2 The CONTRACTOR shall furnish and install all embedded items to include but not limited to inserts, anchors, pipe sleeves, and any other miscellaneous metal as may be required for the installation and attachment of other work.

9.3 The CONTRACTOR shall provide such openings as are required for the passing of work through the concrete.

9.4 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.

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 seven (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 three (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 10.3 or 10.4. 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 may also be used for curing concrete:

10.2.1 Ponding or continuous sprinkling with water.

10.2.2 Wet sand or absorptive burlap kept continuously wet.

10.3 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.

10.4 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 forty (40) degrees or above ninety (90) degrees Fahrenheit. 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.

10.5 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.

10.6 Projecting inserts, anchor bolts, etc., shall be protected from disturbances until the concrete has sufficiently set to hold such items immovable.

10.7 All concrete slabs, etc., shall be barricaded immediately after the surfaces are finished and no traffic, other than for curing purposes, shall be allowed on the surfaces until the concrete has obtained (by compressive strength test) 60% of its 28-day strength.

11.0 CONCRETE FINISHES

11.1 General – Immediately after removal of forms, all unsightly ridges or lips shall be removed and undesirable local bulging on the surfaces to be permanently exposed shall be remedied. Excessive rubbing of formed surfaces will not be permitted. Voids and holes left by the removal of tie rods and erection bolts in all permanently exposed surfaces and surfaces to be exposed to water shall be reamed and

completely filled with dry patching mortar (preshrunk) mixed in the proportions directed when such voids or holes are no longer necessary. The cement used in the mortar shall be a blend of portland cement and white portland cement properly proportioned so that the final color of the cured mortar will be the same as the color of the surrounding concrete. Defective concrete shall be repaired by cutting out the unsatisfactory material and placing new concrete which shall be secured with keys, dovetails or anchors. Concrete for patching shall be drier than the usual mixture and shall be thoroughly tamped into place. Care shall be taken to see that all free water which has accumulated at the surface is removed before making any finish. Other surfaces shall be brought to the specified elevation and left true and regular. Every precaution shall be taken by the CONTRACTOR to protect finished surfaces from stains or abrasions. Surfaces or edges likely to be injured during the construction period shall be properly protected.

11.2 Rubbed Finish – Rubbed finish shall be given to exposed vertical surfaces of new concrete. Rubbed finish shall be as follows: As soon as the pointing and patching have set sufficiently, the surfaces shall be thoroughly saturated with water and then rubbed with a medium coarse carborundum stone, griding the surface to a paste. Rubbing shall be continued until all form marks, projections and irregularities have been removed and the entire surface is of a smooth texture and uniform color. In this process, no cement wash or plaster coating shall be used. The past produced by this rubbing shall be left in place at this time. After all the concrete above the surface being treated has been cast, the final finish shall be obtained by rubbing with a fine carborundum stone and water. This rubbing shall be continued until the entire surface is of a smooth texture and uniform in color. After final rubbing and the surfaces dried, it shall be cleaned of all loose powder.

11.3 Rough Finish – Surfaces under the deck and unexposed surfaces of pile caps and beams will require no additional finishing. Surface to receive "second pour" concrete or grout fill shall be screeded with straight edges to bring the surface to the required finish plane with no coarse aggregate visible.

11.4 Deck – The horizontal surfaces of the concrete deck shall be finished as follows: after screeding has been completed and the excess mortar and water removed, but while the concrete is still plastic, the surface shall be tested for trueness with a 10-foot straight edge laid parallel to the centerline of the slab and half-lapped to cover the entire slab. Should there be any uneveness of more than 1/8 inch, measured as an ordinate, either above or below the general contour of the surface, such defect shall be immediately corrected. As soon as the concrete has hardened sufficient, it shall be given a belting finish. The belting operation shall be done parallel to the longitudinal centerline of the deck. The belt shall be of two-to-four ply canvas or of other materials acceptable to the ENGINEER not less than six inches (6") wide.

As many passes of the belt shall be used as are necessary to give the surface a uniform herringbone finish with no corrugations more than 1/8 inch in depth.

11.5 Minor Area Finishes – Areas inaccessible for practical finishing specified above shall be finished by hand by means approved by the ENGINEER to match the adjacent finished surfaces.

12.0 INSPECTIONS AND TESTING

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

12.2 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.

12.3 The CONTRACTOR shall make the necessary arrangements with the CONTRACTOR supplied testing laboratory to facilitate concrete sampling and test.

12.4 An independent testing laboratory shall perform compressive strength tests, air entrainment tests and slump tests for every 100 cubic yards or fraction thereof but not less than once for each day of concrete pouring. All tests shall be made at the expense of the CONTRACTOR.

12.5 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 seven (7) days and two for testing at twenty-eight days. If the twenty-eight day breaks are good, fourth cylinder may be discarded. If the twenty-eight day breaks are deficient, the fourth cylinder shall be broken as instructed.

12.6 Slump tests shall be made in accordance with ASTM C-143 for each set of cylinders submitted to the laboratory.

12.7 Air entrainment tests shall be made in accordance with ASTM C-138, C-173, or C-231 for each set of cylinders.

12.8 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 quality

of the structure 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 C-42 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.

12.9 Reports of all test and control measures shall be submitted to the OWNER in triplicate. Reports shall show the in-place location of concrete.

12.10 The minimum compressive strength of test cylinders shall be 5000 PSI, unless noted otherwise.

12.11 Record the atmospheric and concrete temperatures on all test reports.

13.0 CONCRETE DISPOSAL

13.1 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.

14.0 MEASUREMENT AND PAYMENT

14.1 Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 03400 – MISCELLANEOUS METALS

PART 1 – GENERAL

1.0 SCOPE OF WORK

1.1. This section covers the miscellaneous work required that is not specified elsewhere.

2.0 CONTRACTOR FURNISHED ITEMS

2.1. The CONTRACTOR shall furnish and install, but not limited to the following miscellaneous items:

2.1.1 Edge protection angles.

2.1.2 Inserts for Handrails and Handrails.

3.0 MATERIALS

3.1. Structural Steel. Steel shall conform to ASTM A36, "Structural Steel."

3.2. Threaded Rods, Anchor Bolts, Washers and Nuts. Threaded rods, washers and nuts for anchor bolts shall be as specified on the drawings. Plate washers shall be ASTM A36 steel. Rods, nuts and washers shall be hot-dip galvanized.

4.0 SHOP DRAWINGS

4.1. Shop drawings or catalog cuts of all items furnished by this section shall be submitted to the ENGINEER for approval prior to fabrication.

5.0 GALVANIZING

5.1. Indicated items shall be galvanized as noted. They shall be hot-dip galvanized after fabrication in accordance with ASTM A123; ASTM A153; Class B-1; ASTM A386, Class B-1, as applicable.

6.0 FABRICATED STEEL ITEMS

6.1. Fabricated steel items shall be in accordance with the details shown on the drawings. Welds in all items shall be ground smooth where exposed in the finished construction. Items as indicated shall be hot-dip galvanized as hereinbefore specified. Installation shall be in accordance with the drawings and/or approved

shop drawings. Where embedded in concrete, the items shall be accurately positioned and maintained in such position during placing of concrete.

7.0 PAINTING (IF REQUIRED)

7.1. Surface Preparation

7.1.1 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.

7.1.2 Clean steel in accordance with SSPC procedures as follows: SSPS-SP10, Near-White Blast cleaning.

7.1.3 Clean all gage metals and equipment in accordance with SSPC-SP6 or a phosphate surface preparation rinse system sealed with a rust bond penetration sealer.

7.2. 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.

7.3. Unless instructed otherwise, all paint coats shall be applied in the shop with any touch-up paint applied after installation of steel is complete.

7.4. Steel that received a yellow topcoat shall always have all paint coats applied in the shop with touch-up in the field after complete installation of steel.

7.5. Coating System:

7.5.1 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 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.

7.5.2 All surfaces, except galvanized, shall receive a total of three coats, with a total of 8 mils average build-up as follows:

a. 1st Shop Coat – All surfaces, included surfaces inaccessible after fabrication, shall receive one (1) coat of Carbo-Zinc 12 VOC

inorganic zinc primer. Coverage shall be 2.5 – 3.0 mil minimum thickness.

b. 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.

c. 3rd Shop Coat – This coat shall be Carboline 134HS and the color shall be safety yellow. Coverage will be 1.5 – 2.0 mil thickness.

8.0 MEASUREMENT AND PAYMENT

8.1. Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 03500 - ROLLER-COMPACTED CONCRETE (RCC)

PART 1 - GENERAL

1.0 SCOPE OF WORK

1.1. Description. Roller-Compacted Concrete (RCC) shall consist of aggregate, Portland cement, possibly other supplementary cementing materials (fly ash, slag and silica fume) and water. RCC shall be proportioned, mixed, placed, compacted and cured in accordance with these specifications; and conform to the lines, grades, thickness, and typical cross sections shown in the Plans or otherwise established by the ENGINEER.

2.0 REFERENCES

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 Section:

2.1.1 American Society for Testing and Materials (ASTM)

a. ASTM C31/C31M – Practice for Making and Curing Concrete Test Specimens in the Field

b. ASTM C33/C33M – Standard Specification for Concrete Aggregates

c. ASTM C39/C39M – Test Method for Compressive Strength of Cylindrical Concrete Specimens

d. ASTM C42/C42M – Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

e. ASTM C78C78M – Test Method for Flexural Strength of Concrete (Using Simple Beam with Third Point Loading)

f. ASTM C94/C94M – Standard Specification for Ready-Mixed Concrete

g. ASTM C150/C150M – Standard Specification for Portland Cement

h. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete

i. ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

j. ASTM C494/C494M – Standard Specification for Chemical Admixtures for Concrete

k. ASTM C496/496M – Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens

l. ASTM C566 – Test Method for Total Evaporable Moisture Content of Aggregate by Drying

m. ASTM C595/C595M – Standard Specification for Blended Hydraulic Cements

n. ASTM C618 – Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

o. ASTM C989/C989M – Standard Specification for Slag Cement for Use in Concrete and Mortars

p. ASTM C1040/C1040M – Test Method for Density of Unhardened and Hardened Concrete in Place by Nuclear Method

q. ASTM C1077 – Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation

r. ASTM C1170/C1170M – Standard Test Method for Determining Consistency and Density of Roller-Compacted Concrete Using a Vibrating Table

s. ASTM C1157 – Standard Performance Specification for Hydraulic Cement

t. ASTM C1176/C1176M – Standard Practice for Making Roller-Compacted Concrete in Cylinder Molds Using a Vibrating Table

u. ASTM C1240 – Standard Specification for Silica Fume Used in Cementitious Mixtures

v. ASTM C1435 – Practice for Molding Roller-Compacted Concrete in Cylinder Molds Using a Vibrating Hammer

w. ASTM C1602/1602M – Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete

x. ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3))

y. ASTM D977 – Standard Specification for Emulsified Asphalt

z. ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))

aa. ASTM E329 – Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

2.1.2 American Concrete Institute (ACI)

a. ACI PRC 214 – Guide to Evaluation of Strength Test Results of Concrete

3.0 SUBMITTALS

3.1. The CONTRACTOR submitting a bid shall include, as part of the bid, the name of the RCC Contractor or RCC Subcontractor and the following information pertaining to the RCC work:

3.1.1 Completed Project Listing – The CONTRACTOR (or designated Subcontractor) shall provide evidence of successful installation of RCC pavement on three (3) prior projects of comparable size and application, including dual lift intermodal applications, if applicable. The project listing shall include a brief project description for each project as well as the final contract amount, the OWNER'S and design ENGINEER'S name and contact information.

3.1.2 Proposed Installation Equipment – The CONTRACTOR shall supply a list of the proposed installation equipment including mixing plant, paving equipment, and compaction equipment. The make, model, and equipment specification sheet for each piece of equipment shall be

included. Assume a minimum of two (2) approved paving machines on the job site for single and dual lift construction and one (1) RCC mixing plant.

3.1.3 Project Personnel – The proposed CONTRACTOR shall submit resumes and references for the proposed RCC Project Manager and Project Superintendent. All are expected to have experience with a similar level of responsibility on at least three (3) similar projects. Should the proposed CONTRACTOR become the successful bidder, the personnel proposed shall be assigned to this project. If for some reason the proposed personnel are not available for this project, replacement personnel shall be subject to approval by the OWNER.

3.2. Requirements – The CONTRACTOR shall submit the following to the ENGINEER at least 30 days before start of any production of RCC pavement:

3.2.1 Schedule – Construction schedule for all RCC related operations.

3.2.2 Procedures and Paving Plan – Proposed procedures describing direction of paving operations, paving widths, planned longitudinal and transverse cold joints, and curing methods and patterns.

3.2.3 Material Certifications.

a. Aggregate – Certification for aggregate source, quality and sizing as required by the specification.

b. Cementitious materials – Certification for Portland cement and supplementary cementitious materials as required by the specification.

3.2.4 Construction Equipment – Manufacturer's data and specifications including capacities for equipment to be used in mixing, hauling, placing, and compacting RCC.

3.2.5 Plant Layout – Layout of plant showing mixing plant, cement and aggregate storage, and water supply.

3.2.6 Mix Design – The proposed mix design will be developed by the CONTRACTOR and must be submitted to the ENGINEER for approval at least four weeks prior to RCC construction. This mix design shall include details on aggregate gradation, cementitious materials,

admixtures (if used), compressive and/or flexural strengths, and required moisture and density to be achieved. The minimum cementitious material shall be 500 pounds per CY. If class F fly ash is utilized, it shall not exceed 20% by weight.

3.2.7 The testing laboratory to be utilized shall be submitted in the bid documents.

4.0 QUALITY CONTROL AND QUALITY ASSURANCE PROGRAM

4.1. Testing Parameters & Frequency – The CONTRACTOR shall provide any and all quality control (QC) testing that is deemed necessary to properly control the quality, consistency, and uniformity of the RCC produced and placed. No minimum numbers of quality control tests are required for this contract. Any information from the CONTRACTOR'S quality control tests shall be available to the OWNER upon request for the information. This request may be done verbally and/or in writing to the CONTRACTOR'S quality control representative and/or on-site construction manager. All QA/QC test results are to be submitted to the OWNER.

4.2. Access & Inspection – The CONTRACTOR shall provide safe and convenient access, acceptable to the ENGINEER, for inspection and sampling of the RCC and shall cooperate in the inspection and sampling process when requested to do so.

4.3. Contractor Equipment – The CONTRACTOR shall have major equipment items such as batch plant, rollers, pavers, trucks and similar items, available for inspection by the ENGINEER. Deficiencies in quality, quantity, or types of equipment shall be corrected prior to starting work. This inspection and approval shall in no way relieve the CONTRACTOR from the obligation to provide the equipment required to perform the work.

4.4. Plant Inspections – RCC plant inspections will be conducted at random to check the settings, operation, materials, and mixture produced. The CONTRACTOR'S representative will order the plant shut down if deficiencies are found, such as deviation from approved job-mix formula, segregation in the mix, or inconsistent plant operation. The CONTRACTOR'S representative shall provide to the satisfaction of the ENGINEER the corrective actions prior to re-starting production.

4.5. Optimum Moisture – The optimum moisture density relationship of the RCC shall be determined in accordance with ASTM D1557.

4.5.1 Moisture Content – The moisture content of the material placed shall be between ±1.0% of optimum. Determination of Degree of Compaction in

the field will be based on the maximum wet density as determined by the above method. If the moisture content of the RCC falls out of this acceptable range, it's the CONTRACTOR'S responsibility to determine whether that material shall be left in place or removed. The final acceptance of the material placed will be determined upon strength and surface tolerance as described in Sections 8.4 and 15.1.

4.6. Thickness and Bonding – One core will be taken from each 2,500 square yards, or less, of RCC area. Final thickness acceptance shall not be deficient by more than 1/2 inch (12.5 mm). Removal and replacement of deficient area, or other remedies will be required as directed by the ENGINEER. No skin patches will be allowed. During multiple lift placement, the core will be checked to ensure that separation has not occurred during lift placement. If the core reveals separation between lifts two additional cores per area shall be taken at the CONTRACTOR'S expense. If a majority of the additional cores reveal separation between lifts, the RCC placed within the affected area may be rejected and the CONTRACTOR may be required to remove all the defective material or accept reduced pay for the affected area. Separation shall be defined as when a core separates at the joint during normal coring procedures.

4.7. Density & Moisture Testing – A minimum of three (3) field density and moisture content samples will be taken every five (5) hours of production, or part thereof for any individual plant, or from every 400 – 500 cubic yards of production, or part thereof, whichever is lower. The average in place field density shall be not less than 98% of maximum laboratory density determined in accordance with ASTM D1557 with no individual test below 96%. At any point during construction, the CONTRACTOR may request additional test to be performed at their discretion as part of their quality assurance program. These tests may be used to satisfy the above-mentioned testing requirement for the OWNER.

4.8. Strength Testing – Obtaining samples and testing of RCC for compressive strength determination shall be performed in accordance with ASTM C42/C42M. RCC pavement strengths will be based on the average of three (3) cylinders per 2,500 square yards, or less, or every 5 hours of production whichever is lower, with no single cylinder below 90% of the specified seven (7) day compressive strength in accordance with ASTM C42 / C42M. Final acceptance of the RCC will be based upon the compressive strength cylinder breaks meeting or exceeding design strength after 28 days of curing. If the cylinders do not meet the strength requirements as demonstrated in the RCC test section, then the area may be cored at the CONTRACTOR'S expense immediately after being notified and/or at 28-days later to determine if that section of RCC has met sufficient strength per the specified design strength. The cores may be tested for compressive strength and/or

splitting tensile strength. The specific test to be performed on the re-cores will be left up to the discretion of the CONTRACTOR. The core or cylinder compressive strengths shall be compared to the CONTRACTOR'S strength development curves established in the test section and submitted prior to the start of construction to determine the flexural strength of the pavement for final acceptance.

4.8.1 Core Holes – The CONTRACTOR shall fill the core holes with Portland cement concrete or by non-shrink grout as directed by the ENGINEER. Reinforcement shall not be required, and thickness shall be as specified for RCC.

4.8.2 The following are the minimum design strength requirements:

a. Compressive Strength, Cylinders: 5,500 psi at 28 days

b. Flexural Strength, Beams: 650 psi at 28 days

c. Splitting Tensile Strength, Cores: 400 psi at 28 days

d. Modulus of Elasticity: 4,000,000 psi

4.9. Surface Tolerance – Surface tolerances and corrective action shall conform to Section 15 of this specification.

4.10. Independent Laboratory – Before the paving work starts, the CONTRACTOR and the OWNER will jointly agree on an independent testing laboratory that shall be used to determine the RCC mix, thickness and strength of the RCC. The independent testing shall be AASHTO accredited in concrete. The strengths or any re-test shall be compared to the adjusted strength calculated based on the approved job mix formula and strength development curves.

PART 2 - PRODUCTS

5.0 MATERIALS

5.1. General – All materials to be used for RCC pavement construction shall be approved by the ENGINEER based on laboratory tests or certifications of representative materials which will be used in the actual construction.

5.2. Portland Cement – Cement shall comply with the latest specifications for Portland cement (ASTM C150 and ASTM C1157), or blended hydraulic cements (ASTM

C595 and ASTM C1157). The proposed RCC mix shall have a minimum 15% cement content.

5.3. Aggregates – Unless otherwise approved in writing by the ENGINEER, the quality of aggregates shall conform to ASTM C33. The plasticity index of the aggregate shall not exceed a value of five (5). Aggregates may be obtained from a single source or may be a blend of coarse and fine aggregate. Aggregates must be angular and have minimum of two fractured faces and shall consist of granite or limestone. No gravels may be utilized. Fine aggregates shall conform to ASTM C33 and may consist of natural concrete sands or manufactured sands. The combined coarse and fine aggregate gradation shall be well-graded without gradation gaps and conform to the following gradation:

Sieve Size	*% Passing by Weight*
1" (25 mm)	100
3/4" (19 mm)	92 - 100
1/2" (12.5 mm)	70 - 100
3/8" (9.5 mm)	60 - 90
No. 4 (4.75 mm)	40 - 75
No. 8 (2.36 mm)	35 - 65
No. 16 (1.18 mm)	20 - 50
No. 30 (0.6 mm)	15 - 40
No. 50 (0.3 mm)	5 - 25
No. 100 (0.15 mm)	0 - 18
No. 200 (0.075 mm)	0 - 8

5.4. Mineral Admixtures – Mineral admixtures shall conform to the requirements of ASTM C618 (fly ash), and ASTM C989 (slag). Unless specifically directed by the ENGINEER, total mineral admixture content including the content in blended cements shall not exceed the weight of Portland cement in the RCC mix.

5.4.1 Fly Ash – Fly Ash shall conform to the requirements of ASTM C-618, Class F, including the optional requirements for drying shrinkage, and uniformity. All fly ash for the project shall be from a single source.

5.4.2 Ground Granulated Blast Furnace (GGBF) Slag – GGBF Slag shall conform to the requirements of ASTM C 989, grade 100, or 120. All GGBFS for the project shall be from a single source.

5.5. Chemical Admixtures – Chemical admixtures including water reducing and retarding admixtures shall conform to ASTM C 494 and must be approved by the ENGINEER prior to use.

5.6. Water – Water shall be clean, clear, and free of acids, salts, alkalis or organic materials that may be injurious to the quality of the concrete. Non-potable water may be considered as a source for part or all the water, providing the mix design indicates proof that the use of such water will not have any deleterious effect on the strength and durability properties of the RCC.

5.7. Curing Compound – Concrete curing compounds shall conform to ASTM C309 or ASTM D977.

6.0 EQUIPMENT

6.1. General – All necessary equipment shall be on hand and approved by the ENGINEER before work will be permitted. Roller-compacted concrete shall be constructed with any combination of equipment that will produce a completed pavement meeting the requirements for mixing, transporting, placing, compacting, finishing, and curing as provided in this specification. High volume mixing equipment and high-density pavers will be required to meet this specification.

6.2. Mixing Plant.

6.2.1 Location – The mixing plant shall be located within a 30-minute haul time from the RCC placement location. With prior testing and ENGINEER'S approval, a set retarding admixture may be used to extend the haul time. Two possible locations have been provided just to the south of the adjacent APM terminal and are shown in Figure 1 on the following page.

6.2.2 Capacity – The plant shall be capable of producing an RCC mixture in the proportions defined by the final approved mix design and within the specified tolerances. The capacity of the plant(s) shall be sufficient to produce a uniform mixture at a rate compatible with the placement equipment but not less than 175 cubic yards per hour per plant. The volume of RCC material in the mixing chamber shall not be more than the rated capacity for dry concrete mixtures. Multiple plants shall be used if a single plant cannot provide an uninterrupted supply of RCC to the paver(s) during peak paving operations.

Figure 3- Potential Batch Plant Sites

6.2.3 Pugmill – Only pugmill plants will be allowed to produce the mixture. A pugmill plant shall be a central plant with a twin shaft pugmill mixer, capable of batch or continuous mixing, equipped with synchronized metering devices and feeders to maintain the correct proportions of aggregate, cement, mineral admixture and water. Other pugmill plant requirements are as follows:

a. Aggregate Storage – If previously blended aggregate is furnished, storage may be in a stockpile from which it is fed directly to a conveyor feeding the mixer. If aggregate is furnished in two or more size groups, aggregate separation must be provided at the stockpiles.

b. Aggregate Feed – Aggregate bins shall have a feed rate controlled by a variable speed belt or an operable gate calibrated to accurately deliver any specified quantity of material. If two or more aggregate size stockpile sources are used, the feed rate from each bin shall be readily adjustable to change aggregate proportions when required. Feed rate controls must maintain the established proportions of aggregate from each stockpile bin when the combined aggregate delivery is increased or decreased.

c. Scales (if applicable) – Plant scales for any weigh box or hopper shall be sensitive to 0.5% of the maximum load required. Beam-type scales shall have a separate beam for each aggregate size. Scales shall be of an approved design. Standard test weights accurate to plus or minus 0.1% shall be provided for checking plant scales.

d. Cement and Mineral Admixture Material Storage – Separate and independent storage silos shall be used for Portland cement and mineral admixture. Each silo must be clearly identified to avoid confusion during silo loadings. If the CONTRACTOR chooses to pre-blend the cementitious material, he must employ blending equipment acceptable to the ENGINEER and demonstrate, with a testing plan, the ability to successfully produce a uniform blended material meeting the mix design requirements. Testing of the pre-blended cementitious material shall be done on a daily basis to assure both uniformity and proper quantities.

e. Cement and Mineral Admixture Feed Unit – Satisfactory means of dispensing Portland cement and mineral admixture, volumetrically or by weight, shall be provided to assure a uniform and accurate quantity of cementitious material enters the mixer.

f. Water Control Unit – The required amount of water for the approved mix shall be measured by weight or volume. The unit shall be equipped with an accurate metering device. The water flow shall be controlled by a meter, valve or other approved regulating device to maintain uniform moisture content in the mixture.

g. Surge Hopper – For continuous operating pugmills, a surge hopper attached to the end of the final discharge belt shall be provided to temporarily hold the RCC discharge to allow the plant to operate continuously.

6.3. Pavers.

6.3.1 Requirements – RCC shall be placed with a paver(s) equipped with a high-density screed and is subject to approval by the ENGINEER. High-Density screeds will be defined as screeds having dual-tamping bars or a single tamping bar and dual pressure bars. The paver shall be capable of placing RCC to a minimum of 90% of the maximum wet density in accordance with ASTM D1557 or equivalent test method. The paver shall be of suitable weight and stability to spread and finish the RCC material, without segregation, to the required thickness, smoothness, surface texture, cross-section, and grade.

6.4. Compactors.

6.4.1 Large Compactors – Self-propelled steel drum and rubber coated drum vibratory rollers having a minimum static weight of 10 tons (9.07 metric tons) shall be required for primary compaction. For final compaction and surface sealing, steel drum rollers, rubber coated drum rollers and pneumatic or combination rollers, shall be utilized. Finish rolling shall be done with combination or dual drum rollers having rubber coated drums. Utilization and rolling methods will be developed during the test section and adapted as needed in the field.

6.4.2 Small Compactors – Walk-behind vibratory rollers or plate tampers shall be used for compacting areas inaccessible to the large rollers

6.4.3 Haul Trucks – Trucks for hauling the RCC material from the plant to the paver shall have covers available to protect the material from rain or excessive evaporation. The number of trucks shall be sufficient to ensure adequate and continuous supply of RCC material to the paver.

6.5. Water Trucks – At least one water truck, or other similar equipment, shall be on-site and available for use throughout the paving and curing process. Such equipment

shall be capable of evenly applying a fine spray of water to the surface of the RCC without damaging the final surface.

6.6. Equipment Inspection – Before start-up, the CONTRACTOR'S equipment shall be carefully inspected. Should any of the equipment fail to operate properly, no work shall proceed until the deficiencies are corrected.

6.7. Access for Inspection and Calibration – The ENGINEER shall have access at all times to any plant, equipment or machinery to be used on this project in order to check calibration, scales, controls or operating adjustments.

PART 3 – EXECUTION

7.0 PREPARATION OF SUBGRADE/SUBBASE

7.1. Before RCC pavement construction begins, subgrade/subbase shall be approved by RCC Contractor, General Contractor and ENGINEER. Any deficiencies shall be corrected per the project specifications.

8.0 TEST SECTION

8.1. Timing and Size – At least ten (10) days before the start of paving operations, the CONTRACTOR shall construct a test section using the trial mix design. This test pavement will allow the ENGINEER to evaluate the strength of the RCC material, methods of construction, curing process and surface conditions of the completed test pavement. The test section shall be at least 50 feet (15 meters) long and a minimum of two paver widths wide. It shall be located in a non-critical area or as indicated on the Plans. The test pavement will be constructed over an extended period to demonstrate the construction of cold joints in both a longitudinal and transverse direction, as well as fresh joint construction. All test results shall be approved by the ENGINEER.

8.2. Methods – The equipment, materials and techniques used to construct the test section shall be that which will be used to construct the main RCC pavement.

8.3. Demonstration – During construction of the test section the CONTRACTOR will establish an optimum rolling pattern and procedure for obtaining a density of not less than 98% of the maximum wet density in accordance with ASTM D1557 or equivalent test method. In addition, the CONTRACTOR must also demonstrate the ability to achieve a smooth, hard, uniform surface free of excessive tears, ridges, spalls and loose material.

8.4. Strength Testing.

8.4.1 Field Cast Specimens – Specimens shall be prepared in accordance with ASTM D1557, ASTM C1435, or ASTM C1176 and shall be cured and transported to the laboratory in accordance with ASTM C31. Specimens shall be tested for compressive strength (ASTM C39) at 7 and 28 days of curing. Strength of field cast samples must meet or exceed the requirements per the project specifications. Final acceptance of the RCC by the ENGINEER will be based upon the compressive strength of the cylinders at 28 days.

8.4.2 Cores and Beams – After a minimum of seven (7) days of cure time, cores and beams for testing in accordance with ASTM C42. The cores will be tested for compressive strength (ASTM C 39) at seven (7) days of age. In addition, 6 x 6 x 21-inch (150 x 150 x 525 mm) beams will be sawn from the test section after seven (7) days and flexural strength will be determined in accordance with ASTM C78. All coring, cutting and testing of the test section shall be paid for by the CONTRACTOR. Procedures may be repeated at 28 days if required by the ENGINEER.

9.0 MIXING PROCESS

9.1. General – Except for minor variations in moisture content, the same mixture proportions shall be used for the entire project, unless otherwise stated in the project documents. The water content shall be varied by the CONTRACTOR, as necessary, to provide a consistency that is most conducive to effective placement and compaction. If during mixing there is a substantial change in the type or source of cementitious materials, or aggregates, the mixing must be suspended, and a new mix design shall be developed if not previously approved.

9.2. Mixture Ingredient Tolerances – The mixing plant must receive the quantities of individual ingredients to within the following tolerances:

Material	***Variation in Weight (%)***
Cementitious materials	2.0
Water	3.0
Aggregates	4.0

9.3. Mixing Time – Mixing time will be that which will assure complete and uniform mixing of all ingredients. For drum mixers and dry batch facilities, the time of mixing shall be determined from uniformity test results.

9.4. Material Buildup – All material must be discharged before recharging. The mixing chamber and mixer blade surfaces must be kept free of hardened RCC or other buildups. Mixer blades shall be checked routinely for wear and replaced if wear is sufficient to cause inadequate mixing.

9.5. Plant Calibration – Prior to commencement of RCC production, the CONTRACTOR shall carry out a complete and comprehensive calibration of the plant in accordance with the manufacturer's recommended practice. All scales, containers and other items necessary to complete the calibration shall be provided by the CONTRACTOR. After completion of the initial calibration, the plant shall be recalibrated as directed by the ENGINEER.

9.6. Daily Reports – The CONTRACTOR shall supply daily plant records of production and quantities of materials used that day. Reports shall be submitted before the beginning of the following day.

10.0 TRANSPORTATION

10.1. The transportation of the RCC pavement material from the plant to the areas to be paved shall be in dump trucks fitted and equipped, when necessary, with retractable protective covers for protection from rain or excessive evaporation. The trucks shall be dumped clean with no buildup or hanging of RCC material. For paver placed RCC, the dump trucks shall deposit the RCC material into the paver hopper. Dump truck delivery must be scheduled so that RCC material is spread and compacted within the specified time limits.

11.0 PLACING

11.1. Condition of the Subgrade/Subbase – Prior to RCC placement, the surface of the subgrade/subbase shall be clean and free of foreign material, ponded water and frost prior to the placement of the RCC pavement mixture. The subgrade/subbase must be uniformly moist at the time of RCC placement. If sprinkling of water is required to remoisten certain areas, the method of sprinkling shall not be such that it forms mud or pools of free-standing water. Prior to placement of RCC, the subgrade/subbase shall be checked for proper density and soft or yielding areas and these areas shall be corrected as specified in Section 7.0.

11.2. Paver requirements – RCC shall be placed with an approved paver and high-density screed as specified in Section 6.3.1 and shall meet the following requirements:

11.2.1 Material Supply – The quantity of RCC material in the paver shall not be allowed to approach empty between loads. The material shall be maintained above the auger shaft at all times during paving.

11.2.2 Operation – The paver shall operate in a manner that will prevent segregation and produce a smooth continuous surface without tearing, pulling, or shoving. The spread of the RCC shall be limited to a length that can be compacted and finished within the appropriate time limit under the prevailing air temperature, wind, and climatic conditions.

11.2.3 Speed – The paver shall proceed in a steady, continuous operation with minimal starts and stops. Paver speed during placement operations shall not exceed the speed necessary to ensure that minimum density requirements as specified in Section 4.7 are met and surface distress is minimized.

11.2.4 Surface Texture – The surface of the RCC pavement once it leaves the paver shall be smooth, uniform and continuous without excessive tears, ridges, or aggregate segregation.

11.3. Lift Thickness – Lift thickness of compacted RCC pavement shall be as indicated on the Plans. If RCC pavements are to be constructed in a thickness greater than 10 inches (300 mm), the use of two lifts shall be utilized. No lift shall be less than 4 inches (100 mm).

11.4. Adjacent Lane Placement – Adjacent paving lanes shall be placed within 60 minutes. If more than 60 minutes elapses between placements of adjacent lanes, the vertical joint must be considered a cold joint and shall be prepared in accordance with Section 14.2. At the ENGINEER'S discretion, this time may be increased or decreased depending on the use of set retarding admixtures or the ambient weather conditions of temperature, wind, and humidity.

11.5. Multiple Lift Placement – For multiple lift placement, the total pavement thickness shall be as shown on the Plans, and the CONTRACTOR shall submit his method of placement and lift thickness as part of a paving plan subject to approval by the ENGINEER. In multiple lift construction, the second lift must be placed within 60 minutes of the completion of the first lift. If more than 60 minutes has elapsed, the interface between the first and second lifts shall be considered a cold joint and shall be prepared in accordance with Section 14.3.1. At the discretion of the ENGINEER, this time may be increased or decreased depending on the use of set retarding admixtures or the ambient weather conditions of temperature, wind, and humidity.

11.6. Hand Spreading – Broadcasting or fanning the RCC material across areas being compacted will not be permitted. Such additions of material may only be done immediately behind the paver and before any further compaction has taken place. Any segregated coarse aggregate shall be removed from the surface before rolling.

11.7. Segregation – If segregation occurs in the RCC during paving operations the spreading shall cease until the cause is determined and corrected.

11.8. Placement Patterns – RCC placement shall be done in a pattern so that the curing water from the previous placements will not pose a runoff problem on the fresh RCC surface or on the subbase layer.

11.9. Paving Inaccessible Areas – Areas inaccessible to either paver or roller may not be placed by hand. An alternate and preferred method for paving inaccessible areas is to use cast-in-place, air-entrained concrete with a minimum Modulus of Rupture of 650 psi (4.5 MPa) or as specified by the ENGINEER / project specifications. In areas that may be subjected to high load transfer, the ENGINEER may require the cast-in-place concrete to be doweled into the RCC. Inaccessible areas are to be identified in the paving plan submittal.

11.10. Alternate Placement Methods – Placement of RCC with graders, dozers or other alternative paving equipment other than equipment as specified in Section 6.0 is not allowed.

12.0 WEATHER CONDITIONS

12.1. Cold Weather Precautions – RCC material shall not be placed on any surface containing frost or frozen material or when the air temperature is below 40°F (4°C), except when the air temperature is at least 35°F (2°C) and rising. When the air temperature is expected to fall below 35°F (2°C), the CONTRACTOR must present to the ENGINEER a detailed proposal for protecting the RCC pavement. This proposal must be accepted by the ENGINEER before paving operations may be resumed. A sufficient supply of protective material such as insulating blankets, plastic sheeting, straw, burlap or other suitable material shall be provided at the expense of the CONTRACTOR. The methods and materials used shall be such that a minimum temperature of 40°F (4°C) at the pavement surface will be maintained for a minimum of five (5) days. Approval of the CONTRACTOR'S proposal for frost protection shall not relieve the CONTRACTOR of the responsibility for the quality and strength of the RCC placed during cold weather. Any RCC damaged from freezing shall be removed and replaced at the CONTRACTOR'S expense.

12.2. Hot Weather Precautions – During periods of hot weather (ambient temperature in excess of 90°F) or windy conditions (greater than 30 mph), special precautions shall be taken to minimize moisture loss due to evaporation. Under conditions of excessive surface evaporation due to a combination of air temperature, relative humidity, concrete temperature and wind conditions, the CONTRACTOR must present to the ENGINEER a detailed proposal for minimizing moisture loss and protecting the RCC. Precautions may include cooling of aggregate stockpiles by use of a water spray, protective covers on dump trucks, temporary wind breaks to reduce wind effect, cooling of concrete mix water, and decreasing the allowable time between mixing and final compaction.

12.3. Rain Limitations – No placement of RCC pavement shall be done while it is raining hard enough to be detrimental to the finished product. Placement may continue during light rain or mists provided the surface of the RCC pavement is not washed-out or damaged due to tracking or pickup by dump trucks or rollers. Dump truck covers must be used during these periods. The ENGINEER will be the sole judge as to when placement must be stopped due to rain.

13.0 COMPACTION

13.1. Time Limits – Compaction shall begin immediately behind the placement process and shall be completed within 60 minutes of the start of plant mixing. The time may be increased or decreased at the discretion of the ENGINEER depending on use of set retarding admixtures or ambient weather conditions of temperature, wind and humidity.

13.2. Rolling Pattern – The CONTRACTOR shall determine the sequence and number of passes by vibratory and non-vibratory rolling to obtain the minimum specified density and surface finish. Rollers shall only be operated in the vibratory mode while moving. Pneumatic-tire rollers may be used during final compaction to knead and seal the surface. After achieving the minimum specified density, cosmetic and finish rolling shall continue as necessary.

13.3. Rolling Longitudinal and Transverse Joints – The roller shall not operate within 12 in. (300 mm) of the edge of a freshly placed lane until the adjacent lane is placed. Then both edges of the two lanes shall be rolled together within the allowable time. If a cold joint is planned, the complete lane shall be rolled and the cold joint procedures in Section 14.2 shall be followed.

13.4. Longitudinal Joints – Longitudinal joints shall be given additional rolling as necessary to produce the specified density for the full depth of the lift and a tight smooth transition occurs across the joint. Any uneven marks left during the

vibrating rolling shall be smoothed out by non-vibrating or rubber tire rolling. The surface shall be rolled until a relatively smooth, flat surface, reasonably free of tearing and cracking is obtained.

13.5. Roller Speed – Speed of the rollers shall be slow enough at all times to avoid displacement of the RCC pavement. Displacement of the surface resulting from reversing or turning action of the roller shall be corrected immediately.

13.6. Inaccessible Areas – Areas inaccessible to large rollers shall be treated as specified in Section 11.9.

13.7. Density Requirements – In-place field density tests shall be performed in accordance with ASTM C1040, direct transmission, as soon as possible, but no later than 30 minutes after completion of rolling. A minimum of four (4) tests will be performed for every 10,000 SF of paving. Only wet density shall be used for evaluation. The required density shall be not less than 98% of the maximum wet density obtained by ASTM D1557 or equivalent test method based on a five (5) period moving average of consecutive tests with no test below 96%. All test data / moving average values will be recorded and reported to the ENGINEER.

14.0 JOINTS

14.1. Fresh Vertical Joints – A vertical, or joint that does not exceed ten (10) degrees from vertical, shall be considered a fresh joint when an adjacent RCC lane is placed within 60 minutes of placing the previous lane, with the time adjusted depending on use of retarders or ambient conditions. Fresh joints that meet the above requirements as well as the density requirements in Section 13.7 do not require special treatment.

14.2. Cold Vertical Joints – Any planned or unplanned construction joints that do not qualify as fresh joints shall be considered cold joints and shall be treated as follows:

14.2.1 Longitudinal Cold Joints – Longitudinal cold joints shall either have a formed face that is within ten (10) degrees of vertical and meet the density requirements of Section 13.7 or be cut vertically for the full depth. The vertical cut shall be at least six (6) in (150 mm) from the exposed edge. All excess material from the joint cutting operation shall be removed.

14.2.2 Transverse Cold Joints – Transverse cold joints shall be cut vertically for the full depth of the pavement. The joint shall be located in material that

is sound and meets the density requirements of Section 13.7. All excess material from the joint cutting operation shall be removed.

14.2.3 Cold Joint Cleaning – Prior to placing fresh RCC mixture against a compacted cold vertical joint, the joint shall be thoroughly cleaned of any loose or foreign material. The vertical joint face shall be wetted and in a moist condition immediately prior to placement of the adjacent lane.

14.3. Fresh Horizontal Joints – For multi-layer construction a horizontal joint shall be considered a fresh joint when a subsequent RCC lift is placed within 60 minutes of placement of the previous lift. This time may be adjusted at the discretion of the ENGINEER depending on use of retarders or ambient weather conditions. Fresh joints do not require special treatment other than cleaning the surface of all loose material and moistening the surface prior to placement of the subsequent lift.

14.3.1 Horizontal Cold Lift Joints – For horizontal cold joints the surface of the lift shall be kept continuously moist and cleaned of all loose material prior to placement of the subsequent lift. The ENGINEER may require other action such as use of a cement slurry or mortar grout between lifts. If supplementary bonding materials are used, they shall be applied immediately prior to placement of the subsequent lift.

14.3.2 RCC Pavement Joints at Structures – The joints between RCC pavement and concrete structures shall be treated as cold vertical joints.

14.4. Control Joints – Control joints shall be constructed in the RCC pavement to induce cracking at pre-selected locations. Joint locations shall be shown on the Drawings or as directed by the ENGINEER. Early entry saws should be utilized as soon as possible behind the rolling operation and set to manufacturer's recommendations. Conventionally cut control joints shall be saw cut to 1/4 depth of the compacted RCC pavement. Joints shall be saw-cut as soon as those operations will not result in significant raveling or other damage to the RCC pavement.

14.5. Expansion Joints – Expansion joints shall be constructed in the RCC pavement as shown on the plans or as directed by the ENGINEER.

15.0 FINISHING

15.1. Surface Smoothness – It is the intent of this specification to provide a smooth rideable surface for the intended use of the OWNER. The finished surface of the RCC pavement, when tested with a 10-foot (3-meter) straight edge or crown surface template, shall not vary from the straight edge or template by more than 3/8 inch at

any one point. When the surface smoothness is outside the specified surface tolerance the CONTRACTOR shall grind the surface to within the tolerance by use of self-propelled milling machines equipped with concrete planning heads or an approved diamond grinder.

15.2. Surface Correction – When surface irregularities are outside the tolerances cited above, the CONTRACTOR shall grind or mill the surface to meet the tolerance at no additional cost to the OWNER.

16.0 CURING

16.1. Immediately after final rolling and compaction testing, the surface of the RCC pavement shall be kept continuously moist until an approved curing method is applied.

16.2. Curing Compound – White-pigmented curing compound complying to ASTM C309 will be applied to ensure a uniform void-free membrane across the entire RCC pavement. If the application rate is found to be excessive or insufficient, the CONTRACTOR, with approval of the ENGINEER, can decrease or increase the application rate to a level which achieves a void-free surface without ponding.

16.3. Sheet Materials – Curing paper, plastic and other sheet materials for curing RCC shall conform to ASTM C171. The coverings shall be held securely in place and weighted to maintain a close contact with the RCC surface throughout the entire curing period. The edges of adjoining sheets shall be overlapped and held in place with sandbags, planking, pressure adhesive tape, or other engineer-approved method.

16.4. Water curing – Water cure shall be applied by water trucks equipped with misting spray nozzles, soaking hoses, sprinkler system or other means that will assure a uniform moist condition to the RCC. Application of this moisture must be done in a manner that will not wash out or damage the surface of the finished RCC pavement.

17.0 TRAFFIC

17.1. With the exception of paving equipment, the CONTRACTOR shall protect the RCC from heavy traffic (GVWR greater than 20 tons) until adequate strength has been achieved. Completed portions of the RCC pavement may be opened to traffic after seven days or as approved by the ENGINEER.

18.0 MAINTENANCE

18.1. The CONTRACTOR shall maintain the RCC pavement in good condition until all work is completed and accepted. Such maintenance shall be performed by the CONTRACTOR at his own expense.

19.0 MEASUREMENT AND PAYMENT

19.1. Measurement – The work described in this document will be measured in square yards of completed and accepted RCC pavement as determined by the specified lines, grades and cross sections shown on the Drawings.

19.2. Payment – The work described in this document will be made in accordance with the applicable Schedule of Prices. The price shall include placement, compaction, curing, inspection and testing assistance and all other incidental operations. Such payment shall constitute full reimbursement for all work necessary to complete the RCC pavement. The final price for paving shall be lump sum.

19.2.1 Test Section – If a test section is constructed, it will be paid for on a lump sum basis. Such payment shall constitute full reimbursement for all materials, labor, equipment, mobilization, demobilization, and all other incidentals necessary to construct the Test Section in accordance with Section 8.0. The test section will become part of the finished pavement and shall be constructed in accordance with the paving plan.

END OF SECTION

SECTION 05100 - STRUCTURAL STEEL MATERIALS, FABRICATION & ERECTION

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 perform connection design, prepare shop drawings, supply materials, shop fabricate, inspect, deliver, and erect complete, all structural steel indicated on the drawings and/or as described in this Specification.

1.2. Except as modified herein, all requirements of Paragraph 1.1 shall be in accordance with the requirements of the American Institute of Steel Construction Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design (AISC Specification).

1.3. The work includes, but is not limited to, the following:

1.3.1 Design and detailing of all connections.

1.3.2 Fabrication, erection, shop painting, touch-up painting, and testing of all structural steel. The structural steel includes, but is not limited to, the following:

a. Columns

b. Beams

c. Braces

d. Caged and Uncaged Ladders with Safety Gates

e. Stairs

f. Handrail

g. Grating

h. Floor Plate

1.3.3 All connections and their component parts for the above items.

1.3.4 Any additional structural or miscellaneous steel work required for proper completion of the work, unless specified under other sections.

1.4. Anchor bolts for structural steel shall be furnished and installed by the Contractor performing the concrete work as provided by Section 03150 - "Anchor Bolts and Embeds".

2.0 APPLICABLE SPECIFICATIONS

2.1. The Fabrication and Erection Contractors 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):

a. Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings

b. Code of Standard Practice for Steel Buildings

c. Specification for Structural Joints Using ASTM A325 Bolts or A490 Bolts.

2.1.2 American Iron and Steel Institute:

a. Specification for the Design of Cold-Formed Steel Structural Members

2.1.3 American National Standards Institute (ANSI):

a. A14.3 – Safety Requirements for Fixed Ladders

b. B18.22.1 – Plain Washers

c. B46.1 – Surface Texture (Surface Roughness, Waviness, and Lay)

2.1.4 The American Society for Testing and Materials (ASTM):

a. A36 – Standard Specification for Carbon Structural Steel.

b. A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

c. A123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

d. A143 – Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement

e. A307 – Standard Specification for Low-Carbon Steel Externally & Internally Threaded Standard Fasteners

f. A325 – Standard Specification for High-Strength Bolts for Structural Steel Joints, Including Suitable Nuts and Plain Hardened Washers.

g. A384 – Standard Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies

h. A385 – Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip)

i. A500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

j. A501 – Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing

k. A563 – Standard Specification for Carbon and Alloy Steel Nuts

l. A992 – Standard Specification for Steel for Structural Shapes For Use in Building Framing

m. A1011 – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability

n. F436 – Standard Specification for Hardened Steel Washers

2.1.5 American Welding Society (AWS):

a. D.1.1 – Structural Welding Code

2.1.6 All applicable local and state codes and regulations.

3.0 SUBMITTALS

3.1. The Contractor shall submit, as a minimum, the following documents to the Engineer for review and approval prior to the start of fabrication:

3.1.1 Erection and shop drawings

3.1.2 Quality Control Program and Inspection Procedures

3.1.3 Welding Procedures

3.1.4 Welding Procedure Qualification Test Reports

3.2. A Shipping List (including total weight), a Bolt List, and a minimum of two sets of final erection and shop drawings shall accompany the first shipment of each release.

3.3. All final, as fabricated, erection and shop detail drawings, stamped "Certified for Construction" shall be sent to both the Engineer and the Site prior to or concurrent with shipment of the fabricated steel.

3.3.1 Engineer – Two sets of final erection and shop drawings

3.3.2 Site – Two (2) copies of all erection and shop detail drawings.

3.4. The Contractor shall submit, as a minimum, the following documents to the Engineer for record purposes:

3.4.1 Records of Quality Control inspection test reports requested by the Engineer.

4.0 QUALITY ASSURANCE

4.1. All work covered by this specification shall conform to the AISC Code of Standard Practice for Steel Buildings and Bridges and the AISC Specification for Structural Steel Buildings: Allowable Stress Design and Plastic Design.

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

4.3. Inspection and acceptance, or failure to inspect, shall in no way relieve the Contractor from his 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.

4.4. 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.

4.5. Inspection of shop and field 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.

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

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

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

4.9. Regulatory Requirements

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

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

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

4.9.3 AWS D1.1 Structural Welding Code - Steel.

4.10. Testing and Inspection Agency

4.10.1 The Owner reserves the right engage an independent testing and inspection agency to perform testing, to inspect and evaluate connections, and prepare test reports.

4.10.2 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.

5.0 PERFORMANCE REQUIREMENTS

All work covered by this specification shall conform to the AISC Code of Standard Practice for Steel Buildings and Bridges and the AISC Specification for Structural Steel Buildings: Allowable Stress Design and Plastic Design.

6.0 DRAWINGS

6.1. The Contractor shall furnish erection and shop detail drawings pertaining to all shop fabrication and field erection.

6.1.1 Engineer reviewed and corrected shop detail drawings showing shop welding details and shop connection details.

6.1.2 Erection drawings shall show the complete structure, field connection details, piece marks, and any field notes contained on the ENGINEER'S drawings.

6.1.3 Shop drawings and erection drawings shall be prepared in accordance with the AISC documents listed in this specification.

6.1.4 Erection drawings shall reference the corresponding design drawings and every steel piece on the shop drawings shall reference the appropriate erection drawing.

6.1.5 Erection and shop drawings shall be grouped in sets and identified separately for each building, structure or area.

6.1.6 Erection drawings shall clearly show the mark number and position for each member.

6.1.7 The OWNER'S purchase order number shall be shown on all erection and shop drawings.

6.1.8 Shop drawings shall state the welding electrode to be used.

6.1.9 Surface preparation and shop applied coatings, including areas to be masked, shall be noted on the shop drawings.

6.1.10 Contractor shall provide a Bolt List showing the number, grade, size, and length of field bolts for each connection. This Bolt List may be shown on either the shop drawings or on separate sheets.

6.1.11 If drawing revisions are necessary, the Supplier shall clearly flag on the shop drawings all changes showing the latest revision.

7.0 RECORDS

7.1. The records listed below shall be available for examination by the Owner or his representative at the time of inspection:

7.1.1 Mill test reports or certificates of all materials.

7.1.2 Welding procedures and the results of the welding procedure and operator qualification tests.

7.1.3 Pyrometer charts or other detailed records of heat treatment, if applicable.

7.1.4 Certificate of origin of high-strength bolts.

8.0 MATERIALS

8.1. All materials shall be new and shall conform to the respective specifications and other requirements listed below:

8.2. Structural steel "W", "WT" and "S" shapes shall conform to ASTM A992, Grade 50. All channels, angles and plates shall conform to ASTM A36, unless noted otherwise.

8.3. Hot-formed steel tubing shall conform to ASTM A501.

8.4. Cold-formed steel tubing shall conform to ASTM A500, Grade B.

8.5. Steel pipe shall conform to ASTM A53, Type E or S, Grade B.

8.6. Bolts ½" or smaller in diameter shall conform to ASTM A307. Plain washers conforming to ANSI B18.22.1 shall be provided in connections using these bolts. Bolts, nuts and washers shall be hot dip galvanized.

8.7. All bolts ⅝" or larger in diameter shall be high strength bolts conforming to ASTM A325 or A490. Bolts, nuts and washers shall conform to ASTM A325 or A490, ASTM A563 DH, and ASTM F436 respectively. Bolts, nuts and washers shall be hot dip galvanized.

8.8. 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".

8.9. Unless noted otherwise on the drawings, structural steel column bases and equipment bases supported by concrete foundations shall be grouted with prepackaged, cementitious, nonshrink, nonmetallic Five Star Grout, or Engineer approved equal.

8.10. Bar Grating

8.10.1 Grating shall be welded steel bar type with serrated 1¼" x $^{3}/_{16}$" bearing bars spaced at $1^{3}/_{16}$" center to center, unless noted otherwise. Cross bars shall be spaced at 4" center to center. All bearing bars and cross bars shall be welding quality mild carbon steel and shall conform to ASTM A1011.

8.10.2 Grating shall be attached to the structural framing using mechanically galvanized GFI G-clips as manufactured by Grating Fasteners, Inc. Mechanically galvanized saddle clips may be used at locations in which G-clips are not able to be attached, such as on the web side of a channel.

8.10.3 No tack welding of grating shall be allowed.

8.10.4 Each piece of grating shall be banded on all sides with 3/16" thick galvanized flat bar of the same depth as the grating.

8.10.5 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 grating plate shall be coordinated with the respective trade requiring the opening, prior to fabrication.

8.10.6 Grating, where indicated, shall be removable or hinged, and shall be arranged in sizes to be readily lifted. Frames to receive the grating shall be fabricated of structural shapes by welding with exposed welds ground smooth. Both the frames and the grating shall finish flush with the adjacent floors.

8.10.7 Grating shall be fabricated in panels of sizes suitable for delivery and installation.

8.10.8 Grating shall be hot-dip galvanized after fabrication in accordance with the applicable provisions of ASTM A123, A143, A384 and A385. Care shall be taken not to cut grating after galvanizing has been applied. If field modification of the grating is required, all damaged hot-dip areas shall be coated with brush applied ZRC cold galvanizing compound or equal. Minimum dry film thickness to be 2.5 mils achieved in minimum of two applications. Surface preparation shall be in accordance with manufacturer's recommendations.

8.10.9 If modification of in-place grating is required, and the modification falls on a structural member, then the 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 provided that 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 the grating modification is complete, the grating shall be repaired as noted above. The structural member below shall be touched-up as noted in Paragraph 13.3 of this Specification Section.

8.10.10 Exposed ends of grating at ladder entrance shall be banded with a bar the size of the bearing bars. Exposed end of grating at the top of stairs to have nosing to match stair treads.

8.11. Floor Plate

8.11.1 Floor plate shall be four way raised pattern, commercial grade, carbon steel, and shall have a nominal thickness as called for on the drawings.

8.11.2 Floor plate shall be attached to the structural framing as indicated on the drawings.

8.11.3 No tack welding of floor plate shall be allowed.

8.11.4 All openings in floor plate greater than 6" diameter or 6" square shall be banded with continuous 3/16" flat bar and shall extend 4" above top of floor plate. Location of all openings through floor plate shall be coordinated with the respective trade requiring the opening, prior to fabrication.

8.11.5 Floor plate shall be fabricated in panels of sizes suitable for delivery and installation.

8.11.6 Floor plate shall be hot-dip galvanized after fabrication in accordance with the applicable provisions of ASTM A123, A143, A384 and A385. Care shall be taken not to cut floor plate after galvanizing has been applied. If field modification of the floor plate is required, all damaged hot-dip areas shall be coated with brush applied ZRC cold galvanizing compound or equal. Minimum dry film thickness to be 2.5 mils achieved in minimum of two applications. Surface preparation shall be in accordance with manufacturer's recommendations.

8.11.7 If modification of in-place floor plate is required, and the modification falls on a structural member, then the floor plate shall be removed for modification, modified as required, and replaced back into position. If removal of the floor plate is not possible, then torch cutting will be permitted provided that 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 the floor plate modification is complete, the floor plate shall be repaired as noted above. The structural member below shall be touched-up as noted in Paragraph 13.3 of this Specification Section.

8.12. Stairs

8.12.1 Steel stairs, complete with structural or formed channel stringers, grating threads, 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:

8.12.2 Stair treads shall be rectangular pattern welded grating with serrated 1¼" x 3/16" bearing bars spaced at 13/16" center and bent floor plate nosing. Bars to be welded to 3/16" carrier plates and not be supported by carrier angles.

8.12.3 Treads shall be capable of sustaining a superimposed load of 100 pounds per square foot.

8.12.4 Structural steel for framing of landings shall be furnished as part of the stair work.

8.13. Handrails

8.13.1 Steel railings shall be constructed from 1½" diameter, Schedule 40 steel pipe conforming to ASTM A500, Grade 50.

8.13.2 Joints shall be 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. See structural steel drawings for dimensional details.

8.14. Ladders

8.14.1 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 steel drawings for dimensional details.

8.15. Ladder Cages

8.15.1 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 steel drawings for dimensional details.

8.16. Safety Gates

8.16.1 Safety Gates shall be installed at all elevated landings along the full height of all ladders. Safety gates shall be self-closing safety gates as manufactured by Fabenco, Inc. Gates shall be galvanized / safety yellow in the size required to fit the applicable opening.

9.0 DELIVERY AND STORAGE

9.1. Deliver all material to the job site properly piece-marked for identification and corresponding to the markings indicated on the shop drawings.

9.2. 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.

10.0 FABRICATION

10.1. All structural steel shall be in accordance with the lines, dimensions, grades, details, and notes shown on the drawings and as specified herein.

10.2. 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 of the work shall be coordinated by the Contractor and shall be accomplished at no additional cost to the Owner.

10.3. 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 Engineer.

10.4. The Contractor shall be responsible for all errors of detailing, fabrication, and for the correct fitting of the structural members.

10.5. Fabrication shall be in accordance with Section M2 of the AISC Specifications for Buildings. Said Section M2 consists of the following headings:

10.5.1 M2.1 – Cambering, Curving and Straightening

10.5.2 M2.2 – Thermal Cutting

10.5.3 M2.3 – Planing of Edges

10.5.4 M2.4 – Welded Construction

10.5.5 M2.5 – High Strength Bolted Construction – Assembling

10.5.6 M2.6 – Compression Joints

10.5.7 M2.7 – Dimensional Tolerances

10.5.8 M2.8 – Finishing of Column Bases

10.6. Generally, camber requirements shall be in accordance with Section L1 of the AISC Specification for Buildings. Special camber requirements, if any, are shown on the drawings.

10.7. 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" diameter A325 H.S. bolts, unless otherwise noted on the design drawings.

10.8. 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.

10.9. 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, with a maximum dimension of 3" between rows of bolts. Clip angle connections for beams shall be two sided connections with a minimum clip angle thickness of 5/16" and a minimum bolt size of ¾". 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, but shall in no case include less than 4-bolts for WT braces and 2-bolts for angle braces.

10.10. All ends of steel members with clip angle(s) attached shall be completely sealed with a ⅛" seal weld. The ⅛" seal weld is in addition to the required structural weld.

10.11. 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.

10.12. 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.

10.13. 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.

10.14. No pinholes, slag, or burrs shall be left on welds or steel.

10.15. Copes of beams shall be rounded and not squared.

10.16. Identification of steel by piece-mark shall be by a permanent welded on tag or other Engineer-approved method.

10.17. All holes shall be flush with face of steel.

10.18. Stiffeners, gusset plates, and like shall be coped to fit. No snipe corners will be allowed.

11.0 CONNECTIONS

11.1. 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 "Specification for Structural Joints using ASTM A325 or A490 Bolts".

11.2. Special care shall be taken to provide joint surfaces free from loose mill scale, dirt, oil, burrs, pits, or other defects which would prevent solid seating.

11.3. Slip critical connections shall be clearly defined on the erection drawings. When contact surfaces are galvanized, surfaces shall be scored with a wire brush prior to assembly.

11.4. Primary field connections shall be bolted, using ¾" diameter ASTM A325-N galvanized bolts, bearing type connection with threads included in the shear plane, with one heavy hexagonal structural nut and one galvanized plain, hardened washer (U.N.O.).

11.5. 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 included in the shear plane.

11.6. For bolting requirements, see Paragraph 15.12 of this Specification Section.

11.7. Open holes shall be 13/16" diameter, (U.N.O.). All shop and field holes shall be drilled, cut or punched, not burned.

11.8. 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 to AWS A5.1 or A5.5, E70XX series.

11.9. All connections shall be sized to develop the load or number of bolts indicated on the drawings, or as stated in Section 10.9 above, whichever is greater.

11.10. The steel fabricator shall furnish erection bolts, clip angles, and temporary fasteners required for erection.

11.11. Minimum clip angle thickness shall be ⅜" (U.N.O.).

11.12. 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.

11.13. Gusset plates shall be ⅜" thick, minimum (U.N.O.).

11.14. Each high strength bolt that is loosened or removed from a connection after it has been fully tightened shall <u>not</u> be reused.

12.0 COLUMN BASES AND BEARING PLATES

12.1. 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.

12.2. Column bases shall be finished in accordance with Section M2.8 of the AISC Specification for Buildings.

12.3. Columns shall be milled or saw-cut to provide full bearing.

12.4. Base and cap plates shall be straight and true.

13.0 GALVANIZING

13.1. All structural steel including, but not limited to primary and secondary framing, ladders, handrail, and stair stringers, stair treads, and bar grating shall be hot-dip galvanized.

13.2. Galvanizing of structural steel shall be in accordance with the applicable provisions of ASTM A123, A143, A384 and A385.

13.3. All damaged hot dip galvanized areas shall be coated with brush applied ZRC cold galvanizing compound or equal. Surface preparation shall be in accordance with the manufacturer's recommendations.

14.0 SHOP QUALITY CONTROL

14.1. Testing and Inspection

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

14.1.2 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.

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

14.1.4 Perform visual inspection of all welds.

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

a. Ultrasonic Testing (ASTM E164).

b. Inspect 100% of fillet welds visually.

15.0 ERECTION

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

15.2. Erection of the structural steel shall be in accordance with Section M4 of the AISC Specification for Buildings. Said Section M4 consists of the following headings, amended herewith as noted:

15.2.1 M4.1 – Alignment of Column Bases

15.2.2 M4.2 – Bracing

15.2.3 M4.3 – Alignment

15.2.4 M4.4 – Fit of Column Compression Joints

15.2.5 M4.5 – Field Welding

15.2.6 M4.6 – Field Painting (Touch-up only)

15.2.7 M4.7 – Field Connections

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

15.4. 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 Engineer of any discrepancies.

15.5. 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.

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

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

15.8. Lifting of structural members shall be done in such a manner as to preclude damage to the coating system.

15.9. All base plates supported by concrete foundations shall be grouted. Grout shall be applied by qualified person, experienced in the application of the engineer approved grout.

15.10. Assembly

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

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

15.11. Columns and Bearing Surfaces

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

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

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

15.11.4 Comply with manufacturer's instructions for grout.

15.12. Bolting

15.12.1 All bolts ⅝" or larger shall be high-strength bolts meeting the requirements of ASTM A325 or A490, installed and tightened using the turn-of-nut method. Bolts shall be installed in all holes of the connection and brought to a snug tight condition. Snug tight is defined as the tightness that exits when the plies of the joint are infirm contact. This may be attained by a few impacts of an impact wrench or the full effort of a worker using an ordinary spud wrench. Following this initial operation, all bolts in the connection shall be further tightened by the applicable amount of rotation specified in Table 5 of AISC Allowable Stress Design Specification for Structural Joints Using ASTM A325 or A490 Bolts.

15.12.2 Bolts ½" or smaller shall be ASTM A307 bolts. Bolts for these joints shall be installed and tightened so that all faying surfaces of the joint are in snug contact, and all bolts are as tight as can be drawn up by a worker applying his full effort using a spud wrench, or as achieved by a few impacts of an impact wrench.

15.13. Welding

15.13.1 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.

15.13.2 Perform field welding in accordance with AWS Code.

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

15.13.4 Immediately after erection of structural steel, coated areas which have been abraded or otherwise damaged by welding, bolting, or other field operations shall be touched up in accordance with this specification.

16.0 FIELD QUALITY CONTROL

16.1. Testing and Inspection

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

16.1.2 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.

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

a. Perform visual inspection of all field welds.

b. Test field welds as follows, if required:

1. Dye penetrant of all fillet welds.

2. UT of all full penetration welds.

END OF SECTION

SECTION 16000 – ELECTRICAL - GENERAL

PART 1 - GENERAL

1.0 REQUIREMENTS

1.1. Reference Specification 01100 – "General Provisions".

2.0 CODES AND STANDARDS

2.1. All work under these specifications shall be constructed in accordance with the latest editions of all relevant codes and standards listed herein. All equipment, material and installations shall comply with applicable codes, standards, and installation practices. Comply with the requirements of the applicable local codes, all local rules and regulations including those of the fire authorities. These standards shall apply to the pertinent materials, equipment, and installation practices.

2.2. Where no specific method or form of construction is called for in the Contract Documents, the CONTRACTOR shall comply with code requirements when carrying out such work. Where code conflicts exist, the most stringent requirement applies.

2.3. The latest edition of each of the following publications shall be used unless stated otherwise:

2.3.1 Local Laws and Ordinances

2.3.2 American National Standards Institute (ANSI):

a. ANSI C2 – National Electrical Safety Code

b. ANSI C119.1 – Electric Connectors - Sealed Insulated Underground Connector Systems Rated 600 Volts

c. ANSI/ICEA S-94-649 – Concentric Neutral Cables, Rated 5 Through 46 KV

d. ANSI/ICEA S-97-682 – Utility Shielded Power Cables Rated 5 Through 46 kV

e. ANSI C136 – Roadway and Area Lighting Equipment

f. ANSI/TIA 606-B – Generic Labeling Practices

2.3.3 American Society for Testing and Materials (ASTM)

a. ASTM B1 – Standard Specification for Hard-Drawn Copper Wire

b. ASTM B8 – Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

c. ASTM F512 – Standard Specification for Smooth-Wall Poly (Vinyl Chloride) (PVC) Conduit and Fittings for Underground Installation

d. ASTM B496 – Standard Specification for Compact Round Concentric-Lay-Stranded Copper Conductors

2.3.4 Institute of Electrical and Electronics Engineering, INC (IEEE)

2.3.5 National Electrical Manufacturers Association (NEMA)

a. NEMA RN1 – Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit

b. NEMA TC2 – Electrical Polyvinyl Chloride (PVC) Conduit

c. NEMA TC3 – Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing

d. NEMA TC8 – Extra-Strength PVC Plastic Utilities Duct for Underground Installation

e. NEMA TC9 – Fittings for Polyvinyl Chloride (PVC) Plastic Utilities Duct for Underground Installation

2.3.6 National Fire Protection Association (NFPA)

a. NFPA 70 – National Electric Code (NEC)

2.3.7 Underwriters Laboratories Inc. (UL)

a. UL 6 – Electrical Rigid Metal Conduit

b. UL 44 – Thermoset-Insulated Wires and Cables

c. UL 83 – Thermoplastic-Insulated Wires and Cables

d. UL 467 – Grounding and Bonding Equipment

e. UL 486A – Wire Connections and Soldering Lugs for Use with Copper Conductor

f. UL 510 – Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape

g. UL 514A – Metallic Outlet Boxes

h. UL 514B – Conduit, Tubing, and Cable Fittings

i. UL 854 – Service Entrance Cables

j. UL 1242 – Electrical Intermediate Metal Conduit

k. UL-1598 – Luminaries

2.3.8 Power Cable Engineers Association (IPCEA) Method K-2 chart.

2.3.9 ACI Standard Code for reinforced concrete (ACI 318-14, Chapter 20)

2.3.10 Illuminating Engineering Society (IES):

a. IES HB-10 – IES Lighting Handbook

b. ANSI/IES LS-1-22 – Lighting Science: Nomenclature and Definitions for Illuminating Engineering

c. IES LM-79-08 – Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

d. IES LM-80-15 – Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules

3.0 DEFINITIONS

3.1. Reference Specification 01100 "General Provisions" for definitions.

4.0 DRAWINGS AND SPECIFICATIONS

4.1. The civil, structural, and electrical drawings and specifications shall be considered as mutually explanatory and complementary. Any electrical work called for by one and not by the other shall be performed as though required by all. All sections and subsections of the Electrical work shall be governed by and subject to the general and supplementary conditions. Any discrepancies in or between the drawings and specifications, or between the drawings and actual field conditions shall be reported to the OWNER in sufficient time to issue an addendum for clarification.

4.2. The electrical drawings are diagrammatic, and some circuit runs have been distorted to avoid confusion of lines. The drawings indicate the general layout of the complete electrical system however, field verification of scale dimensions on plans is directed since actual locations, distance, and levels will be governed by actual field conditions.

5.0 FIELD MEASUREMENTS AND COORDINATION

5.1. Separate divisional Drawings and Specifications shall not relieve the CONTRACTOR or Subcontractors from full compliance of work of his trade indicated on any of the Drawings or in any Section of the Specifications. The CONTRACTOR shall report conflicts prior the start of work.

5.2. Verify all field dimensions and locations of equipment to insure close, neat fit with other trade's work. Do not scale electrical drawings; rely on dimensions shown on architectural, civil or structural drawings.

5.3. Coordinate work with all other trades in proper sequence to ensure that the total work is completed within Contract time schedule and with minimum cutting and patching. Locate all equipment, materials, and apparatus symmetrical with architectural elements. Install to exact height and locations when shown on architectural drawings. When locations are shown only on mechanical drawings,

be guided by structural details and conditions existing at job and correlate this work with that of others.

5.4. Install work as required to fit structure, avoid obstructions, and retain clearance, headroom, openings, and passageways. CONTRACTOR shall not cut any structural members without written approval from ENGINEER.

5.5. Carefully examine any existing conditions, piping, and premises. Compare Drawings with existing conditions. Report any observed discrepancies. Written instructions will be issued by the ENGINEER to resolve discrepancies.

5.6. Because of the small scale of the Drawings, it is not possible to indicate all offsets and fittings or to locate every accessory. Drawings are essentially diagrammatic. Study carefully the sizes and locations of structural members and take actual measurements on the job. Locate material, equipment, and accessories with sufficient space for installing and servicing. CONTRACTOR is responsible for accuracy of his measurements and shall not order materials or perform work without verification. No extra compensation will be allowed because field measurements vary from the dimensions on the Drawings. If field measurements show that equipment or material cannot be fitted, the ENGINEER shall be consulted. Remove and relocate, without additional compensation, any item that is installed and is later found to encroach on space assigned to another use.

6.0 GUARANTEE AND SERVICE

6.1. Reference Specification 01100 – “General Provisions”.

7.0 SUBMITTALS

7.1. Before ordering any materials or equipment, the CONTRACTOR shall submit one complete schedule showing the make, type, manufacturer's name, and trade designation of all equipment. This schedule shall be accompanied by the manufacturer's printed specifications and shop drawings for each piece of equipment or specialty and shall give dimensions, diagrams, descriptive literature, capacity or rating, kind of material, finish, guarantee, etc., and such other detailed information as the ENGINEER may require. When approved, such schedule shall become part of these Specifications, and shall be of equal force in that no deviation will be permitted except with the approval of the ENGINEER.

7.2. If shop drawings show variation from the requirements of the Contract Documents, the CONTRACTOR shall make specific mention of such variation in his letter of transmittal. shop drawings show variation from the requirements of the Contract

Documents, the CONTRACTOR shall make specific mention of such variation in his letter of transmittal. Approval of shop drawings by ENGINEER shall not relieve the CONTRACTOR of the responsibility for executing the work in accordance with the Contract at no additional cost.

7.3. Review of shop drawings, descriptive literature, catalog data, or schedules by the ENGINEER shall not relieve the CONTRACTOR of the responsibility for deviations from Contract Drawings or Specifications, unless he has in writing called to the attention of the ENGINEER such deviation at the time of submission, nor shall it relieve the CONTRACTOR from responsibility for errors of any sort in shop drawings, descriptive literature, catalog data, or schedules.

7.4. Submit shop drawings and any other drawings specifically called for in other sections. Shop drawings shall consist of plans, sections, elevations, and details to scale (not smaller than 1/4 inch per foot), with dimensions clearly showing the installation. Direct copies of small-scale project drawings issued to the CONTRACTOR are not acceptable. Drawings shall take into account equipment furnished under other Sections and shall show space allotted for it. Include construction details and materials. Submit product data after award of the Contract and before any equipment or materials are purchased. Product data are defined as manufacturer's printed literature specifically marked to indicate size and model and accompanied by rating sheets listing values showing that equipment meets scheduled or specified values. Properly coded stamp from the ENGINEER on returned submittal is required before ordering equipment.

PART 2 - PRODUCTS

8.0 EQUIPMENT AND MATERIALS

8.1. All materials shall be new and unused unless otherwise stated, the best of their respective kinds, suitable for the conditions and duties imposed on them. The description, characteristics, and requirements of materials to be used shall match existing installed materials and products. When in doubt consult the ENGINEER.

8.2. Equipment and materials furnished under this Section shall be the product of a manufacturer regularly engaged in the manufacture of such items for a period of at least three (3) years. Where practical, all of the components shall be products of a single manufacturer in order to provide proper coordination and responsibility. Where required, CONTRACTOR shall furnish proof of installation of similar equipment or materials.

8.3. Each item of equipment shall bear a nameplate showing the manufacturer's name, trade name, model number, serial number, ratings and other information necessary to fully identify it. This plate shall be permanently mounted in a prominent location and shall not be concealed, insulated, or painted. The label of the approving agency, such as UL or NEMA, by which a standard has been established for the particular item, shall be in full view. Materials shall be UL-listed for the application specified or indicated on the Drawings or Specifications.

8.4. All electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, motor control centers, or other similar devices or equipment shall be field marked per NEC Article 110.16 to warn qualified personnel of potential electrical arc flash hazards. Labels shall be Brady Cat # 94913 or approved equal.

8.5. Materials and equipment are specified herein by a single or by multiple manufacturers to indicate quality, material, and type of construction desired. Manufacturer's products shown on the Drawings have been used as basis for design; it shall be the CONTRACTOR'S responsibility to ascertain that alternate manufacturer's products meet detailed specifications and that size and arrangement of equipment are suitable for installation. Prior to shop drawing submittals CONTRACTOR shall obtain written approval from the ENGINEER prior to substitution of alternate manufacturer's product.

8.6. Catalog numbers and model numbers indicated in the drawings and specifications are used as a guide in the selection of the equipment and are only listed for the CONTRACTOR'S convenience. The CONTRACTOR shall determine the actual model numbers for ordering equipment and materials in accordance with the written description of each item and with the intent of the Drawings and Specifications.

8.7. Ground rods and grounding connections – Reference Specification 16060 Part 2, 2.1.

PART 3 - EXECUTION

9.0 WORKMANSHIP

9.1. All materials, fixtures, and equipment shall be installed and completed in a first-class workmanlike manner and in accordance with the best modern methods and practice. Any materials installed which do not present an orderly and reasonably neat and/or workmanlike appearance, or do not allow adequate space for

maintenance, shall be removed and replaced when so directed by the ENGINEER at no additional cost.

10.0 COORDINATION

10.1. The CONTRACTOR shall be responsible for full coordination of the electrical systems with site drawings of the construction area so that the proper openings and sleeves or supports etc., are provided for conduit, devices, or other equipment passing through slabs or walls.

10.2. Any additional steel supports required for the installation of any electrical equipment, etc., shall be provided by the CONTRACTOR.

10.3. It shall be the CONTRACTOR'S responsibility to see that all equipment that may require maintenance and operation are made easily accessible, regardless of the diagrammatic location shown on the Drawings.

10.4. All connections to fixtures and equipment shown on the Drawings shall be considered diagrammatic unless otherwise indicated by a specific detail on the Drawings. The actual connections shall be made to fully suit the requirements of each case and adequately provide for servicing.

10.5. The CONTRACTOR shall protect equipment and fixtures at all times during storage and construction and shall replace all equipment and fixtures which are damaged as a result of inadequate protection.

10.6. Prior to ordering electrical equipment, starting and during the progress of work, the CONTRACTOR shall review and examine all work and materials to be supplied and installed by others as they apply to work in this Section. Any conflicts between equipment supplied and the requirements on the drawings shall be reported to the ENGINEER. The CONTRACTOR shall correct the conflicts and incorporate into the electrical submittals prior to ordering equipment. Start of work and installation of the electrical system will be construed as the CONTRACTOR'S acceptance of suitability of work by others and equipment requirements. Any conflicts with equipment's electrical requirements after the electrical system has been installed shall be the responsibility of the CONTRACTOR to make corrective action. Any corrective action shall be at the CONTRACTOR'S expense.

10.7. Interruption of Service – Extent, length, and timing of outages shall be reviewed and scheduled by the ENGINEER. Before any equipment is shut down for disconnecting or tie-ins, arrangements shall be made with the ENGINEER and this work shall be done at the time best suited to the OWNER. Services shall be

restored the same day. CONTRACTOR shall provide all temporary power, lighting, and other services as required for construction and outages. The CONTRACTOR shall remove such temporary services when no longer required.

10.8. Cutting and Patching – CONTRACTOR shall be responsible for cutting and patching of all holes, chases, sleeves, and other openings required for installation of equipment furnished and installed under these Specifications and Drawings. Obtain written approval from ENGINEER before cutting any structural items. Where shown to cut and patch asphalt, the CONTRACTOR shall perform patch as specified in a first-class manner.

10.9. Equipment Setting – Bolt equipment directly to concrete pads or foundations, using hot-dipped galvanized anchor bolts, nuts, and washers. Level all equipment.

10.10. Painting – Touch-up factory finishes on equipment located inside and outside shall be done in accordance with these specifications. The CONTRACTOR shall obtain matched color and type coatings from the manufacturer and apply as directed by manufacturer. If corrosion is found during inspection on the surface of any equipment, clean, prime, and paint as required.

10.11. Clean-up – Thoroughly clean all exposed parts of apparatus and equipment of cement, plaster, and other materials and remove all oil and grease spots. Repaint or touch up as required to look like new and match original finish. During progress of work, CONTRACTOR is to carefully clean and leave premises free from debris and in a safe condition.

10.12. Start-up and Operational Test – Start each item of equipment in strict accordance with the manufacturer's instructions; or where noted under equipment specification, start-up shall be done by a qualified representative of the manufacturer at the expense of the CONTRACTOR. Alignment, lubrication, safety, and operating control shall be included in start-up check.

10.13. Record Drawings – During the progress of the work the CONTRACTOR shall record on their field set of Drawings the corrections, variations, and deviations for systems which are not installed exactly as shown on the Contract Drawings. Upon completion of the work, “As-Built” record drawings shall be prepared and submitted to the OWNER.

10.14. Acceptance – Acceptance will be on the basis of regular inspections of the work. Request inspections as required per this specification. Conceal no work until inspected. It is the CONTRACTOR’S responsibility to document that all inspections are conducted in accordance with these specifications. A

representative of the CONTRACTOR'S firm shall be in attendance to assist during inspections. CONTRACTOR shall furnish necessary electricians to assist during inspections and make any necessary adjustments.

10.15. Punch List – Submit written confirmation that all punch lists have been checked and the required work completed. The CONTRACTOR, at the ENGINEER'S current billing rate, shall pay for additional field time required by the ENGINEER to report or check on past punch list deficiencies.

10.16. Equipment Identification – Install engraved plastic nameplates or tags on controls, panels, switches, starters, timers, and similar operable equipment, keyed by number to operating instructions. Reference Specification 16100 2.9(E) for Equipment Identification Requirements.

END OF SECTION

SECTION 16060 – ELECTRICAL – GROUNDING

PART 1 - GENERAL

1.0 REQUIREMENTS

1.1. Grounding systems shall be as indicated on construction drawings and as required by NFPA 70 and ANSI C2

1.2. Reference NEC Article 250 for general grounding requirements that apply to the complete installation, including but not limited to, low voltage equipment, lighting, switches, switchgear, manholes, handholes cable sheaths, cable shields, conduit and fencing installations.

2.0 SUBMITTALS

2.1. The CONTRACTOR shall submit product data for each type of the following products being provided and mark the data sheet for the product being provided with an identifying mark or arrow:

2.1.1 Ground rod

2.1.2 Exothermic connections

2.1.3 Mechanical connections

2.1.4 Proposed Test Equipment

2.1.5 Grounding test results

2.1.6 Grounding conductors

2.1.7 All other grounding specific materials

PART 2 - PRODUCTS

3.0 GROUNDING MATERIALS

3.1. Ground rods – shall be copper-clad steel with diameter adequate to permit driving to full length of the rod, but not less than 3/4 inch in diameter and ten (10) feet long unless otherwise indicated.

3.2. Ground rod connections – Connect copper-clad steel ground rods only to insulated TW, or RHW copper ground conductor and weld the connection. Insulate entire area of the rod in the vicinity of the weld and the connecting wire and seal against moisture penetration.

3.3. Exothermic connections – All grounding system connections below finished grade shall be made by exothermic connection. Connections shall include, but are not limited to, all cable-to-cable splices, tees, X's, all cable to ground rods, ground rod splices, cable-to-steel and cast iron, and cable lug terminations, etc. Procedures outlined in manufacturer's instructions shall be followed. Molds shall not be altered in the field. All material used (molds, welding metal, tools, and accessories, etc.) shall be Cadweld, manufactured by Erico Products, Inc., or approved equal. Material of different manufacturers shall not be mixed. Welds which have "puffed up" or which show convex surfaces indicating improper cleaning is not acceptable.

3.4. Mechanical connections – For accessible connections in lieu of a thermic type process, a compression ground grid connector of a type which uses a hydraulic compression tool to provide the correct circumferential pressure may be used. Tools and dies shall be as recommended by the manufacturer. An embossing die code or other standard method shall provide visible indication that a connector has been adequately compressed on the ground wire.

3.5. Ground conductors:

3.5.1 Size No. 6 AWG or smaller shall be identified by a continuous green outer finished along its entire length. Sizes larger than No. 6 AWG shall be identified by either a continuous green outer finish along its entire length or at the time of installation by a distinctive green marking at its terminal.

3.5.2 Grounding conductors shall be stranded-bare copper conforming to ASTM B 8, Class B, for sizes No. 6 AWG and larger, and shall be solid-bare copper conforming to ASTM B 1 for sizes No. 8 and smaller.

3.6. Cable sheaths, cable shields, conduit, and equipment shall be grounded in accordance with NEC Article 250 and all applicable references within.

PART 3 - EXECUTION

4.0 INSTALLATION

4.1. Provide a bare or insulated equipment grounding conductor which shall be separate from the electrical system neutral conductor. The equipment grounding conductor

shall be colored green and shall be continuous from a connection at the Service Entrance Equipment Ground to all switchboards, distribution and branch panelboards. Equipment grounding conductors shall be provided in all branch circuits serving convenience outlets, receptacles, and portable and permanently installed electric appliances, equipment apparatus, and other miscellaneous metal enclosing bodies including light switch boxes normally within contact of personnel. Branch circuit grounding conductors shall be sized in accordance with the NEC. Connections at panelboards, outlets, and equipment apparatus shall be made in an approved and permanent manner. Resistance to ground shall not exceed 25 ohms.

4.2. All ground connections shall be made on surfaces which have been cleaned of all paint, dirt, oil, etc., so that connections are bare metal to bare metal contact. All ground connections shall be tight, and shall be made with UL-listed grounding devices, fittings, bushings, etc. Bond bushings of raceway systems to ground lugs in boxes, cabinets, motors and equipment to assure electrical continuity of all metallic components of the electrical systems. Comply with the requirements of NEC Articles 250D, 250E, 250F, 250G, 250J and 250K.

4.3. Ground exposed, non-current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductor in metallic raceways, and neutral conductor of wiring systems. Grounding electrodes shall be driven as required. Where rock is encountered, grounding plates may be used in lieu of grounding rods. If applicable, make connection to water pipe by suitable ground clamp or lug connection to plugged tee. If flanged pipes are encountered, make connection with lug bolted to street side of flanged connection. Supplement metallic water service grounding system with additional made electrode in compliance with NFPA 70. Where ground fault protection is employed, ensure that connection of ground and neutral does not interfere with correct operation of fault protection.

4.4. All equipment enclosures, motor and transformer frames, conduits systems, cable armor, and similar items shall be grounded by a separate ground wire from the equipment ground installed with the power cable, tied directly to the ground system.

4.5. Exposed connections shall be made by means of approved grounding clamps. Exposed connections between different metals shall be sealed with no-oxide paint Grade A or approved equal. All buried connections shall be made by welding process.

4.6. All underground conductors shall be laid slack and, where exposed to mechanical injury, shall be protected by rigid conduit. Conductors in rigid conduit shall be electrically connected to both ends of the guard.

4.7. The CONTRACTOR shall exercise care to insure good continuous ground, in particular between the conduit system and equipment frames and enclosures. Where necessary, jumper wires shall be installed.

4.8. Two grounding pig tails are required per manholes.

4.9. Multiple conductors in a single lug are not permitted. Each grounding conductor shall terminate in its own terminal lug.

4.10. Flexible metal conduit, liquid-tight flexible conduit or nonmetallic rigid conduit is not permitted to be used as a grounding conductor.

4.11. Provide bare or insulated, green conductor for grounding conductors installed in conduit or raceways. Reference NEC Article 352, Section 60 for running a ground wire through a non-conducting conduit when required for equipment grounding. For three phase wiring, provide a green wire ground conductor with the phase conductors in each conduit. This green wire ground conductor shall be used to provide ground continuity between the equipment or device and the metallic conduit raceway system.

4.12. The metallic electrical raceway may not be used as the grounding conductor.

5.0 TESTING

5.1. The CONTRACTOR shall test the ground resistance of the system. All test equipment shall be provided by the CONTRACTOR and approved by the ENGINEER. Dry season resistance of the system shall not exceed 25 ohms. If such resistance cannot be obtained with the system as shown, the CONTRACTOR shall provide additional grounding as directed by the ENGINEER without additional payment.

5.2. Perform ground resistance tests for ground rods before any wire is connected. Take measurements in normally dry weather, not less than 48 hours after rainfall. Ground resistance shall also be measured for each piece of equipment grounded to the ground electrode. Use a portable ground testing megger to test each ground or group of grounds. The instrument shall be equipped with a meter reading directly in ohms or fractions thereof to indicate the ground value of the ground electrode under test. Provide one copy of the ground megger manufacturer's directions, indicating the method to be used. CONTRACTOR shall submit field test results to the ENGINEER.

6.0 MEASUREMENT AND PAYMENT

6.1. Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 16100 – ELECTRICAL – BASIC MATERIALS AND METHODS

PART 1 – GENERAL

1.0 REQUIREMENTS

1.1. This Electrical Specification Section "Basic Materials and Methods" is part of each Electrical Specification Section making reference to or requiring products specified herein. All items called for in this Section are to be considered a minimum requirement and shall follow the NEC latest revision. If more stringent requirements are called for in separate sections of these specifications, those guidelines shall be used.

2.0 SUBMITTALS

2.1. Submit the producer's/manufacturer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow. Provide the following:

2.1.1 All conduit and raceways.

2.1.2 All conduit and raceway fittings.

2.1.3 Bushings, sleeves

2.1.4 Conduit seals

2.1.5 All outlet boxes, pull boxes, junction boxes, fabricated boxes

2.1.6 Enclosures and cabinets

2.1.7 Conductors and cables

2.1.8 Grounding systems, ground rods, equipment and connections.

2.1.9 Lightning protection systems

2.1.10 Conduit supports

2.1.11 Concrete inserts and components

2.1.12 Pull wires, pull ropes and lubricants

2.1.13 Metal framing systems

2.1.14 Cable Trench System

2.1.15 Any other items being supplied on the project

PART 2 – PRODUCTS

3.0 ACCEPTABLE PRODUCERS/MANUFACTURERS

3.1. Allied Tube and Conduit; Anaconda Industries; Appleton Electric; Belden Corporation; B-Line; W.H. Brady Co.; Carlon; Challenger; Crouse-Hinds Co.; ETP; Elcen Metal Products Co.; General Cable Co.; General Electric Co.; Hoffman Engineering Co.; Harvey Hubbell, Inc.; Midland-Ross Corporation; Musco Lighting; Okonite Co.; 0-Z/Gedney; Raco, Inc.; Republic Steel Corporation; 3M; Southwire; Square D Co.; Seton Nameplate; Thomas and Betts; Triangle PWC, Inc.; Walker Parkersburg Textron; Wiremold Co.; Westinghouse; Pre-Approved Equal by ENGINEER.

3.2. As indicated, products listed herein may be common to various Electrical Sections for this project.

3.3. All materials and equipment specified herein shall be UL-listed and adhere to the applicable requirements of the National Electrical Code (NEC), latest issue.

4.0 RACEWAYS

4.1. Rigid Metal Conduit (RMC) – NEC Articles 344 and 300.6. RMC shall be UL Listed, hot dip galvanized steel. RMC shall be PVC coated inside and outside for all areas subject to direct exposure including all areas under a dock or wharf.

4.2. Rigid Nonmetallic Conduit Type PVC – NEC Article 352. PVC shall be schedule 40 or schedule 80, as indicated on the Drawings. Conduit shall be in accordance with NEMA TC 2 for general use and NEMA TC 6 & 8 for underground use.

4.3. Electrical Metallic Tubing (EMT) – NEC Article 358. EMT shall be steel, protected inside and outside by a coating of approved corrosion-resistant material such as zinc or cadmium. Shall be in accordance with UL 797 and ANSI C80.3.

4.4. Flexible Metal Conduit (FMC) – NEC Article 348. FMC shall be Anaconda Sealtite Conduit, fabricated from continuous lengths of spirally wound, galvanized steel strip, with successive convolutions securely interlocked. A synthetic jacket shall be

extruded over the lining to make a moisture- and oil-proof conduit which is bendable to a small radius. Minimum size of conduit shall be not less than 3/4 inch. Flexible conduit shall be Type UA (UL approved). Install bonding jumper on exterior of each flexible conduit, size per NEC Table 250-95.

4.5. Liquid Tight Flexible Metal Conduit (LFMC) – NEC Article 350. LFMC shall be galvanized steel, protected inside and outside with an extruded outer liquid tight, non-metallic, sunlight resistant jacket. Use with standard liquid tight fittings.

4.6. Metal Wireways – NEC Article 376. Metal Wireways shall be sheet metal troughs with hinged or removable covers, rust resistant undercoat, and gray finish coat. Sizes shall be as indicated on the Drawings or determined by the CONTRACTOR based on NEC requirements according to the number of conductors enclosed. Exterior units shall be weatherproof. Steel shall be minimum 14 gauge.

4.7. Busways – NEC Article 368. Busways shall be of sheet metal enclosure components, ventilated or non-ventilated, indoor or outdoor type as indicated on the Drawings with copper bus, insulators or insulation jackets, and copper or brass bus fastenings. Sheet metal shall have rust resistant undercoat and factory standard color finish coat. Ampacity and bracing shall be as indicated on the Drawings. Provide full neutral bus and ground bus unless otherwise indicated on the Drawings.

5.0 RACEWAY FITTINGS

5.1. Intermediate Metal Conduit – shall have threaded galvanized steel fittings; threadless, compression, galvanized steel fittings or threadless, compression, cadmium plated malleable iron fittings. Fittings shall be rain tight/concrete tight.

5.2. Rigid Metal Conduit – shall have threaded fittings, galvanized steel; threadless compression galvanized steel; or threadless compression cadmium-plated malleable iron. RMC Fittings shall be PVC coated inside and outside for all areas subject to direct exposure including all areas under a dock or wharf. Fittings shall be rain tight/concrete tight.

5.3. Rigid Non-Metallic Conduit – shall have PVC fittings suited for the purpose and joined together by a method approved for the purpose. Schedule 80 conduit sections shall be joined together with threaded fitting connectors.

5.4. Electrical Metallic Tubing (EMT) – fittings shall be compression type, all zinc-plated steel; zinc-plated steel body with cadmium-plated malleable iron nut; or cadmium-plated malleable iron body and compression nut. Fittings shall be UL-listed for rain tight, concrete tight, or rain tight/concrete tight. EMT fittings for sizes

two (2) inches and larger may be zinc plated steel, set screw type unless otherwise indicated on the Drawings. Die cast or indenter type fittings shall not be permitted.

5.5. Flexible Metal Conduit Fittings – shall be zinc-plated steel or cadmium-plated malleable iron screw type with insulated throat and angular wedge fitting between convolutions of conduit.

5.6. Liquidtight Flexible Metal Conduit Fittings – shall be cadmium-plated malleable iron or steel with compression type steel ferrule and neoprene gasket sealing rings, with insulated throat.

5.7. Wireway Fittings – shall be steel with rust resistant undercoat and finish coat to match the wireway. The fittings shall be so designed that the sections can be electrically and mechanically fitted together to form a complete system. Dead ends shall be closed.

5.8. Expansion Fittings – shall be corrosion protected steel for metal raceways per NEC Article 300.6, and PVC for non-metallic raceways. Provide bonding fittings for metal raceways and grounding conductors for PVC raceways.

5.9. Locknuts – shall be extra heavy, zinc-coated steel for sizes 1/2 inch to 2 inches. Locknuts 2-1/2 inches and larger shall be malleable iron, Thomas and Betts or equal.

5.10. Couplings and Unions – shall be galvanized steel, tapered thread standard conduit couplings for intermediate metal conduit and rigid metal conduit. PVC couplings for rigid non-metallic conduit shall use approved adhesive, and threaded couplings shall be used for schedule 80 conduit. Split couplings shall be galvanized steel. Unions shall be ground joint type galvanized steel. Couplings and Unions shall be PVC coated inside and outside for all areas subject to direct exposure including all areas under a dock or wharf.

6.0 BUSHINGS

6.1. Bushings shall be O-Z Gedney Manufacturing Co., type A or equal

6.2. Bushings shall be one of the following types:

6.2.1 Zinc-plated steel, threaded or threadless.

6.2.2 Zinc-plated steel of threaded or threadless, phenolic insulated with temperature rating of 150 degrees C.

6.2.3 Cadmium-plated malleable iron, threaded or threadless.

6.2.4 Cadmium-plated malleable iron, threaded or threadless, phenolic insulated, with temperature rating of 150 degrees C.

6.2.5 Phenolic with temperature rating of 150 degrees C.

6.2.6 Zinc-plated steel or cadmium-plated malleable iron; threaded or threadless; non-insulated or insulated with grounding connector or grounding lug.

6.3. Insulated bushings shall have phenolic insulation molded to the bushing.

7.0 CONDUIT SEALS

7.1. Conduit Seals shall be galvanized steel, tapered threads for intermediate metal conduit and rigid metal conduit with sealing compound and fiber.

8.0 BOXES

8.1. Junction Boxes (Exposed Non-Hazardous Areas) – shall be NEMA 4 type FS or FD. Junction Boxes shall be cast-iron or cadmium-plated or "feraloy" equipped with cast covers and gaskets secured with brass machine screws in all locations. Boxes shall be 4 inches x 4 inches x 1-1/2 inches deep or larger as required and meet NEC code requirements for the number and size of wires and size of conduit entering box. Boxes in Class II, Division 1, Group F hazardous areas shall conform to NEC Article 500.7 for protection techniques.

8.2. Fabricated Boxes – Shall be a minimum NEMA 4X, hot dipped galvanized steel or stainless steel for outside installations. All exterior boxes shall be rated NEMA 4P. Covers shall be hinged or screwed with neoprene gaskets. Boxes in Class II, Division 1, Group F hazardous areas shall conform to NEC Article 500.7 for protection techniques.

9.0 CABINETS

9.1. Cabinets shall be flush or surface mounted as indicated on the Drawings, and fabricated of U.S. standard gauge steel, galvanized with turned lip on front. Cover shall be flat steel sheet with hinged door (concealed hinges) and flush catch and lock. All cabinets for the project shall be keyed alike. Cover shall be treated with rust-resistant undercoat and grey baked finish coat. Where exposed to sunlight, the materials shall be listed as sunlight resistant or shall be identified as sunlight

resistant per NEC Article 300. Reference NEC Article 312 for cabinet installation and construction specifications including specifications for mounting cabinets in wet locations.

10.0 CONDUCTORS

10.1. For information on cables to be used in underground duct banks, see Specification 16375 – UNDERGROUND/UNDERWHARF WORK.

10.2. Conductors shall be in accordance with NEC Article 310, but not less than 98% conductivity copper, medium or soft drawn. Sizes shall be as indicated on the Drawings. Sizes No. 10 and smaller may be solid unless noted on the drawings. Sizes No. 8 and larger shall be stranded. Insulation shall be THW, THWN or XHHW unless noted otherwise.

10.3. Refer to the Specification 16175, "Conductor and Cable ID", for color coding and identification of conductors.

10.4. Identification tags or labels – shall be vinyl coated, with 1/8-inch minimum height, black characters on white background. Tag or label shall be 1/4 inches wide minimum.

10.5. Wire Connectors – Connectors for 600-volt conductors Size No. 10 AWG and smaller shall be pressure type UL 486A. Use 600-volt splicer-reducer pressure connectors for copper conductors to 500 MCM. Use rectangular, solderless pressure connectors or split bolt copper alloy connectors for copper conductors to 1000 MCM.

10.6. Wire Pulling Lubricant – Lubricant shall be Dyna Blue, or an approved equal product produced specifically for wire pulling lubrication. Soap flakes or vegetable soaps shall not be used for lubrication. Wire and cable shall be carefully handled during installation. Reference NEC Article 728 for fire resistive cable lubricant when required.

10.7. Minimum Conductor Sizes – Minimum size for branch circuits shall be per NEC Article 310.106(A) but not less than No. 12 AWG. Minimum size conductors for Class 1, Class 2 and Class 3 signal circuits shall be per NEC Article 725 but not less than No. 14 AWG for Class 1 remote-control and signal circuits, No. 16 AWG for Class 2 low-energy, remote-control and signal circuits, No. 22 AWG for Class 3 low-energy, remote-control, alarm and signal circuits.

10.8. Bonding Conductors – Conductors to be per ASTM B1 for solid bare copper wire sizes No. 8 AWG and smaller diameter. Conductors to be per ASTM B8, Class B for stranded bare copper wire sizes No. 6 AWG and larger diameter.

11.0 MISCELLANEOUS MATERIALS

11.1. Ground Rods – See Specification 16060 "General Grounding"

11.2. Sleeves – Sleeves shall be galvanized steel, flanged type, schedule 40 galvanized steel pipe or schedule 80 PVC pipe suitable for concrete encasement.

11.3. Concrete Inserts – Concrete inserts shall be galvanized steel, minimum 14 gauge cut to necessary length for the purpose. Use galvanized hardware.

11.4. Metal Framing System:

11.4.1 Steel channel sections shall be rolled from commercial grade steel.

11.4.2 The cross-sectional width dimension of the channel shall be a minimum of 1-1/2 inches. The depth shall be sized to satisfy the load requirements and deflection.

11.4.3 Channels 1-1/2 inches in depth or greater shall be rolled from 12-gauge steel. Channels smaller than 1-1/2 inches in depth may be 14-gauge steel.

11.4.4 Attachment holes shall be factory punched on hole centers equal to the channel cross-sectional width dimension and shall be maximum of 9/16-inch diameter.

11.4.5 The finish on steel components shall be electro-galvanizing.

11.4.6 Nuts, bolts, washers, straps, threaded rod, and other parts shall be protected with the same finish as the channels.

11.5. Equipment Identification – Provide nameplate for equipment identification. Nameplate shall be 3 inches x 1 inch minimum. Plates shall be laminated plastic (micarta) with white core. Secure all cabinet nameplates with a minimum of two chrome plated self-tapping screws, with round head or fillister head or machine screws and nuts. Do not rely on adhesive mounting. Name tags for equipment operated from normal power shall be "Black." Name tags for equipment operated

from emergency power shall be "Red". Reference ANSI Z535 for Product Safety Labeling Formats.

11.6. Pull Wire and Pull Rope:

11.6.1 Pull wire shall be galvanized steel wire, No. 14 AWG minimum size.

11.6.2 Pull rope shall be ply cord with 200 lbs. tensile strength, minimum.

11.6.3 Pull Wire/Rope installed in conduit shall have plastic tags or labels in all conduits at each end attached to pull wire/rope and indicate on Record Drawings. Tags or labels shall be vinyl coated, with 1/8-inch minimum height, black characters on white background. Tag or label shall be ¼ inches wide minimum. Dymo type labels are not acceptable.

11.7. Terminal Strips – Terminal strips shall be sectional barrier type made of molded phenolic for use in wiring control panels. Number of terminals and ampacity shall be derived from the project design drawings. The binding head shall be screw in type. Reference NEC Article 110.14 for Electrical Connections.

11.8. Equipment Backboards – Equipment backboards shall be interior grade 3/4-inch plywood finished on one side. Size shall be 4 feet x 8 feet unless noted otherwise. Finish backboard with two coats of fire-retardant gray paint before mounting. Use moisture resistant backing and stand-offs for backboards installed in unconditioned spaces, such as damp or wet locations or buildings without air conditioning. Reference NEC Article 312 for installation and construction specifications.

11.9. Conduit Straps – All conduit shall be secured in accordance with NEC guidelines using two-hole stainless steel straps.

PART 3 – EXECUTION

12.0 GENERAL

12.1. Materials and equipment shall be installed in a neat and workmanlike manner according to the standards of the industry. Materials and equipment installed and not meeting the standards of the industry and the NEC may be rejected and required to be removed and reinstalled by the CONTRACTOR at no additional cost to the OWNER. All materials and equipment shall, at a minimum, be installed by the recommendations of the manufacturer.

12.2. CONTRACTOR is responsible for the safety and conditions of the materials and

equipment installed until OWNER'S beneficial occupancy or Final Acceptance.

12.3. Protection: During the installation period and until the work is finally accepted, the Electrical CONTRACTOR shall properly and adequately protect all items of equipment and raceway which he installs from the adverse effects of water, dampness, dust, falling objects, and injury due to the activities of his own workmen and others. In the event that damage occurs to equipment due to negligence by the Electrical CONTRACTOR, the Electrical CONTRACTOR shall, at his own expense, replace, repair, or have repaired the damaged item subject to the approval of the ENGINEER.

12.4. The Electrical CONTRACTOR shall keep his area of work free of packing cases, scrap wire, and debris. Switchgear rooms shall be broom swept as required.

12.5. Minor location changes from those indicated may be necessary so that work can conform with the project as constructed, to fit work of other trades, or to comply with the rules of authorities having jurisdiction. CONTRACTOR shall coordinate with ENGINEER and other trades prior to installation.

12.6. Repair of Existing Work – Repair of existing work, demolition, and modification of existing electrical distribution systems shall be performed using skilled craftsmen of the trades involved.

12.7. Wiring Methods – Provide insulated conductors installed in conduit, except where specifically indicated or specified otherwise or required by NFPA 70 to be installed otherwise. Provide bare or insulated, green equipment conductor in feeder and branch circuits, including lighting circuits. Grounding conductor shall be separate from electrical system neutral conductor. Provide bare or insulated, green conductor for grounding conductors installed in conduit and raceways. Minimum conduit size shall be 1/4 inches in diameter for low voltage lighting and power circuits.

12.7.1 Restrictions Applicable to PVC:

a. Do not use in areas where subject to severe physical damage, including but not limited to, mechanical equipment rooms, electrical equipment rooms, under wharfs or docks and other such areas.

b. Do not use above grade unless noted otherwise on drawings.

12.7.2 Underground Conduit – NEC Article 300.50 (C) and 300.6 (A) (3). Plastic-coated rigid steel; plastic-coated steel IMC; PVC, type EPC-40

or EPC-80. Concert nonmetallic conduit to rigid steel conduit or steel IMC before rising above grade or through floor slab. Minimum PVC conduit shall be 3/4 inch.

12.7.3 Conduit shall not be supported at any point by wire or wire clips.

a. Job cut threads shall be given a coat of rust resistant paint such as zinc chromate or equal.

b. Conduit shall be closed during construction to prevent entrance of foreign material. After concrete work has been dried in, all conduits shall be cleaned so that they are free of any foreign material. Do not wait until the wire is pulled to clean the conduit.

12.8. Raceways:

12.8.1 Refer to structural drawings for openings for raceways, etc., in wharf's structural steel and route as required. CONTRACTOR shall be responsible for locating and providing proper dimensions for all required electrical openings.

12.8.2 Layout and install raceways with sufficient clearance to permit proper installation and future maintenance.

12.8.3 Install raceways straight and plumb. Squarely cut conduit and properly ream to remove all constriction and burrs before making up joints. Paint exposed threads to retard rusting. Bending of conduit with a pipe tee or vise is prohibited.

12.8.4 Raceways under wharf and in concrete slabs at or below grade shall be PVC coated threaded rigid metal steel conduit. All exposed raceways penetrating concrete slab shall be PVC coated rigid metal steel conduit unless indicated otherwise. Any raceway not meeting these requirements shall be replaced at the CONTRACTOR'S expense. Additional construction time and compensation for the correction of the deficiency will not be allowed.

12.8.5 Rigid metal conduit installed in concrete or under wharf shall be made watertight by applying an approved compound to the threads.

12.8.6 PVC coated rigid metal conduit shall be utilized throughout except for the concrete encased PVC duct banks and land side stub outs. The joints

shall be protected with PVC tape applied after the joints are made. Tools for the purpose shall be used in making up the joints so as not to damage the coating.

12.8.7 Conduit may be exposed under the wharf. PVC conduit in these areas is unacceptable.

12.8.8 Conduit shall not be supported at any point by wire or wire clips.

12.8.9 Job cut threads shall be given a coat of rust resistant paint such as zinc chromate or equal and wrapped with PVC tape.

12.8.10 Conduit in masonry shall be installed ahead of the masons.

12.8.11 Conduit shall be closed during construction to prevent entrance of foreign material. After the concrete has dried in, all conduits shall be cleaned so that they are free of any foreign material and water. Do not wait until the wire or rope is pulled to clean the conduit.

12.9. Wet or Damp Locations – NEC Article 300

12.9.1 Use PVC coated threaded rigid galvanized steel unless noted otherwise. See Section 4.1 of this specification.

12.9.2 Use rigid steel or IMC conduit within five feet of the exterior and below concrete slabs in contact with soil, gravel, or vapor barriers. Cover conduit on the outside with factory coating of 20 mil bonded PVC or field coat with two coatings of asphaltum or bitumastic paint before installation. After installation, completely coat damaged areas of coating.

12.9.3 Wireways and wireway fittings shall be used for exposed work and when installed outdoors or in wet locations shall be approved for weatherproof construction.

12.10. Bushings – NEC Article 300. Bushings shall be provided in accordance with the NEC at the end of all conduits to protect the insulation of the conductor. Provide grounding bushings for metal raceways, boxes, and cabinets to ensure that all metallic surfaces are effectively grounded. Metallic raceway may be bonded to cabinets, boxes and panelboards by double locknut and bushing to ensure the metallic parts are all effectively grounded.

12.11. Conduit or Raceways Sealed – NEC Article 300. Conduit or raceways through which moisture may enter and contact energized live parts shall be sealed or plugged at either or both ends with conduit seals where portions of an interior raceway system are exposed to widely different temperatures, e.g., circulation of air from a warmer to a cooler section through the raceway shall be prevented by conduit seals.

12.12. Conduit Installed in Concrete:

12.12.1 Conform to applicable portion of ACI 318-14, Chapter 20 Standard Code for reinforced concrete.

12.12.2 Conduit shall be PVC. Where conduit exits or enters concrete, conduit shall be hot dip galvanized rigid steel and coated with two coats of asphaltum or bitumastic paint.

12.12.3 Align and run conduit in direct lines.

12.12.4 Locate conduits in center third of concrete slab thickness. Outside conduit diameter not to exceed 1/3 concrete slab thickness. Install no conduit in concrete slabs of less than 3 inches thick.

12.12.5 Conduits in concrete slabs shall not cross at an angle of less than 45 degrees.

12.12.6 Conduits shall not pass-through beams except when shown on the Drawings.

12.12.7 Space vertical installation of conduit through concrete slabs not closer than three diameters on center.

12.12.8 Space between conduit in slabs not closer than six diameters apart, except one conduit diameter at conduit crossings.

12.12.9 Where conduits rise through floor slabs, curved portion of bends shall not be visible above finish floor.

12.12.10 Where conduit penetrates floors or walls, completely caulk and seal clearances around the conduit and make watertight.

12.13. Cleaning – Clean conduit systems by wire rat brush and mandrel. Totally remove all moisture.

12.14. Conduit Straps – See Section 11.9. All straps used to hold surface mounted conduit shall be stainless steel and have two holes. These straps shall be installed in all accessible areas to 12 feet above grade. Conduit installed in areas exposed to weather or water shall be corrosion resistant per NEC Article 344.10(B) and as indicated on the Drawings.

12.15. Install conduit as follows:

12.15.1 Conduit shall be in complete runs before pulling in cables or wires.

12.15.2 Flattened, dented or deformed conduit is not permitted. Remove and replace the damaged conduits with new undamaged material.

12.15.3 Cut conduits square with hacksaw, ream, remove burrs, thread conduit and draw up tight.

12.15.4 Conduits shall be mechanically and electrically continuous.

12.15.5 Conduit shall be supported independently without reliance on mechanical, plumbing or other utility supports. i.e. (suspended support members, decking, ductwork, lighting fixtures, mechanical piping, mechanical ducts, etc.). Where metal decking is used, provide supports independent of decking so that loads will not be transferred to decking.

12.15.6 Support within one foot of changes of direction, and within one foot of each enclosure to which is connected.

12.15.7 Close ends of empty conduit with plugs or caps at the rough-in stage to prevent entry of debris, until wires are pulled in.

12.15.8 Secure conduits to cabinets, junction boxes, pull boxes and outlet boxes with bonding type locknuts. For rigid and IMC conduit installations, provide a locknut on the inside of the enclosure, made up wrench tight. Do not make conduit connections to junction box covers.

12.15.9 Conduits shall be installed, where possible, in such manner as to avoid the collection of condensed moisture in the conduit. Drain fittings shall be installed at low points in exposed conduit runs.

12.15.10 Install conduits with pull wires or ropes including pull wires for spare conduits.

12.15.11 Conduit supports shall be spaced on 10-foot intervals maximum.

12.16. Conduit Bends:

12.16.1 Make bends with standard conduit bending machines only if standard manufactured bends are not available.

12.16.2 A conduit hickey may be used for slight offsets and for straightening stubbed out conduits. The hickey bender shall only be used for Rigid or IMC since it would normally kink EMT tubing (except for very small bends).

12.16.3 Bending of conduits with a pipe tee or vice is prohibited.

12.16.4 Furnish and install pull wire in all empty conduits.

12.16.5 The radius of the curve of any field bend to the centerline of the conduit shall not be less than indicated in NEC Table 2, Chapter 9.

12.17. Layouts – Deviations to layouts may only be made where necessary to avoid interferences and only after drawings showing the proposed deviations have been submitted to the ENGINEER and preapproved in writing by the ENGINEER.

12.18. Boxes – Reference Section 8.1 for Box Requirements. Attach boxes to concrete formwork or to other surrounding structural material. Provide additional junction and pull boxes where injury to insulation or deformation of wire would occur due to excessive pulling resistance.

12.19. Wire Pulling Lubrication —Reference 2.8F for Requirements.

12.20. Supports – Reference Part 3, 3.1(O) for Requirements and Spacing

12.21. Raceway Supports – Concrete bases and structural steel to support raceways, that are not specifically shown on Structural or Architectural Drawings, shall be furnished by the CONTRACTOR whose raceways are to be supported. All equipment shall be bolted to supports with a minimum of ½" stainless steel bolts.

12.22. Underground Work – Reference Specification 16375 – UNDERGROUND / UNDER WHARF WORK

12.23. Caulking and Seals – At bulkheads and dock conduit penetrations, completely seal

clearances around the conduit and make watertight with an ENGINEER approved product.

12.24. Finishes and Painting:

12.24.1 Painting for all work in these Specifications shall be by the electrical CONTRACTOR unless specified otherwise.

12.24.2 Finish in areas not listed or otherwise noted shall be black enamel.

12.24.3 Hangers, supports, structural steel, and equipment that are not factory finished shall be hot dip galvanized or prime coated and finished coated with color to match the area in which it will be located.

12.24.4 Electric cabinets, switchboards, panelboards, and equipment that is factory finished and has damaged finish shall be touched up to match the factory finish. Surface shall be sanded, primed, and two coats of factory supplied paint shall be applied.

12.24.5 All surfaces that are to be painted shall be free of rust, scale, oil, and grease before prime coat is applied.

13.0 WIRING

13.1. General – Conductors shall not be installed until conduit system is complete. Bending radius of insulated wire or cable shall not be less than the minimum recommended by wire or cable manufacturer. Maximum pulling tension of any wire or cable shall not exceed manufacturer's recommended values. Do not injure insulation while installing wire in conduits.

13.2. Conductor Identification – Provide conductor identification within each enclosure where tap, splice, or termination is made. Refer to Specification 16175 – CONDUCTOR AND CABLE ID, for color coding and identification of conductors.

13.3. Conductors in Parallel – NEC Article 310.10(H). Conductors connected in parallel (electrically joined at both ends to form a single conductor) shall be of the same length, of the same conductor material, the same circular-mil area, the same insulation type, and terminate in the same manner. Where installed in separate raceways or cables, the raceways or cables shall have the same physical characteristics.

13.4. Wiring in motor control centers, switchboards, panelboards, junction cabinets, etc., shall be neatly formed to present a neat and orderly appearance.

13.5. A single neutral may be installed for three branch circuits provided each of the three is from a different phase. A single neutral may be installed for two circuits provided each is from a different phase or a different line.

13.6. Except for control wiring, the minimum size of wire shall be No. 12 AWG.

13.7. Interconnections of control wiring shall be on identified numbered terminal strips.

13.8. Splices – Splices shall be permitted in junction boxes, outlet boxes, or other permanently accessible locations. Conductors No. 6 or smaller shall be spliced with devices approved by Underwriters Laboratories, Inc., as splicing connectors. Splices in conductors larger than No. 6 shall be accomplished with devices UL-approved as pressure cable connectors.

13.9. Wire Equipment Supports – Concrete bases and structural steel to support this Section's equipment and raceways, and not specifically shown on Structural or Architectural Drawings shall be furnished by CONTRACTOR whose equipment or raceways is to be supported. Provide a raised reinforced 4-inch concrete base for all floor supported equipment, or as indicated on the Drawings.

13.10. Setting in Concrete – Place all inserts in concrete forms prior to time concrete is poured. If additional inserts are required in existing concrete work, use self-drilling screw anchors.

13.11. Pulling Lubrication – Refer to Section 10.6 above for restrictions and requirements.

13.12. Equipment Identification – Refer to Section 11.5 above for Equipment Identification.

13.13. Grounding – See Specification 16060 – GENERAL GROUNDING. Ground and bond in accordance with NEC Article 250 and other applicable articles for crane rails.

END OF SECTION

SECTION 16145 – ELECTRICAL – PERIMETER AND HIGH-MAST LIGHTING

PART 1 – GENERAL

1.0 REQUIREMENTS

1.1. This section applies to both High Mast and Perimeter Lighting

1.2. All items called for in this section are to be considered a minimum requirement.

1.3. Submit product data for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow.

1.4. Work includes the supply, installation, and connection of new or replacement exterior lighting fixtures, luminaires (bulbs, lamps), and supports. The terms "lighting fixtures", "fixture" and "luminaire" are used interchangeably.

1.5. MUSCO is an APM Terminals approved LED Lighting Vendor.

2.0 REFERENCES

2.1. The publication references listed below are referred to in the text by the basic designation only. Perform all work and install all materials and equipment in full accordance with the latest applicable codes, versions, rules, regulations, requirements, and specifications indicated below. Applicable North American Standards are cited herein, though other local standards may apply. Comply with the following:

2.1.1 Local Laws and Ordinances.

2.1.2 National Fire Protection Association (NFPA).

a. NFPA 70 – National Electrical Code (NEC).

2.1.3 Underwriters' Laboratory (UL)

a. UL 1598 – Luminaires.

2.1.4 American National Standards Institute (ANSI).

a. ANSI C136 Series – Standards for Roadway and Area Lighting Equipment.

2.1.5 Illuminating Engineering Society (IES).

a. IES HB-10 – The Lighting Handbook.

b. IES LS-1 – Lighting Science: Nomenclature and Definitions for Illuminating Engineering

c. IES LM-79 – Optical and Electrical Measurements of Solid-State Lighting Products.

d. IES LM-80 – Measuring LED Output Characteristics.

e. IES TM-21 – Projecting Long-Term Luminous, Photon, and Radiant Flux Maintenance of LED Light Sources.

2.1.6 National Voluntary Laboratory Accreditation Program (NVLAP)

2.1.7 National Electrical Manufacturers' Association (NEMA).

a. NEMA ANSLG C78.377 – Specifications for The Chromaticity of Solid-State Lighting Products.

2.1.8 Institute of Electrical and Electronics Engineer (IEEE).

a. IEEE C2; Errata; INT 1-4; INT 5-7; INT 8 – National Electrical Safety Code.

b. IEEE Standards Dictionary: Glossary of Terms & Definitions.

2.1.9 US Occupational Safety and Health Administration (OSHA).

2.1.10 ASCE/SEI 7 – Minimum Design Loads for Buildings and other Structures.

2.1.11 American Society for Testing and Materials (ASTM)

a. ASTM B117 – Standard Practice for Operating Salt Spray (Fog) Apparatus.

b. ASTM A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

c. ASTM A1011/A1011M – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

d. ASTM A572/A572M – Standard Specification for High Strength Low-Alloy Columbium-Vanadium Structural Steel

e. ASTM A588/A588M – Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi [345 MPa] Minimum Yield Point, with Atmospheric Corrosion Resistance.

2.1.12 United States Military Standard

a. MIL-W-83420 – Wire Rope, Flexible, for Aircraft Control, General Specification for.

3.0 SUBMITTALS

3.1. Shop Drawings

3.1.1 Fixtures – Submit the following information for each luminaire fixture, with the information arranged in the order of luminaire designation:

a. Material and construction details shall include information on housing, shielding, and optics system.

b. Description of luminaires, physical dimensions, and arrangement at the top of high mast poles.

c. Signed and sealed structural calculations by an engineer licensed in the State of Alabama for the high mast light system. Calculations shall be in accordance with ASCE 7 utilizing ultimate design wind speed of 155 mph, exposure category D.

d. Wiring schematic and connection diagram.

e. Installation and Service details.

f. All fixture support components documentation. Include data on features, accessories, and finishes.

g. Operational Service: Submit documentation that includes contact information, summary of maintenance procedures, and the limitations and conditions applicable to the project.

h. Provide contact information as applicable to your organization.

3.1.2 High mast pole – Submit the following information for high mast pole:

a. Shop drawings, construction details, manufacturer data.

b. Dimension detail drawings.

c. High mast post calculations that shall be in accordance with ASCE 7 utilizing ultimate design wind speed of 155 mph, exposure category D.

d. High mast post materials and construction details.

e. If luminaire ring assembly is mounted at a height greater than 100 ft. submit the following:

i. Luminaire ring assembly roller assembly information

ii. Hoist cable data

iii. Safety mechanism information

iv. Winch plate assembly data

v. Portable Power Unit data including torque limiter, and electrical control information.

3.2. Test Reports

3.2.1 Luminaires – Submit the following information for luminaires:

a. IES LM-79 – Luminaire Test Report on manufacturer's standard production model luminaire. Submittal shall include all photometric and electrical measurements, as well as all data results produced under the IES LM-79 test.

b. IES LM-80 – Light Source Test Report on manufacturer's standard production LED package, array, or module. Submittal shall include:

i. Testing agency

ii. Report number

iii. Date

iv. Type of equipment

v. LED light source being tested

c. Submit certification from the manufacturer indicating the expected useful life of the luminaires provided "70 percent Rated Lumen Maintenance Life" as defined in IES LM-80. The useful life shall be directly correlated from the IES LM-80 test data. Thermal properties of the specific luminaire and local ambient operating temperature and conditions shall be taken into consideration. ("Useful Life" is the operating hours before reaching 70 percent of the initial rated lumen output (L70) with no catastrophic failures under normal operating conditions.)

3.2.2 Test laboratories for the IES LM-79 and IES LM-80 test reports shall be one of the following:

a. An IES or NVLAP accredited laboratory for solid-state lighting testing.

b. A manufacturer's in-house lab that has been regularly engaged in the design and production of roadway and area luminaires and the manufacturer's lab has been successfully certifying these fixtures for a minimum of 15 years.

3.3. Photometric Plan

3.3.1 Photometric Plan drawing for the Phase IV Yard Expansion shall demonstrate a lighting solution for each area. Submit the following information for the Photometric Plan drawing:

a. A computer-generated photometric analysis of the "designed to" values and for the "end of useful life" of the luminaire installation using a light loss factor of 0.7 unless approved otherwise.

b. Horizontal illumination levels in lux on a scaled site plan that is to verify luminaires and design layout meet required illumination and photometric values of the expected design as follows:

   i. Horizontal illuminance measurements at a maximum of 6 meters (20 feet) at 1 meter (3.2 feet) above finished grade.

   ii. Minimum and maximum lux (foot-candle) levels.

   iii. Average maintained lux (foot-candle) level.

   iv. Maximum to minimum ratio for horizontal illuminance only.

   v. Identify fixtures with fixture tags consistent with Lighting Fixture Schedule to indicate special orientation, shield etc.

c. Design Data for Luminaires as follows:

   i. Lamp data including lumen output (initial and mean), color rendition index (CRI), rated life (hours), and color temperature (degrees Kelvin).

   ii. Luminaire Drawings – Include dimensions, effective projected area (EPA), accessories, and installation and construction details. Accompany shop drawings with photometric data, including zonal lumen data, average and minimum ratio, aiming diagram, and computerized distribution data.

   iii. Amount/Extent of shielding on luminaires.

   iv. Provide safety certification and file number for the luminaire family. Include listing, labeling and identification per NFPA 70 (NEC).

   v. Provide long term lumen maintenance projections for each LED luminaire in accordance with IES TM-21. Data used for projections shall be obtained from testing in accordance with IES LM-80.

3.4. Warranty

3.4.1 Lighting manufacturer shall provide a written ten (10) year on-site replacement warranty for material, fixture finish, and workmanship. On-site replacement includes transportation, removal, and installation of new products. Material warranty shall include:

a. All power supply units (drivers).

b. Replacement when more than 10 percent of LED sources in any light bar or subassembly(s) are defective or non-starting.

c. Finish warranty shall include warranty against failure and against substantial deterioration such as blistering, cracking, peeling, chalking, or fading.

d. The equipment items shall be supported by service organizations which are convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period. Warranty service shall be provided at an agreed upon reasonable amount of time.

e. Warranty period shall begin on date of acceptance for work provided under orders from this agreement. CONTRACTOR shall provide signed warranty certificates from the lighting manufacturer prior to final payment.

PART 2 – PRODUCTS

4.0 MINIMUM REQUIREMENT FOR LUMINAIRES

4.1. Luminaires shall be rated for operation within an ambient temperature range of minus 20 degrees C (minus 12 degrees F) to 50 degrees C (122 degrees F).

4.2. Design wind speed is 155 mph in accordance with ASCE 7.

4.3. Seismic load shall be in accordance with ASCE 7.

4.4. Luminaires shall be UL listed for wet locations per UL 1598 and suitable for the marine environment. Optical compartment for LED luminaires shall be sealed and rated a minimum of NEMA 4 or of IP65 per NEMA IEC 60529.

4.5. Luminaires shall have IES distribution and NEMA field angle classifications as indicated in luminaire schedule on project plans per IES HB-10.

4.6. Luminaire housings shall be die cast or extruded aluminum. Housing finish shall be baked-on enamel, anodized or baked-on powder coat paint. Provide materials and equipment with manufacturers' standard finish system/color, except where otherwise specified. If manufacturer has no standard color, factory applied painting system to electrical equipment finish equipment with ANSI Number 61, light gray color. Finish shall be capable of surviving ASTM B117 salt fog environment testing for 2500 hours minimum without blistering or peeling.

4.7. Luminaires shall be fully assembled and electrically tested prior to shipment from factory.

4.8. Luminaire arm bolts shall be 304 stainless steel.

4.9. Luminaire lenses shall be constructed of clear tempered glass, UV-resistant acrylic, or polycarbonate vandal-resistant lenses.

4.10. The wiring compartment on pole-mounted area luminaires should be accessible without the use of hand tools to manipulate small screws, bolts, or hardware. All factory electrical connections shall be made using crimp, locking, or latching style connectors. Twist-style wire nuts are not acceptable.

4.11. Incorporate modular electrical connections, and construct luminaires to allow replacement of all or any part of the optics, heat sinks, power supply units, ballasts, surge suppressors and other electrical components using only simple tools, such as a screwdriver.

4.12. Luminaires shall have a nameplate bearing the manufacturer's name, address, model number, date of manufacture, and serial number securely affixed in a conspicuous place. The nameplate of the distributing agent will not be acceptable.

4.13. Roadway and area luminaires shall have an integral tilt adjustment of ± 5 degrees to allow the unit to be leveled in accordance with ANSI C136.

4.14. Luminaire shall pass 3G vibration testing in accordance with NEMA C136.

4.15. Provide luminaire shielding to prevent up light.

4.16. Luminaries shall be dimmable

4.17. Light Sources:

4.17.1 In operational areas, lamps, which give a light similar to daylight, shall be used.

4.17.2 In accordance with NEMA ANSLG C78.377 Color Rendering Index (CRI) shall be 70-85 and Correlated Color Temperature (CCT) shall be 4000 - 5500 degrees K for high mast area light sources.

4.17.3 Fixtures shall have a minimum ambient operating temperature of -20°C to +50°C.

4.18. Power Supply Units (Drivers):

4.18.1 Minimum efficiency shall be 85 percent.

4.18.2 Shall be rated to operate between ambient temperatures of minus 30 degrees C (minus 22 degrees F) and 50 degrees C (122 degrees F).

4.18.3 Shall be equipped with over-temperature protection circuit that turns light source off until normal operating temperature is achieved.

4.18.4 Shall be designed to operate on the voltage system to which they are connected, typically ranging from 120 V to 480 V nominal.

4.18.5 Operating frequency shall be: 60 Hz.

4.18.6 Power Factor (PF) shall be greater than or equal to 0.95.

4.18.7 Total Harmonic Distortion (THD) current shall be less than or equal to 20 percent.

4.18.8 Provide surge protection integral to luminaire

5.0 MINIMUM REQUIREMENTS FOR AREA LIGHTING

5.1. Minimum Lighting Levels – The lighting systems for the Phase IV yard expansion shall provide levels of five (5) foot candle design average luminance.

5.2. The CONTRACTOR shall demonstrate the design is acceptable with photometric plan for the areas to be lit and take final illumination measurements once the lighting has been installed to verify the design is satisfied. Illumination levels measured in accordance with IES HB-10 shall not be less than five (5) foot candles

at any point inside the project limits as shown on the project illumination plan drawing. Minimum/average illumination level shall be achieved by the area lighting.

5.3. In the lighting calculations, an allowance shall be made for 20% deterioration in the performance of each luminaire over time (i.e., 0.7 light loss factor). This shall be considered when final illumination measurements are taken, with lux levels on site to be 20% higher than the design levels nominated above.

5.3.1 Definitions of Terms

a. E_m – value below which the average luminance on the specified surface is not allowed to fall

b. E_{min} – Minimum illumination value on the specified surface

c. E_{ave} – Average illumination value on the specified surface

d. U_o – Illuminance Uniformity (Emin / Eave), ratio of minimum illuminance (luminance) to average illuminance (luminance) on (of) a surface

5.4. Uniformity (E_{min}/E_{ave}) shall be 0.4 or less. Lighting shall be as uniform as practicable. Sharp differences in lighting levels shall be avoided.

5.5. The CONTRACTOR shall demonstrate the design will have limited light spillage beyond the Phase IV project limits.

5.6. The CONTRACTOR shall demonstrate the design will have no light spillage into the water.

5.7. Light measurements:

5.7.1 Light measurements shall be taken in accordance with IES HB-10 guidelines and are normally taken in the horizontal plane one (1) meter above the ground or other working surface without the presence of containers. Measurements at a lower level may be necessary where there are obstructions that might conceal a tripping hazard.

5.7.2 Light meters shall be able to read to an accuracy of one (1) lux. Meters should have a wide angle of acceptance in order to minimize errors due

to directionality or low sensitivity to differing types of light sources or be provided with the relevant correction factors. The meter should not be oriented towards a light source.

5.7.3 Records shall be kept of all lighting measurements and shall be provided to the ENGINEER. These shall include the date, time, weather conditions, location, and details of the lighting and light meter.

5.8. Lighting Adjustment:

5.8.1 The choice and positioning of light sources and each installation of fixtures should be planned individually, and the fixtures identified accordingly

5.8.2 Lamp fittings shall be provided with shielding or diffusers to prevent light pollution and glare.

5.8.3 Lamp standards shall be designed to allow the lamps to be cleaned and changed safely.

5.8.4 Field verify required lighting levels are being produced per approved photometric plans. Make any necessary corrections to installed lighting to meet approved levels.

5.9. High Mast Pole:

5.9.1 The High Mast Pole shall consist of two or more round or multisided tapered sections. The pole shaft section shall be fabricated from high-strength, low-alloy steel plate conforming to ASTM A572 standards, with a minimum yield strength of 55,000 psi. These shaft sections shall telescope into each other to match the overall desired height of the pole.

5.9.2 The overlap telescoping joint shall have a minimum slip distance equal to 1-1/2 times the inside diameter of the female section. The sections shall be pre-fitted and matched, marked at the factory.

5.9.3 All sections shall maintain a uniform taper from top to bottom. There shall be a maximum of one longitudinal weld in the tapered sections of the shaft.

5.9.4 The longitudinal seams shall have at least 60% weld penetration, except in the areas where the shaft section telescopes over another. In the

overlapping areas, the weld penetrate shall be 100%. No transverse butt welds may be used in fabricating the shafts.

5.9.5 The finished poles shall be hot dipped galvanized per ASTM A-123 after fabrication.

5.9.6 The base plate shall be fabricated from structural quality hot-rolled carbon steel plate that meets or exceeds ASTM standards with minimum yield strength of 36,000 psi. The base plate shall telescope the pole shaft and is circumference-welded top and bottom. The base plate shall have slotted holes for ½-inch variation in the anchor bolt setting.

5.9.7 Reinforced handhole(s), having an appropriate 10-inch x 30-inch opening, shall be located 15 inches up from the base. A handhole cover, attaching hardware, and grounding provision hardware shall be included with each handhole frame.

5.9.8 Anchor bolts shall be fabricated from a commercial quality hot-rolled carbon steel bar that meets or exceeds minimum yield strength of 55,000 psi. Properly sized anchor bolts shall be provided with two hex nuts and two flat washers per bolt.

5.9.9 All welding shall be of the highest quality and performed by American Welding Society certified welders and conforming to the latest revision of the American Welding Society specification AWS D1.1. All welds shall be done by either the shielded metal-arc, gas-shielded flux core, gas metal-arc or submerged-arc process.

5.9.10 Pole Accessories shall be provided by the CONTRACTOR as follows:

5.9.11 Ground Fault Circuit Interrupter (GFCI) Duplex Receptacle which shall be 120VAC, 20A in a weatherproof assembly and shall be mounted above finished grade as indicated on the construction drawings.

5.9.12 Lockable hasp and latch for the cabinet that complies with OSHA lockout and tag-out requirements.

5.9.13 Base Covers – Manufacturers' standard metal units, arranged to cover pole's mounting bolts and nuts. Finish shall be the same as the pole.

5.9.14 Support structure to accommodate security cameras and IT equipment.

PART 3 – EXECUTION

6.0 INSTALLATION REQUIREMENTS

6.1. Luminaire Installation

6.1.1 Install new lamps in each luminaire.

6.1.2 Fasten luminaire to luminaire structural supports.

6.1.3 Use fastening methods and materials selected to resist design forces defined for the application and approved by manufacturer.

6.1.4 Adjust luminaires that require field adjustment or aiming in accordance with Section 5.8 of this specification.

6.1.5 Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources such as auto or aerial traffic. Site location is adjacent to an airport.

6.2. Pole Installation

6.2.1 Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.

6.2.2 Clearances – Maintain the following minimum horizontal distances of poles from surface and underground features, unless otherwise indicated on Drawings:

a. Fire Hydrants and Storm Drainage Piping: 60 inches (1520 mm).

b. Water, Gas, Electric, Communication, and Sewer Lines: 10 feet (3 m).

6.2.3 Concrete Pole Foundations – Set anchor bolts according to anchor-bolt templates furnished by pole manufacturer. Concrete materials, installation, and finishing requirements are specified in 03300 – CAST-IN-PLACE Concrete.

6.2.4 Foundation-Mounted Poles – Mount pole with leveling nuts and tighten top nuts to torque level recommended by pole manufacturer.

a. Use anchor bolts and nuts selected to resist forces defined for the application and approved by manufacturer.

b. Grout void between pole base and foundation. Use non shrink or expanding concrete grout firmly packed to fill space.

6.2.5 Install base covers, unless otherwise indicated.

6.3. Raise and set poles using web fabric slings (not chain or cable) and install in accordance with ANSI C2, NFPA 70, and to the requirements specified herein. Installation shall be carried out in strict compliance with the manufacturer's instructions and directions from the factory representative.

6.4. Grounding:

6.4.1 Ground noncurrent-carrying parts of equipment including metal poles, luminaires, mounting arms, brackets, and metallic enclosures as specified in Section 16060 – GENERAL GROUNDING. Where copper grounding conductor is connected to a metal other than copper, provide specially treated or lined connectors suitable for this purpose.

6.4.2 Ground metal poles and support structures according to Section 16060 - GENERAL GROUNDING.

a. Install grounding electrode for each pole, unless otherwise indicated.

b. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.

6.4.3 Ground nonmetallic poles and support structures according to Section 16060 – GENERAL GROUNDING.

a. Install grounding electrode for each pole.

b. Install grounding conductor and conductor protector.

c. Ground metallic components of pole accessories and foundations

6.5. Field Erection Supervision:

6.5.1 The CONTRACTOR shall provide for the services of a trained factory representative to ensure proper installation of the High Mast System. It shall be the CONTRACTOR'S responsibility to request and coordinate the scheduling of the representative's services and notify ENGINEER.

6.5.2 The CONTRACTOR shall provide the necessary, competent manpower and equipment to be instructed in the proper installation of the High Masts by the factory representative. The factory representative shall be available for at least one day at the start of the installation to ensure that personnel are adequately trained to install High Mast Lighting System.

6.5.3 The CONTRACTOR shall be responsible for maintaining the necessary personnel to properly and satisfactorily install each High Mast System and Luminaires according to the manufacturer's installation.

6.5.4 Any rework, reassembly, adjustment, or other services as required by the factory representative or the OWNER/ ENGINEER to make the High Masts function properly shall be the responsibility of the CONTRACTOR at no additional cost.

6.6. Corrosion Prevention:

6.6.1 Aluminum – Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment

6.6.2 Steel Conduits – In concrete foundations, wrap conduit with 0.010-inch (0.254-mm) thick, pipe-wrapping plastic tape applied with a 50% overlap.

6.7. Acceptance:

6.7.1 General – Each individual High Mast shall be required to pass an acceptance test witnessed by the OWNER/ENGINEER of not less than the following:

a. Operation of the luminaires (including levels from the control panel).

b. General inspection of the unit's installation including plumb of the pole and overall operation and appearance.

6.7.2 Operational Test – Upon completion of installation, conduct an operating test to show that the equipment operates in accordance with the requirements of this Specification section. CONTRACTOR along with the factory representative shall perform a nighttime test in the presence of OWNER and ENGINEER and shall take footcandle readings (FC) to verify FC levels and lighting uniformity. CONTRACTOR shall provide footcandle meter and shall submit a written and signed report.

6.7.3 Warranty – Pole and pole components shall be guaranteed for 10 years minimum. Drivers shall be guaranteed for 10 years of operation minimum. All other luminaire components shall be guaranteed for 10 years minimum. Warranties shall be as stated in 3.4 above.

7.0 MEASUREMENT AND PAYMENT

7.1. Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices.

END OF SECTION

SECTION 16175 – ELECTRICAL – CONDUCTOR AND CABLE ID

PART 1 – GENERAL

1.0 REQUIREMENTS

1.1. This Section provides the requirements for identification of grounded conductors (neutral), grounding conductors, ungrounded conductors, and terminals.

1.2. A continuous white or natural gray covering on a conductor or a termination marking of white or natural gray color shall be used only for the grounded conductor (neutral).

1.3. Grounding Conductor Size No. 6 AWG or smaller shall be identified by a continuous green outer finish along its entire length. Sizes larger than No. 6 AWG shall be identified either by a continuous green outer finish along its entire length or at the time of installation by a distinctive green marking at its termination.

1.4. A continuous green covering on a conductor or a termination marking of green shall be used only for the grounding conductor.

1.5. The neutral shall not be used as the grounding conductor and the grounding conductor shall not be used as the neutral.

PART 2 – EXECUTION

2.0 INSTALLATION

2.1. Identification of conductors shall follow the colors set forth herein for the electrical characteristics as indicated:

2.1.1 120/240 Volt, Single Phase, 3 Wire

a. Neutral: White or Gray

b. Line 1: Black

c. Line 2: Red

d. Grounding Conductor: Green

2.1.2 120/208 Volt, Three Phase, 4 Wire WYE

a. Neutral: White or Gray

b. Phase A: Black

c. Phase B: Red

d. Phase C: Blue

e. Grounding Conductor: Green

2.1.3 277/480 Volt, Three Phase, 4 Wire WYE

a. Neutral: White or Gray with Stripe (tracer)

b. Phase A: Brown

c. Phase B: Orange

d. Phase C: Yellow

e. Grounding Conductor: Green with Stripe (tracer)

2.1.4 Communication wiring shall be permanently tagged for identification.

2.1.5 Colors shall comply with the Insulated Cable Engineers Association, Inc. (ICEA) Method K-2 chart.

2.1.6 For direct current (DC) systems, black shall be negative and red shall be positive.

2.1.7 A single-color conductor other than white, gray, or green may be used when the conductors are identified with number tags or numbered wire.

2.1.8 Identification shall be provided at terminations of the conductors and at junction boxes, terminals, or cabinets when multi-conductors are installed at these locations.

2.1.9 For conductors No. 6 AWG and smaller diameter, color coding shall be by factory-applied, color-impregnated insulation. For conductors No. 4 AWG and larger diameter, color coding shall be by plastic-coated, self-

sticking markers; colored nylon cable ties and plates; or colored heat shrink-type sleeves.

END OF SECTION

SECTION 16375 – ELECTRICAL – UNDERGROUND/UNDER WHARF WORK

PART 1 – GENERAL

1.0 REQUIREMENTS

1.1. This Specification shall be used as a guideline for underground and under wharf electrical construction and selection of materials. For selection of materials, these guidelines should only be used for items that are not specifically called out in the construction drawings.

2.0 REFERENCES

2.1. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of each of these publications should be used unless stated otherwise.

2.1.1 American Concrete Institute (ACI)

a. ACI 315 – Details and Detailing of Concrete Reinforcement

b. ACI 318 – Building Code Requirements for Reinforced Concrete

2.1.2 American National Standards Institute (ANSI)

a. ANSI C2 – National Electrical Safety Code

b. ANSI C119.1 – Electric Connectors - Sealed Insulated Underground Connector Systems Rated 600 Volts

2.1.3 American Society for Testing and Materials (ASTM)

a. ASTM B1 – Hard-Drawn Copper Wire

b. ASTM B8 – Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

c. ASTM F512 – Smooth-Wall Poly (Vinyl Chloride) (PVC) Conduit and Fittings for Underground Installation

d. ASTM B-496 – Standard Specification for Compact Round Concentric-Lay-Stranded Copper Conductors

2.1.4 National Electrical Manufacturers Association (NEMA)

a. NEMA RN1 – Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit

b. NEMA TC2 – Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)

c. NEMA TC3 – PVC Fittings for Use with Rigid PVC Conduit and Tubing

d. NEMA TC8 – Extra-Strength PVC Plastic Utilities Duct for Underground Installation

e. NEMA TC9 – Fittings for ABS and PVC Plastic Utilities Duct for Underground Installation

2.1.5 National Fire Protection Association (NFPA)

a. NFPA 70 – National Electric Code

2.1.6 Underwriters Laboratories, Inc. (UL)

a. UL 6 – Electrical Rigid Metal Conduit

b. UL 44 – Thermoset-Insulated Wires and Cables

c. UL 83 – Thermoplastic-Insulated Wires and Cables

d. UL 467 – Grounding and Bonding Equipment

e. UL 486A – Wire Connections and Soldering Lugs for Use with Copper Conductor

f. UL 510 – Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape

g. UL 514A – Metallic Outlet Boxes

h. UL 514B – Conduit, Tubing, and Cable Fittings

i. UL 854 – Service Entrance Cables

j. UL 651 Schedule 40 and 80 Rigid PVC Conduit

2.1.7 UL 1242 – Electrical Intermediate Metal Conduit

3.0 DEFINITIONS

3.1. In the text of this section, the words conduit and duct are used interchangeably and have the same meaning.

4.0 SUBMITTALS

4.1. CONTRACTOR shall Submit the following for ENGINEER approval:

4.1.1 Manufacturer's Catalog Data:

a. Conduit, Conduit Spacers for duct banks

b. Conduit Fittings

c. Cable lubricants

d. Ground rods, Ground Pockets

e. Cable racks, arms, and insulators

f. Cable tags

g. Cables

h. Handholes, Manholes (if pre-cast)

i. Any other specific materials required for this work and any other materials called out in the construction drawings.

4.1.2 Test Instrument and Procedure:

a. Submit for use of ground megger with proposed method indicated.

4.1.3 Field Test Reports:

a. Insulation resistance test

b. Continuity test

c. Ground resistance tests

d. When testing grounding electrodes and systems, identify each electrode and system for each test, as well as the resistance and soil conditions at the time the measurements are taken

PART 2 – PRODUCTS

5.0 MATERIALS

5.1. Conduit – Conduit and conduit sleeves shall comply with the following standards:

5.1.1 Rigid Metal Conduit UL 6, galvanized steel, threaded type.

5.1.2 Rigid Metal Conduit, PVC Coated UL 6, galvanized steel, threaded type, coated with a polyvinyl chloride (PVC) sheath bonded to the galvanized exterior surface, nominal 40 mils thick, conforming to NEMA RN 1, Type A40, except that hardness shall be nominal 85 Shore A durometer, dielectric strength shall be minimum 400 volts per mil at 60 Hz, tensile strength shall be minimum 3500 psi, and aging shall be minimum 1000 hours.

5.1.3 Intermediate Metal Conduit UL 1242, galvanized steel, threaded type.

5.1.4 Intermediate Metal Conduit, PVC Coated UL 1242, galvanized steel, threaded type, coated with a polyvinyl chloride (PVC) sheath bonded to the galvanized exterior surface, nominal 40 mils thick, conforming to NEMA RN 1, Type A40, except that hardness shall be nominal 85 Shore A durometer, dielectric strength shall be minimum 400 volts per mil at 60 Hz, tensile strength shall be minimum 3500 psi, and aging shall be minimum 1000 hours.

5.1.5 Plastic Conduit and Tubing, NEMA TC 2, EPC 40 PVC or EPC 80 PVC as indicated.

5.1.6 Plastic Utilities Duct for Concrete Encasement, NEMA TC 8, ASTM F 512, Type EB 35.

5.2. Fittings

5.2.1 Metal Fittings, UL 514B, threaded type.

5.2.2 PVC Conduit Fittings, NEMA TC 3 [UL 514B] [UL 651] as applicable.

5.2.3 PVC Duct Fittings, NEMA TC 9.

5.2.4 Outlet Boxes for Steel Conduit: Outlet boxes for use with rigid or flexible steel conduit shall be cast metal cadmium or zinc coated if of ferrous metal with gasketed closures and shall conform to UL 514A.

5.3. Tape

5.3.1 Insulating Tape, UL 510, plastic insulating tape, capable of performing in a continuous temperature environment of 80 degrees C.

5.3.2 Buried Warning and Identification Tape – Provide detectable aluminum foil plastic backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried cable and conduit. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, two (2) inches minimum width, color coded for the utility involved with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be CAUTION BURIED ELECTRIC CABLE BELOW or similar. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material.

5.4. Pull Wire

5.4.1 Reference Specification 16100, 2.9(F) for pull wire requirements.

5.5. Conductors

5.5.1 Reference Specification 16100, 2.8 “CONDUCTORS” for conductor requirements.

5.5.2 Wire and Cable manufactured more than 12 months prior to the date of delivery to the site shall not be used.

5.5.3 Wire and Cable Connector and Terminations – Terminations shall provide a uniform compression over the entire contact surface. Solderless terminal lugs shall be used on stranded conductors. Wiring connections and soldering lugs for use with copper conductors shall conform to UL 486A.

5.6. Grounding and Bonding Equipment (UL 467)

5.6.1 Reference Specification 16060 “GENERAL GROUNDING”

5.7. Manholes and Handholes

5.7.1 Reference Specification 03300 for construction specifications. See project Manhole and Handhole construction drawings for details.

5.7.2 The word "ELECTRIC" shall be cast in the top face of the power manhole cover unless noted otherwise on construction drawings.

5.7.3 The word “COMMUNICATIONS” shall be cast in the top face of the communications handhole cover unless noted otherwise on construction drawings.

5.8. Cable Racks, Arms and Insulators

5.8.1 The wall bracket shall be channel steel.

5.8.2 Metal portion of racks and arms shall be zinc coated after fabrication.

5.8.3 Cable Racks shall be wall bracket, 4 inches by approximately 1 1/2 inch by 3/16 inch by 48 inches long (minimum) channel steel. Slots for mounting cable rack arms shall be spaced at 8 inch intervals.

5.8.4 Cable rack arms shall be steel or malleable iron or glass reinforced nylon and shall be of the removable type.

5.8.5 Insulators for metal rack arms shall be dry process glazed porcelain. Insulators are not required for nylon arms.

5.9. Cable Tags in Manholes, Handholes and Vaults

5.9.1 Reference Specification 16100, "Electrical General Requirements".

PART 3 – EXECUTION

6.0 INSTALLATION

6.1. Installations shall comply with NEC (NFPA 70) and ANSI C2 requirements.

6.2. Duct Banks and Conduit Installation

6.2.1 Top of the duct bank shall be as indicated on construction drawings and shall have a minimum slope of 3 inches in each 100 feet away from buildings and toward manholes and other necessary drainage points.

6.2.2 Run conduit in straight lines except where a change of direction is necessary.

6.2.3 Except at conduit risers, accomplish changes in direction of runs exceeding a total of 10 degrees, either vertical or horizontal, by long sweep bends having a minimum radius of curvature of 25 feet. Sweep bends may be made up of one or more curved or straight sections or combinations thereof. Excavate trenches along straight lines from structure to structure before ducts are laid or structure constructed so the elevation can be adjusted, if necessary, to avoid unseen obstruction.

6.2.4 As each conduit run is completed for conduit sizes three (3) inches and larger, draw a flexible testing mandrel approximately 12 inches long with a diameter less than the inside diameter of the conduit through the conduit. After which, draw a stiff bristle brush through until conduit is clear of particles of earth, sand, and gravel; then immediately install pull wire/rope and conduit plugs.

6.2.5 Except where rigid galvanized steel conduit is indicated or specified, underground conduit shall be PVC Type EB 35.

6.2.6 For conduit sizes less than three (3) inches, draw a stiff bristle brush through until conduit is clear of particles of earth, sand and gravel; then immediately install pull wire/rope and conduit plugs.

6.2.7 Provide not less than three (3) inches clearance from the conduit to each side of the trench. A minimum clearance of 2-1\2 inches shall be provided between adjacent conduits. Grade bottom of trench smooth; where rock, soft spots, or sharp edged materials are encountered, excavate the bottom for an additional three (3) inches, fill and tamp level

with original bottom with sand or earth free from particles, that would be retained on a 1/4 inch sieve.

6.3. Multiple Conduits

6.3.1 Separate multiple conduits as shown in drawings. Stagger the joints of the conduits by rows and layers to strengthen the conduit assembly. Provide plastic duct spacers that interlock vertically and horizontally. Spacer assembly shall consist of base spacers, intermediate spacers, and top spacers to provide a completely enclosed and locked in conduit assembly. Install spacers per manufacturer's instructions but provide a minimum of two spacer assemblies per 10 feet of conduit assembly.

6.3.2 Do not mix different kinds of conduit in any one duct bank. The concrete encasement surrounding the bank shall be rectangular in cross section and shall provide at least 3 inches of concrete cover for ducts

6.3.3 Terminate conduits in end bells where duct lines enter underground structures. Before pouring concrete, anchor duct bank assemblies to prevent the assemblies from floating during concrete pouring. Anchoring shall be done by driving reinforcing rods adjacent to every other duct spacer assembly and attaching the rod to the spacer assembly.

6.4. Conduit Plugs and Pull Rope

6.4.1 New conduit indicated as being unused or empty shall be provided with plugs on each end. Plugs shall contain a weephole or screen to allow water drainage at the low end only. Provide a pull wire/rope having three (3) feet of slack at each end of unused or empty conduits and labeled at both ends. Reference paragraph 11.6 of Specification 16100 – ELECTRICAL – BASIC MATERIALS AND METHODS.

6.5. Partially Completed Duct Banks

6.5.1 During construction wherever a construction joint is necessary in a duct bank, prevent debris such as mud, and, and dirt from entering ducts by providing suitable conduit plugs. Fit concrete envelope of a partially completed duct bank with reinforcing steel extending a minimum of two (2) feet back into the envelope and a minimum of two (2) beyond the end of the envelope. Provide one No. 4 bar in each corner, three (3) inches from the edge of the envelope. Secure corner bars with two No. 3 ties, spaced approximately one (1) foot apart. Restrain reinforcing assembly

from moving during concrete pouring.

6.6. Connections to New Manholes

6.6.1 Construct concrete encased duct lines connecting to underground structures to have a flared section adjacent to the manhole to provide shear strength. Use vibrators when this portion of the encasement is poured to ensure a seal between the encasement and the wall of the structure.

6.7. Conduit Protection at Concrete Penetrations

6.7.1 Galvanized conduits which penetrate concrete (slabs, pavement, and walls) in wet locations shall be protected by a PVC sheath at the penetration; PVC sheath be 40 mils thick conforming to NEMA RN 1 and shall extend from at least two (2) inches within the concrete to the first coupling or fitting outside the concrete (minimum of six (6) inches from penetration).

6.8. Manholes and Handholes

6.8.1 Pulling In Irons

a. Pulling in irons shall be steel bars bent and cast in the walls and floors and shall be made permanent.

b. Cover and seal exterior projections of thru wall type pulling in devices with an appropriate protective coating.

c. In the floor the irons shall be a minimum of six (6) inches from the edge of the sump, and in the walls the irons shall be located within six (6) inches of the projected center of the duct bank pattern or precast window in the opposite wall. However, the puling in iron shall not be located within six (6) inches of an adjacent interior surface, or duct or precast window located within the same wall as the iron. If a pulling in iron cannot be located directly opposite the corresponding duct bank or precast window due to this clearance limitation, locate the iron directly above or below the projected center of the duct bank pattern or precast window the minimum distance required to preserve the 6 inch clearance previously stated. In the case of directly opposing precast windows, pulling in irons consisting of a 3 foot length of No. 5 reinforcing bar, formed into a hairpin, may be cast in place within

the precast windows simultaneously with the end of the corresponding duct bank envelope. Irons installed in this manner shall be positioned directly in line with, or when not possible, directly above or below the projected center of the duct bank pattern entering the opposite wall, while maintaining a minimum clear distance of three (3) inches from any edge of the cast in place duct bank envelope or any individual duct.

d. Pulling in irons shall have a clear projection into the structure of approximately four (4) inches and shall be designed to withstand a minimum pulling in load of 6,000 pounds.

e. Irons shall be hot dipped galvanized after fabrication.

6.9. Cable Racks

6.9.1 Cable racks, arm and insulators shall be sufficient to accommodate the cables. Racks in power manholes shall be spaced not more than three (3) feet apart, and each manhole wall shall be provided with a minimum of two (2) racks. Racks in signal manholes shall be spaced not more than 16 1/2 inches apart with the end rack being no further than 12 inches from the adjacent wall. Methods of anchoring cable racks shall be as follows:

6.9.2 Provide a 5/8-inch diameter by 5 inch long anchor bolt with 3 inch foot cast in structure wall with 2 inch protrusion of threaded portion of bolt into structure. Provide 5/8 inch steel square head nut on each anchor bolt. Coat threads of anchor bolts with white lead immediately prior to installing nuts.

6.9.3 Provide concrete channel insert with a minimum load rating of 800 pounds per foot. Insert channel shall be steel of the same length as "vertical rack channel" and the channel insert shall be cast flush in structure wall. Provide 5/8 inch steel nuts in channel insert type receive 5/8 inch diameter by 3 inch long steel, square head anchor bolts.

6.9.4 Provide concrete "spot insert" at each anchor bolt location, cast flush in the structure wall. Each insert shall have minimum 800 pound load rating. Provide 5/8 inch diameter by 3 inch long steel, square head anchor bolt at each anchor point. Coat threads of anchor bolts with white lead immediately prior to installing bolts.

6.10. Grounding in Manholes:

6.10.1 Grounding shall be as shown in drawings.

6.10.2 Metal frames and covers shall be grounded.

6.10.3 Provide one ground rod for each manhole and handhole.

6.10.4 Provide No. 6 AWG bare copper grounding pigtails on walls of each manhole and handhole. The pigtails shall be exothermically welded to the reinforcing bars and the ground rod and shall extend at least eight (8) inches into manhole and handhole. Two pigtails shall be provided in each manhole and handhole and shall be accessible for future grounding requirements. If manholes are pre-cast and installed in separate pieces, each piece will be required to have two pigtails installed and grounded.

6.11. Power Wire and Cables

6.11.1 Cables shall not be spliced unless indicated on drawings. If the CONTRACTOR feels the need to splice cables, he shall submit a written request for each splice to the OWNER and ENGINEER for approval.

6.12. Cable Pulling:

6.12.1 Test existing duct lines with a mandrel and thoroughly swab out to remove foreign material before pulling cables.

6.12.2 Pull cables down grade with the feed in point at the manhole or buildings of the highest elevation.

6.12.3 Use flexible cable feeds to convey cables through manhole opening and into duct runs.

6.12.4 Accumulate cable slack at each manhole or junction box where space permits by training cable around the interior to form one complete loop.

6.12.5 Maintain minimum allowable bending radii in forming such loops. Do not exceed the specified cable bending radii when installing cable under any conditions, including turnups into equipment.

6.12.6 Cable with tape or wire shield shall have a bending radius not less than 12 times the overall diameter of the completed cable. If basket grip type

cable pulling devices are used to pull cable in place, cut off the section of cable under the grip before terminating.

6.13. Cable Lubricants

6.13.1 Reference Specification 16100, 2.8(F) for Cable Lubricant requirements.

6.14. Cable Pulling Tensions

6.14.1 Tensions shall not exceed the maximum pulling tension recommended by the cable manufacturer. Monitor pulling tension during cable installation to ensure maximum pulling tension is not exceeded.

6.14.2 Installation of cables in manholes and handholes shall not be done utilizing shortest route but shall be routed along those walls providing the longest route and the maximum spare cable lengths. All cables shall be formed closely parallel to the walls, shall not interfere with duct entrance, and shall be supported on cable racks. Install cables at middle and bottom of cable racks, leaving top space opening or future cables. Provide one spare three insulator rack arm for each cable rack in each underground structure.

6.15. Cable Tags in Manholes and Handholes

6.15.1 Provide cable markers for all cables in handholes and manholes. Cable markers shall be designed to withstand the environment in which they are being installed.

6.16. Grounding Systems

6.16.1 Install as indicated on construction drawings. Reference Specification 16060 “General Grounding” For requirements.

7.0 FIELD TESTING

7.1. In addition to requirements that may be stated elsewhere in the contract, notify the ENGINEER five (5) working days prior to each test. Furnish labor, equipment and incidentals required for testing, except that the CONTRACTOR will provide electric power required for the tests. Correct defects in the work provided by the CONTRACTOR and repeat tests until the work is in compliance with contract requirements. Show by demonstration in service that circuits and devices are in good operating condition.

8.0 FIELD QUALITY CONTROL

8.1. In addition to requirements that may be stated elsewhere in the contract, provide written notification to the ENGINEER and OWNER ten (10) working days prior to concrete being installed to allow inspection before encased in concrete. Furnish labor, equipment and incidentals required for inspection. Correct defects in the work provided by the CONTRACTOR and repeat inspection after the work is in compliance with the contract requirements and prior to concrete being installed. Show by demonstration that installation is in good operating condition.

9.0 MEASUREMENT AND PAYMENT

9.1. Measurement and payment for the work covered under this section will be made in accordance with the applicable Schedule of Prices

END OF SECTION

INSERT GRANT CONTRACT PROVISIONS

APPENDIX A

FY2022 COMMUNITY PROJECT FUNDING

GRANT CONTRACT PROVISIONS

FY2022 Community Project Funding

Grant Contract Provisions

Compliance with Federal Law, Regulations and Executive Orders

This is an acknowledgement that HUD financial assistance will be used to fund all or a portion of the contract. The contractor will comply with all applicable Federal law, regulations, executive orders, HUD policies, procedures, and directives.

Nondiscrimination

In accordance with Title VI of the Civil Rights Act, as amended, 42 U.S.C. § 2000d, section 303 of the Age Discrimination Act of 1975, and as amended, 42 U.S.C. § 6102, section 202 of the Americans with Disabilities Act of 1990, 42 U.S.C. § 12132, the Contractor agrees that it will not discriminate against any employee or applicant for employment because of race, color, creed, national origin, sex, age, or disability. In addition, the Contractor agrees to comply with applicable Federal implementing regulations and other implementing requirements HUD may issue.

Equal Employment Opportunity

The following equal employment opportunity requirements apply to the underlying contract:

(a) Race, Color, Creed, National Origin, Sex - In accordance with Title VII of the Civil Rights Act, as amended, 42 U.S.C. § 2000e, the Contractor agrees to comply with all applicable equal employment opportunity requirements of U.S. Department of Labor (U.S. DOL) regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 C.F.R. Parts 60 et seq ., (which implement Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," 42 U.S.C. § 2000e note), and with any applicable Federal statutes, executive orders, regulations, and Federal policies that may in the future affect construction activities undertaken in the course of the Project. The Contractor agrees to take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, creed, national origin, sex, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms

of compensation; and selection for training, including apprenticeship. In addition, the Contractor agrees to comply with any implementing requirements HUD may issue.

(b) Age - In accordance with section 4 of the Age Discrimination in Employment Act of 1967, as amended, 29 U.S.C. § § 623, the Contractor agrees to refrain from discrimination against present and prospective employees for reason of age. In addition, the Contractor agrees to comply with any implementing requirements HUD may issue.

(c) Disabilities - In accordance with section 102 of the Americans with Disabilities Act, as amended, 42 U.S.C. § 12112, the Contractor agrees that it will comply with the requirements of U.S. Equal Employment Opportunity Commission, "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 C.F.R. Part 1630, pertaining to employment of persons with disabilities. In addition, the Contractor agrees to comply with any implementing requirements HUD may issue.

The Contractor also agrees to include these requirements in each subcontract financed in whole or in part with Federal assistance provided by HUD, modified only if necessary to identify the affected parties.

Suspension and Debarment 2 CFR 200.214

This contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such, the contractor is required to verify that none of the contractor's principals (defined at 2 C.F.R. § 180.995) or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).

The contractor must comply with 2 C.F.R. pt. 180, subpart C and2 C.F.R. pt. 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.

This certification is a material representation of fact relied upon by Alabama State Port Authority. If it is later determined that the contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available Alabama State Port Authority, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.

The bidder or proposer agrees to comply with the requirements of2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

Lobbying *(Any project over $100,000)*

No federal funds under this agreement may be used to influence or attempt to influence an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with the awarding of any federal contract, continuation, renewal, amendments other than federal appropriated funds.

Drug Free Workplace

During the performance of this contract, the contractor agrees to (i) provide a drug-free workplace for the contractor's employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution,

dispensation, possession, or use of a controlled substance or marijuana is prohibited in the contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition; (iii) state in all solicitations or advertisements for employees placed by or on behalf of the contractor that the contractor maintains a drug-free workplace; and (iv) include the provisions of the foregoing clauses in every subcontract or purchase order of over $10,000, so that the provisions will be binding upon each subcontractor or vendor.

For the purposes of this section, "drug-free workplace" means a site for the performance of work done in connection with a specific contract awarded to a contractor in accordance with this chapter, the employees of whom are prohibited from engaging in the unlawful manufacture, sale, distribution, dispensation, possession or use of any controlled substance or marijuana during the performance of the contract.

Trafficking in persons 2 CFR Part 175

This contract is covered by 2 CFR Part 175. A person who is an employee, agent, consultant, officer, or elected or appointed official of the recipient or subrecipient may not—

i. Engage in severe forms of trafficking in persons during the period of time that the award is in effect;
ii. Procure a commercial sex act during the period of time that the award is in effect; or
iii. Use forced labor in the performance of the award or subawards under the award.

HUD, as the Federal awarding agency, may unilaterally terminate this award, without penalty.

Conflict of Interest

i. In the procurement of property or services by recipients and subrecipients, the conflict-of-interest rules in 2 CFR 200.317 and 2 CFR 200.318(c) shall apply. In all cases not governed by 2 CFR 200.317 and 2 CFR 200.318(c), recipients and subrecipients must follow the requirements contained in paragraphs ii-v below.

ii. General prohibition. No person who is an employee, agent, consultant, officer, or elected or appointed official of the recipient or subrecipient and who exercises or has exercised any functions or responsibilities with respect to assisted activities, or who is in a position to participate in a decision making process or gain inside information with regard to such activities, may obtain a financial interest or benefit from the activity, or have a financial interest in any contract, subcontract, or agreement with respect thereto, or the proceeds thereunder, either for himself or herself or for those with whom he or she has immediate family or business ties, during his or her tenure or for one year thereafter. Immediate family ties include (whether by blood, marriage or adoption) the spouse, parent (including a stepparent), child (including a stepchild), brother, sister (including a stepbrother or stepsister), grandparent, grandchild, and in-laws of a covered person.

iii. Exceptions. HUD may grant an exception to the general prohibition in paragraph (ii) upon the recipient's written request and satisfaction of the threshold requirements in paragraph (iv), if HUD determines the exception will further the Federal purpose of the award and the effective and efficient administration of the recipient's program or project, taking into account the cumulative effects of the factors in paragraph (v).

iv. Threshold requirements for exceptions. HUD will consider an exception only after the recipient has provided the following documentation:

a. A disclosure of the nature of the conflict, accompanied by an assurance that there has been public disclosure of the conflict and a description of how the public disclosure was made; and

b. An opinion of the recipient's attorney that the interest for which the exception is sought would not violate state or local law.

v. Factors to be considered for exceptions. In determining whether to grant a requested exception after the recipient has satisfactorily met the threshold requirements in paragraph (iii), HUD will consider the cumulative effect of the following factors, where applicable:

a. Whether the exception would provide a significant cost benefit or an essential degree of expertise to the program or project that would otherwise not be available;
b. Whether an opportunity was provided for open competitive bidding or negotiation;
c. Whether the person affected is a member of a group or class of low- or moderate-income persons intended to be the beneficiaries of the assisted activity, and the exception will permit such person to receive generally the same interests or benefits as are being made available or provided to the group or class;
d. Whether the affected person has withdrawn from his or her functions or responsibilities, or the decision-making process with respect to the specific assisted activity in question;
e. Whether the interest or benefit was present before the affected person was in a position as described in paragraph (ii);
f. Whether undue hardship will result either to the recipient or the person affected when weighed against the public interest served by avoiding the prohibited conflict; and
g. Any other relevant considerations.

Contract Work Hours and Safety Standards *(Contracts awarded by recipients in excess of $2000 for construction contracts and in excess of $2500 for other contracts that involve the employment of mechanics or laborers)*

1. **Overtime requirements** - No Contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
2. **Violation; liability for unpaid wages; liquidated damages** - In the event of any violation of the clause set forth in paragraph (1) of this section the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and subcontractor shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this section.
3. **Withholding for unpaid wages and liquidated damages** - The ASPA shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the Contractor or subcontractor under any such contract or any other Federal contract with the same Contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same Contractor, such sums as may be determined to be necessary to

satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this section.

4. **Subcontracts** - The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs (1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this section.

Clean Air *(Contracts of amounts in excess of $100,000)*

The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. §§ 7401 . The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to MARAD and the appropriate EPA Regional Office.

The Contractor also agrees to include these requirements in each subcontract exceeding $100,000 financed in whole or in part with Federal assistance provided by HUD.

Clean Water (*Contracts of amounts in excess of $100,000)*

The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et . The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to HUD and the appropriate EPA Regional Office.

The Contractor also agrees to include these requirements in each subcontract exceeding $100,000 financed in whole or in part with Federal assistance provided by HUD.

Copeland "Anti-Kickback" Act *(Contracts in excess of $2,000 for construction or repair)*

The Contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract. The Act provides that each contractor or subrecipient shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he is otherwise entitled. The recipient shall report all suspected or reported violations to HUD.

Section 3 HUD Act of 1968

The work to be performed under this contract is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended by the Housing and Community Development Act of 1992 (Section 3). The purpose of Section 3, 24 CFR Part 75, is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by Section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

APPENDIX B

CORPS OF ENGINEERS

PERMIT REQUIREMENTS

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, MOBILE DISTRICT
P.O. BOX 2288
MOBILE, AL 36628-0001

REPLY TO
ATTENTION OF:

August 18, 2021

South Alabama Branch
Regulatory Division

SUBJECT: Department of the Army Permit **Modification Number 1**, File Number SAM-2017-00189-JEB, Alabama State Port Authority - Airbus Roll-on-Roll-off Berth, Mobile River

Alabama State Port Authority
Attention: Mr. Bob Harris
Email Address: BHarris@asdd.com
Post Office Box 1588
Mobile, Alabama 36633

Dear Mr. Harris:

Reference is made to your May 13, 2021 request for **Modification Number 1** of your Department of the Army (DA) permit authorized under file number SAM-2017-00189-JEB. The original permit authorized a new bulkhead with backfill and pile-supported deck structures at the existing berthing area on Mobile River. The project is located on Mobile County Parcel: R022910380007003.000, at 80 Virginia Street; within Section 52, Township 5 South, Range 1 West; at Latitude 30.671049° and Longitude -88.036373°; in Mobile, Mobile County, Alabama.

In accordance with your request, the subject DA permit is modified as follows:

Time Extension: The time limit to complete this project is extended until **August 18, 2025**. If the activity authorized herein is not completed on or before that date, this permit, if not previously revoked or specifically extended, shall expire.

Change in Impacts:

a. Reduction of originally authorized dock extension length from 500 feet to 400 feet and an increase in width of the dock structure to 200 feet wide.

b. Realignment of the proposed waterfront bulkhead to align with the western extent of the new pile-supported deck structure. This will result in 0.63 acre less total fill placement within water bottoms.

c. Elimination of the previously authorized RO/RO berthing area and ramp. Clean sandy backfill will instead be placed within the 0.40-acre open-water area.

The total amount of fill to be placed within on-site water bottoms will be approximately 668,000 cubic yards within 8.04 acres of water bottoms. The net impact to the water bottom fill area commensurate with these modifications is 0.23 acre less fill than was originally permitted.

The permit as modified includes the following additional special conditions:

j. The permittee shall implement the attached "Alabama Standard Manatee Construction Conditions" throughout project construction. In the event of an equipment strike, collision with and/or injury to a manatee as a result of project implementation, work shall cease and the permittee shall immediately contact this office at (251) 694-3772, and the U.S. Fish and Wildlife Service in Daphne, (251) 441-5181.

k. In order for the Coast Guard to give proper notice to the maritime community, the permitted owners, contractors, or responsible party shall contact Coast Guard Sector Mobile Waterways Management Branch (spw), 1500 15th Street, Mobile, Alabama 36615, (251) 441-5166 or (251) 441-5940, 60 days prior to performing the proposed action. The permitted owners, contractors, or responsible party must also install and maintain, at the permitted owner's, contractor's, or responsible party's expense, any safety lights, signs and signals required by the USCG, through regulations or otherwise, on the permitted owner's, contractor's, or responsible party's fixed structures. To receive a USCG Private Aids to Navigation marking determination, at no later than 30 days prior to the installation of any fixed structures in navigable waters, you are required to contact the Eighth Coast Guard District (dpw), 500 Poydras Street, Suite 1230, New Orleans, Louisiana 70130, (504) 671-2124 or via email to D8oanPATON@uscg.mil. For general information related to Private Aids to Navigation, please visit the Eight CG District website at www.atlanticarea.uscg.mil/District-8/District-Divisions/Waterways/PATON/.

All other previous conditions to which the work is made subject shall remain in full force and effect.

Electronic copies of this letter are being provided to your agent, APTIM Port services, LLC, Attention: Mr. Scott Wagner at Scott.Wagner@aptim.com; to the U.S. Army Corps of Engineers Mobile District Navigation Section, Operations Division, Attention: Ms. Ashley Kleinschrodt at Ashley.N.Kleinschrodt@usace.army.mil; to USACE Program Management, Attention: Mr. Dean Trawick at Eubie.D.Trawick@usace.army.mil; and to the Alabama Department of Environmental Management, Mobile Branch, Coastal Section, Attention: Mr. Scott Brown, at coastal@adem.alabama.gov; and the Alabama Department of Conservation and Natural Resources, State Lands Division, Attention: Mr. Will Underwood, at DCNR.Coastal@dcnr.alabama.gov, and Mr. Jeremiah Kolb, at Jeremiah.Kolb@dcnr.alabama.gov. If you wish to receive a paper copy of this letter, you should send a written request to this office at the following address: U.S. Army Corps of Engineers, Mobile District, Regulatory Division (RD-A), Post Office Box 2288, Mobile, Alabama, 36628.

If you have any questions, please contact the project manager, Ms. Emma L. Bickerstaff at 251-690-3295 or by email at Emma.L.Bickerstaff@usace.army.mil. For

additional information about our Regulatory Program, visit our web site at www.sam.usace.army.mil/Missions/Regulatory.aspx. Also, please take a moment to complete our customer satisfaction survey located near the bottom of the webpage. Your responses are appreciated and will allow us to improve our services.

BY AUTHORITY OF THE SECRETARY OF THE ARMY:

SEBASTIEN P. JOLY
Colonel, U.S. Army
District Commander

BY: _____
S. BRAD CROSSON
Team Leader
South Alabama Branch
Regulatory Division

Attachments

COMMENCEMENT CERTIFICATION

U.S. Army Corps of Engineers
Mobile District

Permit Number: **SAM-2017-00189-JEB**

Name of Permittee: **Alabama Port Authority**

Date of Issuance: **August 18, 2021**

Upon commencement of the activity authorized by this permit, please sign this certification and return it to the following address:

U.S. Army Corps of Engineers
Mobile District
Regulatory Division
Post Office Box 2288
Mobile, Alabama 36628-0001

Please note your permitted activity is subject to a commencement inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with all terms and conditions of this permit, the permit is subject to permit suspension, modification, or revocation and you are subject to an enforcement action by this office.

I hereby certify the work authorized by the above-referenced permit has commenced in accordance with the terms and conditions of the said permit.

_____ _____
Signature of Permittee Date

COMPLETION CERTIFICATION

U.S. Army Corps of Engineers
Mobile District

Permit Number: **SAM-2017-00189-JEB**

Name of Permittee: **Alabama Port Authority**

Date of Issuance: **August 18, 2021**

Upon completion of the activity authorized by this permit, please sign this certification and return it to the following address:

U.S. Army Corps of Engineers
Mobile District
Regulatory Division
Post Office Box 2288
Mobile, Alabama 36628-0001

Please note your permitted activity is subject to a completion inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with all terms and conditions of this permit, the permit is subject to permit suspension, modification, or revocation and you are subject to an enforcement action by this office.

I hereby certify the work authorized by the above-referenced permit has been completed in accordance with the terms and conditions of the said permit.

_____ _____
Signature of Permittee Date

US Army Corps of Engineers

This notice of authorization must be conspicuously displayed at the site of work.

A permit to perform work authorized by statutes and regulations of the Department of the Army at

Near 80 Virginia Street at Mobile County Parcel: R022910380007003.000

has been issued to Alabama State Port Authority **on** August 18, 2021

Address of Permittee: Post Office Box 1588, Mobile, Alabama 36633

PERMIT NUMBER

SAM-2017-00189-JEB

S. Brad Crosson, Team Leader
South Alabama Branch, Regulatory Division

For the **District Commander**

ENG FORM 4336, Jul 81 (33 CFR 320-330) EDITION OF JUL 70 MAY BE USED

Proponent: CECW-O

STANDARD MANATEE CONDITIONS FOR
IN-WATER WORK OR EVENTS in ALABAMA

The project manager shall comply with the following conditions intended to protect manatees from direct project effects:

a. Instruct all personnel associated with the project/event about the potential presence of manatees and the need to avoid collisions with manatees. Advise all personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act of 1972, the Endangered Species Act of 1973, and Alabama Nongame Species Regulation.

b. Operate all vessels associated with the project/event at "no wake/idle" speeds at all times while in the project/event area, and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom when possible. All vessels will follow routes of deep water whenever possible.

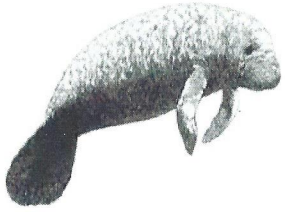
c. Siltation or turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee movement.

d. All on-site project/event personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shut down if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.

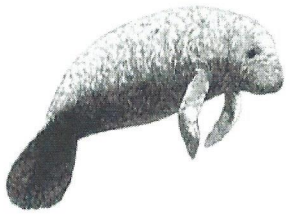
e. Any collision with and/or injury to a manatee shall be reported immediately to the Dauphin Island Sea Lab's Manatee Sighting Network (1-866-493-5803) and the U.S. Fish and Wildlife Service in Daphne, Alabama, at (251) 441-5839 or (251) 441-5181 and emailed to: Alabama@fws.gov. Please report nonemergency manatee observations to the numbers above or online at: http://manatee.disl.org/.

f. Temporary signs using text exactly as below shall be posted prior to and during all in-water project or event activities. Signs shall be at least 8½" by 11" explaining the requirements for the "Idle/No Wake" and the shut down of in-water operations. Signs must be posted in locations prominently visible to all personnel engaged in water-related activities and placed visible to each vessel operator. All signs are to be removed by project manager upon completion of the project or event. Questions concerning these signs can be forwarded to the email address listed above. An example is enclosed and can be copied and used during construction/event activities.

Revised Jan 2015



CAUTION:
MANATEE HABITAT



IDLE SPEED IS REQUIRED IF OPERATING A VESSEL IN THE CONSTRUCTION OR EVENT AREA

All equipment must be SHUTDOWN if a manatee comes within 50 FEET of operation

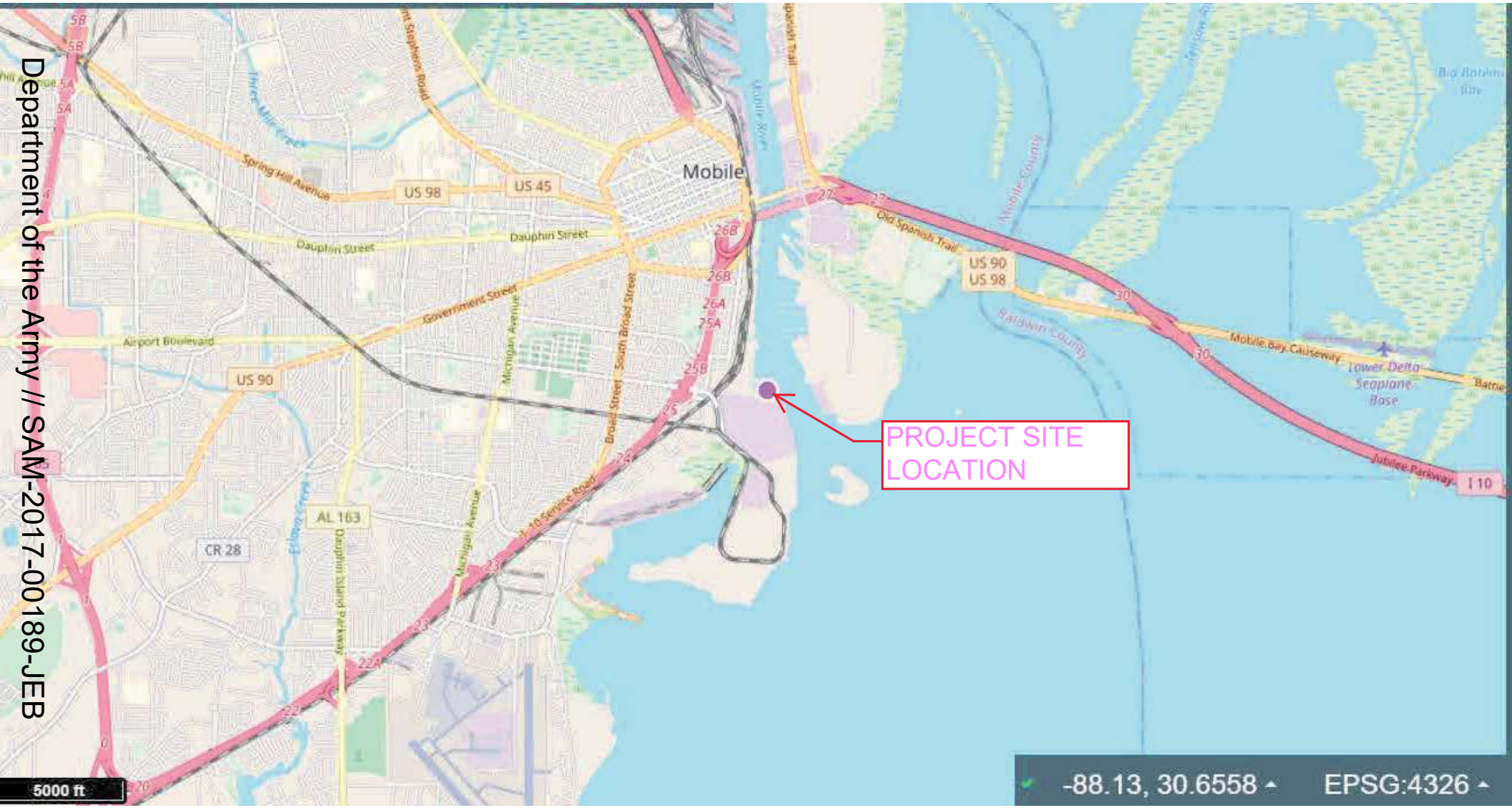
Report any collision with and/or injury to a manatee immediately to:

Dauphin Island Sea Lab's Manatee Sighting Network:

1-866-493-5803

and the U.S. Fish and Wildlife Service in Daphne, AL:

(251) 441-5839 or (251) 441-5181

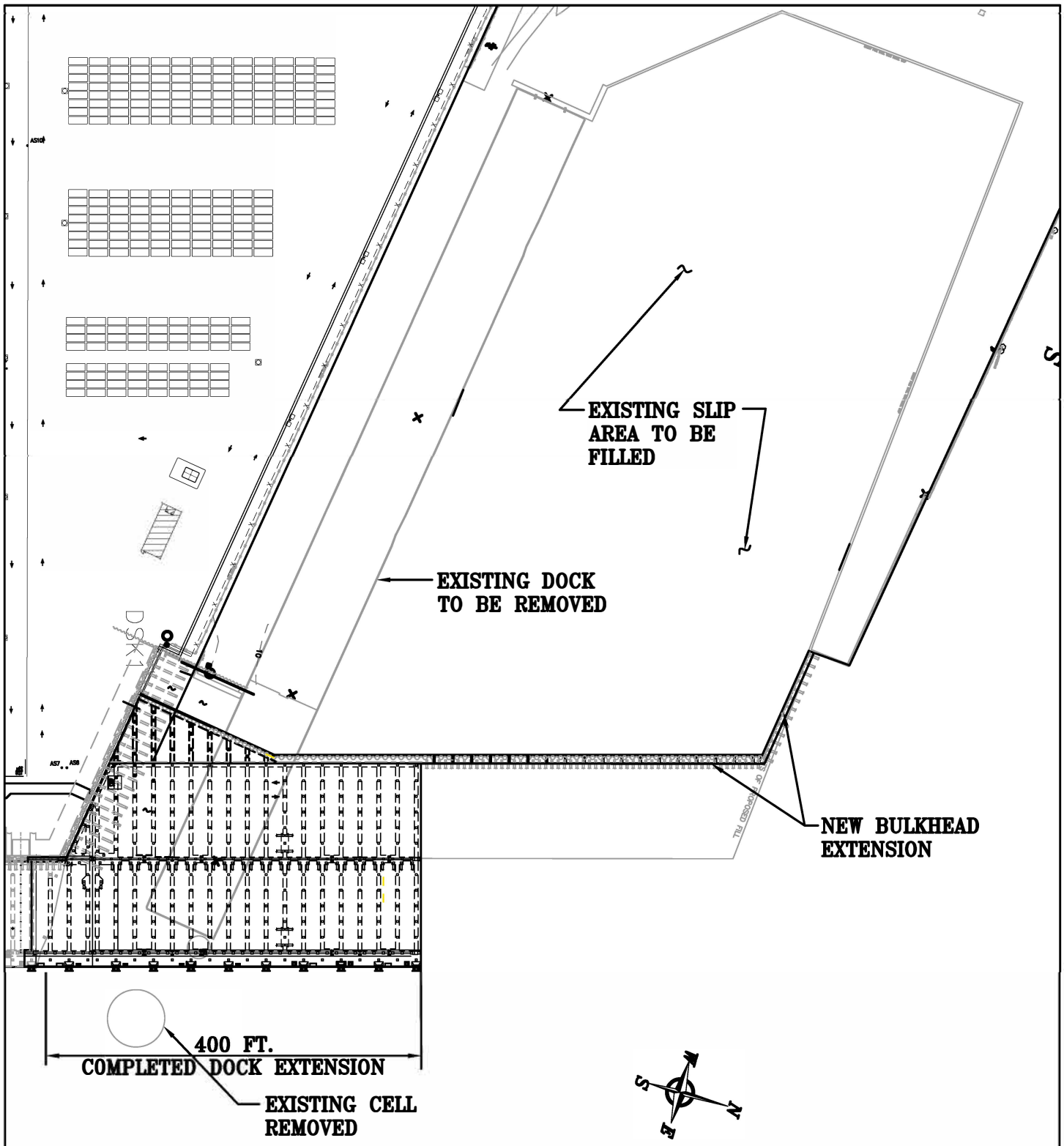


Department of the Army // SAM-2017-00189-JEB


PROJECT SITE LOCATION
1000 ft
-88.0515, 30.6782
EPSG:4326
Department of the Army // SAM-2017-00189-JEB

Enclosure 2

Drawings
Requested Modifications

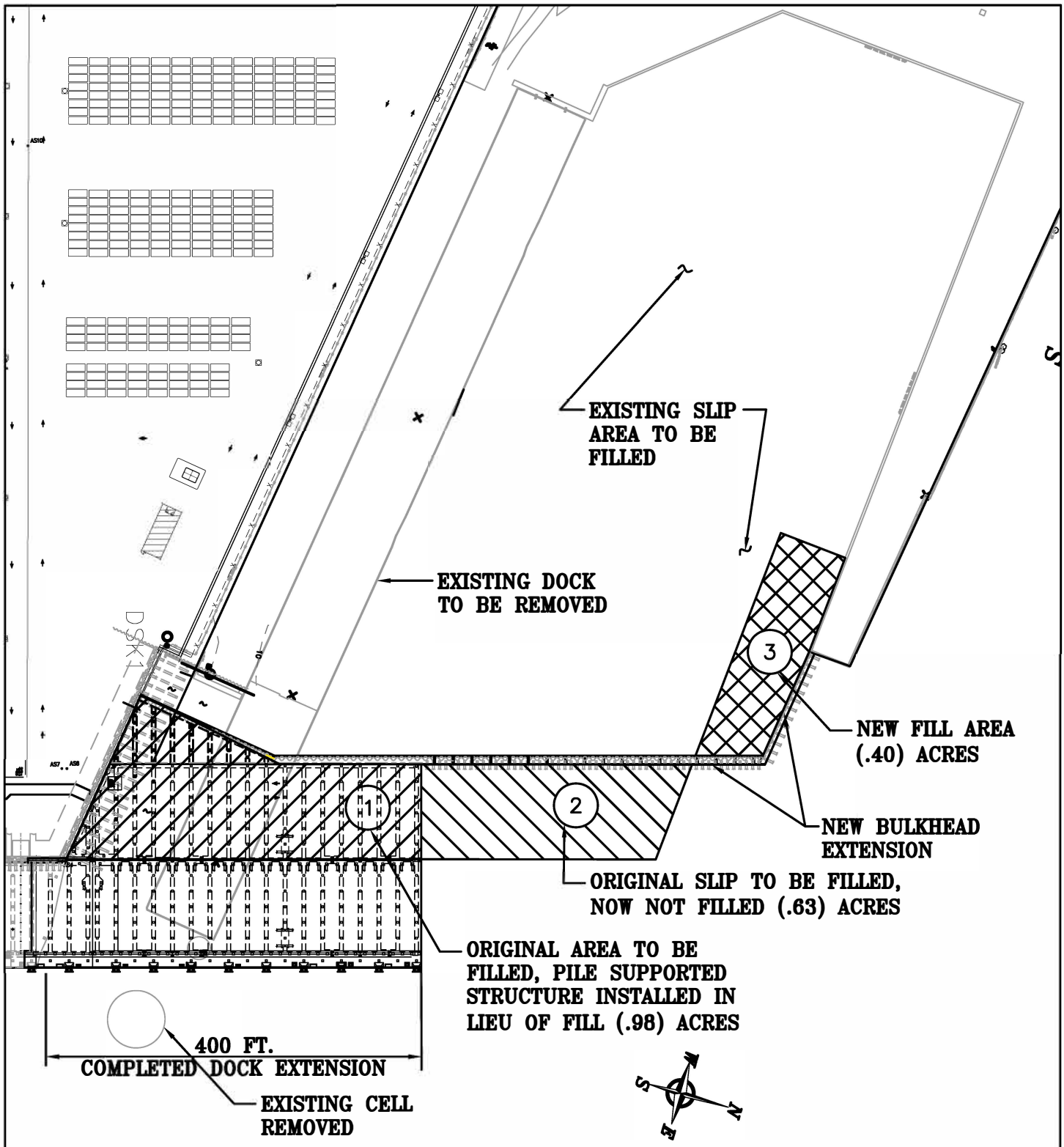


ENLARGED PARTIAL NEW SITE PLAN

SCALE: 1" = 150'–0"

0 75' 150' 300' 450'

REVISED APMT FACILITY BERTH EXTENSION AND SLIP FILL
IN : MOBILE RIVER
TRIBUTARY TO: MOBILE BAY
COUNTY OF: MOBILE STATE: ALABAMA
APPLICATION BY:
ALABAMA STATE PORT AUTHORITY
SHEET 2 OF 18 DATE: 05/2021



ENLARGED PARTIAL NEW SITE PLAN

SCALE: 1" = 150'–0"

0 75' 150' 300' 450'

REVISED APMT FACILITY BERTH EXTENSION AND SLIP FILL
IN : MOBILE RIVER
TRIBUTARY TO: MOBILE BAY
COUNTY OF: MOBILE STATE: ALABAMA
APPLICATION BY:
ALABAMA STATE PORT AUTHORITY

SHEET 2A OF 18 DATE: 05/2021

LANCE R. LEFLEUR
DIRECTOR

KAY IVEY
GOVERNOR

Alabama Department of Environmental Management
adem.alabama.gov
1400 Coliseum Blvd. 36110-2400 ▪ Post Office Box 301463
Montgomery, Alabama 36130-1463
(334) 271-7700 ▪ FAX (334) 271-7950

June 3, 2021

Alabama State Port Authority
C/O Scott Wagner
Project Engineering Manager
APTIM
3600 Springhill Business Park
Suite 200
Mobile, Alabama 36608

RE: State of Alabama Clean Water Act (CWA) §401(a) Water Quality Certification (WQC) Time Extension
Facility: Alabama State Port Authority, Mobile River, Section 5, Township 4 South, Range 1 East, Mobile, Mobile County, Alabama
Mobile District U.S. Army Corps of Engineers (USACE) Permit Number: SAM-2017-00189-JEB
Alabama Department of Environmental Management (ADEM) Tracking Code: ADEM-2017-137.1-WQC

Dear Mr. Wagner:

This letter responds to the Alabama State Port Authority's request for a WQC time extension associated with the above referenced USACE permit which is set to expire on October 12, 2021. Extension of the USACE permit is needed in order to continue with activities authorized therein as those activities cannot be completed prior to the current permit expiration date. This letter **extends** the ADEM's WQC provided there remains strict adherence to the conditions listed in the original WQC. This extension of the ADEM's WQC will terminate concurrently with the expiration of the extended USACE permit.

The ADEM's concurrence with the Alabama State Port Authority's certification of consistency with the Alabama Coastal Area Management Program (ACAMP) remains in effect, provided there are no project design changes resulting in changes to impacts to coastal resources regulated under the enforceable policies of the ACAMP.

Contact the Mobile-Coastal office anytime with questions. Always include the ADEM tracking code above when corresponding on this matter. Katie Smith is the Mobile-Coastal office contact for this project; she may be reached by phone at 251.304.1176 or by e-mail at katiem.smith@adem.alabama.gov.

Sincerely,

Anthony Scott Hughes, Chief
Field Operations Division

cc: DCNR.Coastal@dcnr.alabama.gov
USACE | Mobile District, S. Brad Crosson - (steven.b.crosson@usace.army.mil)

ASH/jsb/kms

Birmingham Branch
110 Vulcan Road
Birmingham, AL 35209-4702
(205) 942-6168
(205) 941-1603 (FAX)

Decatur Branch
2715 Sandlin Road, S.W.
Decatur, AL 35603-1333
(256) 353-1713
(256) 340-9359 (FAX)

Mobile Branch
2204 Perimeter Road
Mobile, AL 36615-1131
(251) 450-3400
(251) 479-2593 (FAX)

Mobile-Coastal
3664 Dauphin Street, Suite B
Mobile, AL 36608
(251) 304-1176
(251) 304-1189 (FAX)

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Alabama State Port Authority	File Number: SAM-2017-00189-JEB	Date: 2021-08-18
Attached is:		See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
XX	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
	PERMIT DENIAL	C
	APPROVED JURISDICTIONAL DETERMINATION	D
	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/CECW/Pages/reg_materials.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:
ATTENTION: MS. EMMA L. BICKERSTAFF
U.S. ARMY CORPS OF ENGINEERS
CESAM-RD-A
POST OFFICE BOX 2288
MOBILE, ALABAMA 36628-0001

Phone: (251) 690-3295
Email: EMMA.L.BICKERSTAFF@USACE.ARMY.MIL

If you only have questions regarding the appeal process you may also contact:
MR. PHILIP A. SHANNIN
ADMINISTRATIVE APPEAL REVIEW OFFICER
CESAD-PDS-O
60 FORSYTH STREET SOUTHWEST, FLOOR M9
ATLANTA, GEORGIA 30303-8803

PHONE: (404) 562-5136; FAX (404) 562-5138
EMAIL: PHILIP.A.SHANNIN@USACE.ARMY.MIL

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number:

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, MOBILE DISTRICT
CORPS OF ENGINEERS
P.O. BOX 2288
MOBILE, ALABAMA 36628-0001

REPLY TO
ATTENTION OF:

November 15, 2017

South Alabama Branch
Regulatory Division

SUBJECT: Department of the Army Final Permit Number SAM-2017-00189-JEB, Alabama State Port Authority, Mobile River

Alabama State Port Authority
Attention: Mr. Bob Harris
Post Office Box 1588
Mobile, Alabama 36633

Dear Mr. Harris:

PLEASE READ THIS LETTER CAREFULLY AND COMPLY WITH ITS PROVISIONS

There is enclosed a Department of the Army (DA) permit authorizing the Alabama Department of Transportation (ALDOT) to perform the work specified therein in accordance with the plans shown on the drawings enclosed thereto. This permit is issued under provision of the Federal laws for the protection and preservation of the navigable waters of the United States. These laws provide that after the proposed work has been approved by issuance of a DA permit,

IT SHALL NOT BE LAWFUL TO DEVIATE FROM SUCH PLANS EITHER BEFORE OR AFTER COMPLETION OF THE WORK,

unless modification of said plans has previously been submitted to and received the approval of the DA.

The ALDOT and its contractors should study and carefully adhere to all the terms and conditions of the permit. The District Office must be notified of the commencement and completion of the permitted work. The enclosed Commencement and Completion Certification forms may be used for that purpose. Also enclosed is a yellow "NOTICE OF AUTHORIZATION" which must be conspicuously displayed at the site during construction of the permitted work.

If for any reason it becomes necessary to make a material change in the location, plans, or mitigation for this work, revised plans should be submitted promptly to the District Engineer in order that the revised plans may receive the approval required by law before work is begun. Compliance with this and other conditions of the permit is essential. Failure to submit the requested notices may result in permit revocation.

A copy of this permit is being provided to the Alabama Department of Environmental Management, Coastal Section, Attention: Mr. Scott Brown, 3664 Dauphin Street, Suite B, Mobile, Alabama 36608, for informational purposes.

If you have any questions, please contact me at (251) 694-4611 or by e-mail at joy.b.earp@usace.army.mil. For additional information about our Regulatory Program, please visit our web site at www.sam.usace.army.mil/Missions/Regulatory.aspx. Also, please take a moment to complete our customer satisfaction survey located near the bottom of the webpage. Your responses are appreciated and will help us improve our services.

Sincerely,

Joy B. Earp
Team Leader
South Alabama Branch
Regulatory Division

Enclosures

JBE 11-15-17
Earp/4611/nj

Zettler SMZ 11/15/17
File:

US Army Corps of Engineers®

THIS NOTICE OF AUTHORIZATION MUST BE CONSPICUOUSLY DISPLAYED AT THE SITE OF WORK.

A permit to perform work authorized by statutes and regulations of the Department of the Army

at **MOBILE RIVER, MOBILE, MOBILE COUNTY, ALABAMA**

has been issued to **ALABAMA DEPARTMENT OF TRANSPORTATION** on **OCTOBER 12, 2017**

Address of Permittee **POST OFFICE BOX 1588, MOBILE, ALABAMA 36633**

Permit Number

SAM-2017-00189-JEB

FOR THE *District Commander*
JOY B. EARP, TEAM LEADER, RD-A
REGULATORY DIVISION

ENG FORM 4336, Jul 81 (33 CFR 320-330) EDITION OF JUL 70 MAY BE USED (Proponent: CECW-0)

COMMENCEMENT CERTIFICATION

U.S. Army Corps of Engineers
Mobile District

Permit Number: **SAM-2017-00189-JEB**

Name of Permittee: **Alabama Department of Transportation**

Date of Issuance: **November 15, 2017**

Upon commencement of the activity authorized by this permit and any mitigation required by the permit, please sign this certification and return it to the following address:

U.S. Army Corps of Engineers
Mobile District
Regulatory Division
Post Office Box 2288
Mobile, Alabama 36628-0001

Please note that your permitted activity is subject to a commencement inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with all terms and conditions of this permit, the permit is subject to permit suspension, modification, or revocation and you are subject to an enforcement action by this office.

I hereby certify that the work authorized by the above-referenced permit has commenced in accordance with the terms and conditions of the said permit, and the required mitigation was completed in accordance with the permit conditions.

_____ _____

Signature of Permittee Date

COMPLETION CERTIFICATION

U.S. Army Corps of Engineers
Mobile District

Permit Number: **SAM-2017-00189-JEB**

Name of Permittee: **Alabama Department of Transportation**

Date of Issuance: **November 15, 2017**

Upon completion of the activity authorized by this permit and any mitigation required by the permit, please sign this certification and return it to the following address:

U.S. Army Corps of Engineers
Mobile District
Regulatory Division
Post Office Box 2288
Mobile, Alabama 36628-0001

Please note that your permitted activity is subject to a completion inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with all terms and conditions of this permit, the permit is subject to permit suspension, modification, or revocation and you are subject to an enforcement action by this office.

I hereby certify that the work authorized by the above-referenced permit has been completed in accordance with the terms and conditions of the said permit, and the required mitigation was completed in accordance with the permit conditions.

_____ _____

Signature of Permittee Date

DEPARTMENT OF THE ARMY PERMIT

Permittee: **ALABAMA STATE PORT AUTHORITY**

Permit No: **SAM-2017-00189-JEB**

Issuing Office: **MOBILE DISTRICT**

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the U.S. Army Corps of Engineers (USACE) having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: The permittee is authorized to place fill in approximately 9.25 acre of water bottom in an existing berthing area for construction of a Roll-On Roll-Off (Ro/Ro) Berth for the handling of the Airbus supply vessel. The unloading ramp will be a concrete pile supported structure with the slip side comprised of a steel pipe pile bulkhead restraint system. The existing approximate 9.25 acre slip behind the bulkhead structure will be filled to create a working area to handle the transit of the off loaded carrier vehicles from the Ro/Ro operation. The creation of the required Ro/Ro Berth will also allow for the construction of an approximate 500 ft. concrete pile supported dock structure addition extending to the North of the existing ASPA/APMT Container Dock Facility. The existing Riverside Cell Structure will be demolished as well as the existing dock structure in the slip area. Approximately 34,800 cubic yards of dredge material will be removed to an elevation of (-)45 ft. dredge depth inclusive of a 2 ft. over dredge allowance to handle the larger post panama ships at the dock extension. The dredge spoil material will be placed within the existing Alabama Port Authority's diked upland disposal area on adjacent Pinto Island. There will also be approximately 768,000 cubic yards of sand and sand/clay fill material placed in the slip behind the dock and bulkhead extension to create the working area. A 287-foot jetty/berm along the north project boundary may be removed as needed.

DRAWINGS AND ATTACHMENTS:

1. **Vicinity Map and New Site Plan (1 page)**
2. **Enlarged Partial New Site Plan (1 page)**
3. **Enlarged Partial Existing Site Plan (1 page)**
4. **Main Dock Extension Typical Section (1page)**
5. **Section at Main Dock Bulkhead Extension (1 page)**
6. **Section at RO-RO Bulkhead (1 page)**
7. **Section at RO-Ro Dock (1 page)**
8. **Dredge Site (1 page)**
9. **Disposal Site Plan (1 page)**
10. **Dredge Plan (1 page)**
11. **Dredge Cross-Sections (11 pages)**
12. **Typical Fill Section (1 page)**
13. **401 Water Quality Certification (3 pages)**
14. **CZM Certification (2 pages)**

Project Location: Within an existing, excavated, industrial slip along Mobile River, Section 5, Township 4 South, Range 1 East, Mobile, Mobile County, Alabama. Exact project coordinates are 30.671049N, -88.036373W.

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on October 12, 2021. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least 1 month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and State coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special condition to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions:

a. Best management practices shall be implemented to minimize erosion, siltation and damage to any adjacent wetlands and waters of the United States. Appropriate erosion and siltation control measures must be used and maintained in effective operating condition for the life of the project.

b. Pre and post-construction hydrographic surveys of the adjacent Federal navigation channel conditions shall be conducted and furnished to the U.S. Army Corps of Engineers (USACE) after completion of the work. These surveys shall be submitted to Mobile District, U.S. Army Corps of Engineers to assure a return of the Federal Project conditions. The survey area will extend 350 feet on each side of the work area. Cross-sections should be taken on a minimum of 50-foot intervals within the survey area, with vertical elevations made continuously along each cross-section. Cross-sections shall encompass the entire Federal channel, top of slope to top of slope. All surveys should be electronically controlled horizontally from known monuments (fixed coordinate points) and referenced to mean low lower water (MLLW) with tidal compensation. Surveys should be plotted in cross-section format with a plan view layout drawing all horizontal control, monument stations, tide gage locations, etc. All field and survey notes shall be furnished. The permittee shall be responsible for returning the project area to Federal Project conditions. The survey shall be submitted to U.S. Army Corps of Engineers, Operations Division, Attention: Ms. Ashley Kleinschrodt, 109 St. Joseph Street, Mobile, Alabama 36601. The pre-construction survey shall be completed before commencement of activities authorized by this permit. The post-construction survey shall be completed within 60 days of completion of the work authorized by this permit.

c. All dredged material shall be placed in the existing Pinto Island spoil disposal site, as indicated on sheet 9 of 22 project drawings.

d. Turbidity screens shall be installed to contain the work area. These screens shall remain in place until any turbidity generated in the waters of the work area returns to background levels.

e. The disposal of trees, brush and other debris in any stream corridor, wetland or surface water is prohibited.

f. The project must be maintained in such a manner that the passage of normal and expected high flows of surface water runoff outside the project boundaries is not restricted or otherwise altered.

g. Should cultural resources be encountered during project activities including but not limited any maintenance work associated with the structure or impoundment, work shall cease and the Alabama State Historical Preservation Officer (SHPO) and the U.S. Army Corps of Engineers shall be consulted immediately. It is the permittee's responsibility to ensure that contractors or persons performing work on the structure or in the vicinity of the structure or impoundment are aware of this requirement. Contact information: U.S. Army Corps of Engineers, at (251) 694-3873, and Alabama Historical Commission at (334) 242-3184.

h. The Alabama Department of Environmental Management issued 401 Water Quality and CZM Coastal Consistency Certification via letter dated July 31, 2017. The permittee shall comply with all terms and conditions of the Coastal Consistency and Water Quality Certification.

i. The project shall comply with all Federal, State and local floodplain ordinances.

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403).

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, State or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a re-evaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit, SAM-2017-00189-JEB.

Robert C. Hanna

(PERMITTEE) For ALABAMA STATE PORTAUTHORITY
POST OFFICE BOX 1588
MOBILE, ALABAMA 36633

11/9/2017
(DATE)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

JAMES A. DELAPP
COLONEL, U.S. ARMY CORPS OF ENGINEERS
(DISTRICT COMMANDER)

BY _____ November 15, 2017
JOY B. EARP, TEAM LEADER (DATE)
SOUTH ALABAMA BRANCH
REGULATORY DIVISION

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

_____ _____

(TRANSFEREE) (DATE)

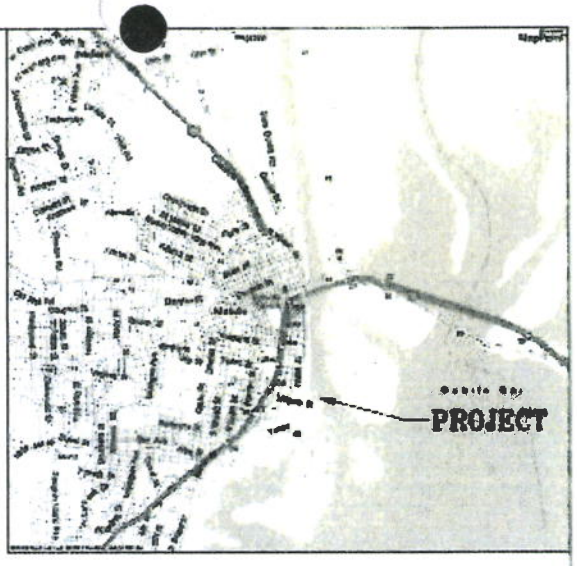
PURPOSE:
ADDITION OF A ROLL ON ROLL OFF BERTH TO SERVICE THE AIRBUS SUPPLY VESSEL AND EXTENSION OF THE EXISTING APM TERMINAL DOCK STRUCTURE TO ALLOW FOR THE BERTHING OF TWO LARGER VESSELS SIMULTANEOUSLY.

DATUM:
NAVD 88

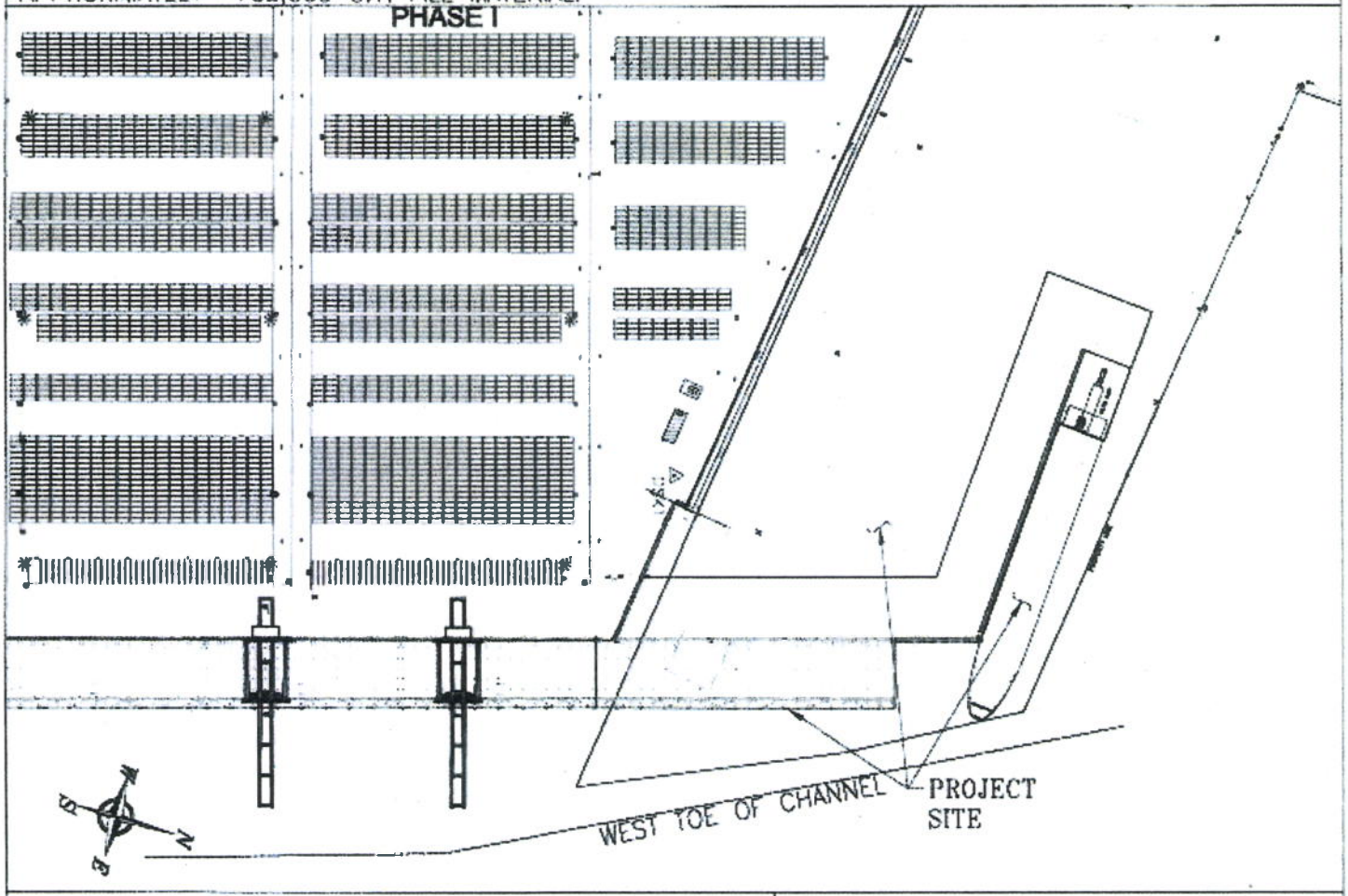
ADJACENT PROPERTY OWNERS:
ALABAMA STATE PORT AUTHORITY
PINTO ISLAND LAND CO., INC.
COAL FREIGHT FORWARDING INC.
MOBILE CITY OF BOARD OF

CUT:
APPROXIMATELY 34,500 C.Y. DREDGED MATERIAL.

FILL:
APPROXIMATELY 768,000 C.Y. FILL MATERIAL.



VICINITY MAP



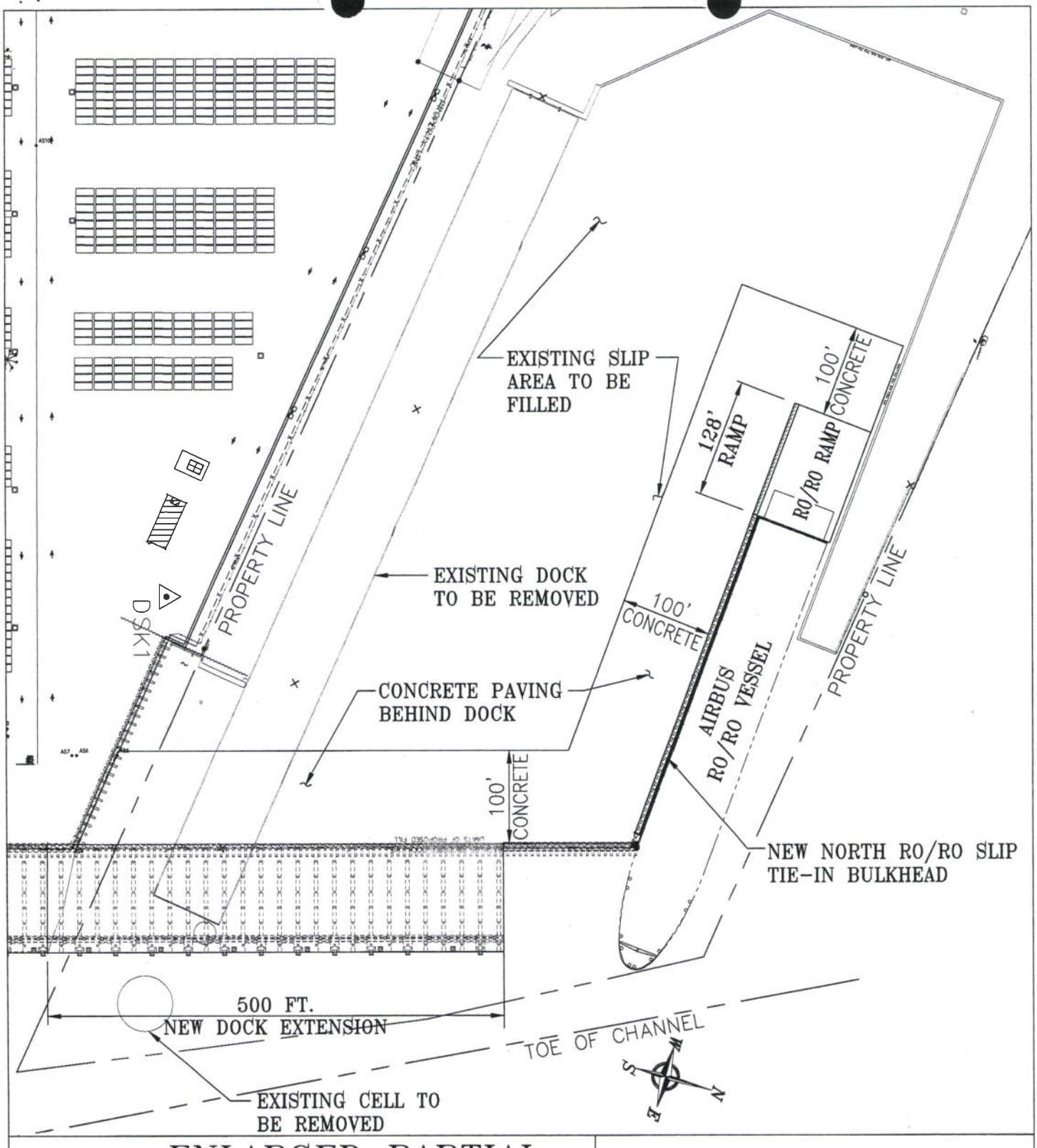
NEW SITE PLAN

SCALE: 1" = 300'-0"

0 150' 300' 600' 1200'

PROPOSED RO-RO DOCK & APMT FACILITY BERTH EXTENSION
IN : MOBILE RIVER
TRIBUTARY TO: MOBILE BAY
COUNTY OF: MOBILE STATE: ALABAMA
APPLICATION BY:
ALABAMA STATE PORT AUTHORITY
SHEET 1 OF 22 DATE: 01/2017

SAM-2017-00189-JSB
DEPT. OF THE ARMY



ENLARGED PARTIAL NEW SITE PLAN

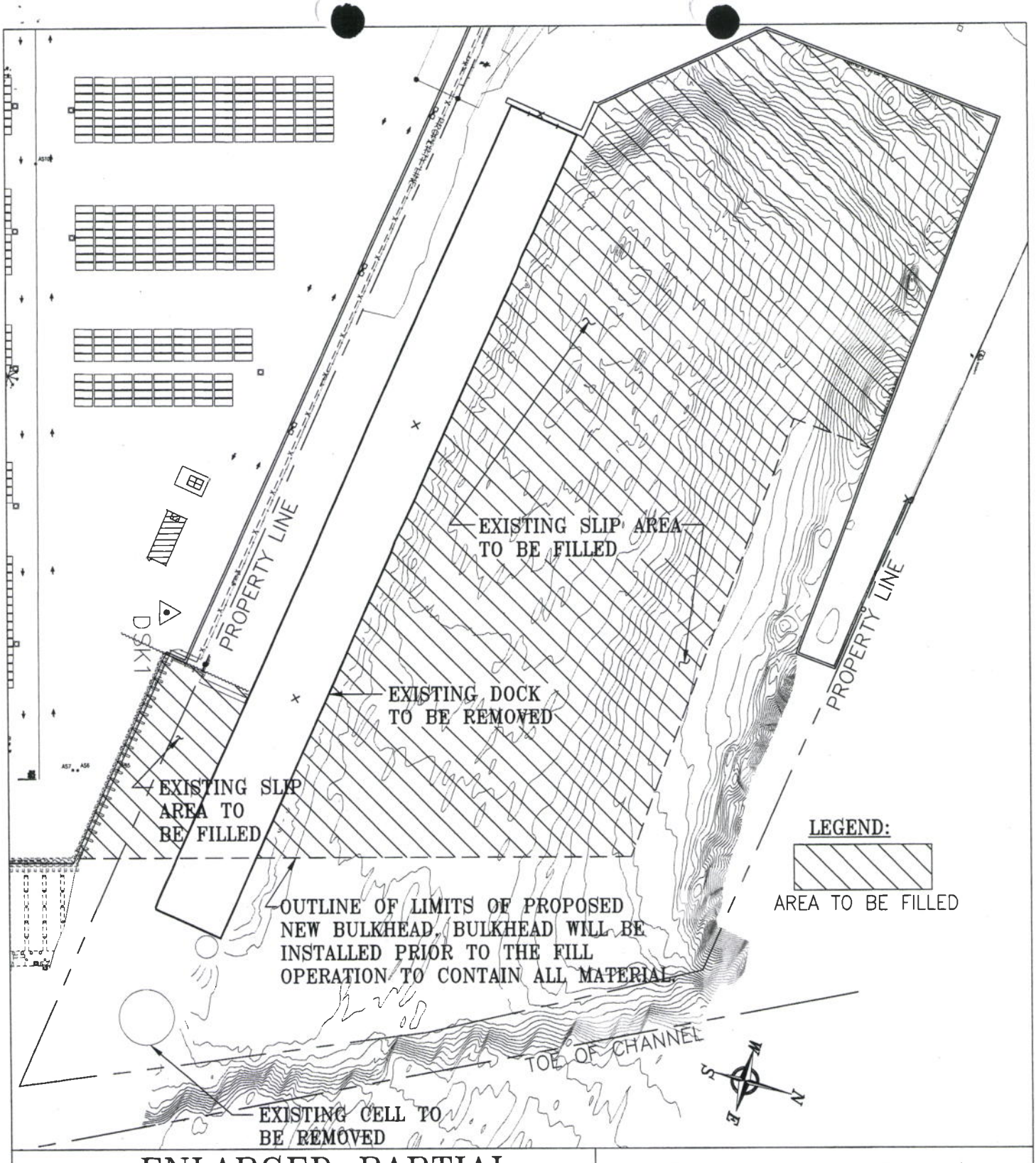
SCALE: 1" = 150'-0"

0 75' 150' 300' 450'

PROPOSED RO-RO DOCK & APMT FACILITY BERTH EXTENSION
IN : MOBILE RIVER
TRIBUTARY TO: MOBILE BAY
COUNTY OF: MOBILE STATE: ALABAMA
APPLICATION BY:
ALABAMA STATE PORT AUTHORITY

SHEET 2 OF 22 DATE: 01/2017

SAM-2017-00189-JKB
DEPT. OF THE ARMY



ENLARGED PARTIAL EXISTING SITE PLAN

SCALE: 1" = 150'-0"

0 75' 150' 300' 450'

PROPOSED RO-RO DOCK & APMT FACILITY BERTH EXTENSION

IN : MOBILE RIVER
TRIBUTARY TO: MOBILE BAY
COUNTY OF: MOBILE STATE: ALABAMA
APPLICATION BY:
ALABAMA STATE PORT AUTHORITY

SHEET 3 OF 22 DATE: 01/2017

SAM-2017-00189-JSB
DEPT. OF THE ARMY

MAIN DOCK EXTENSION TYPICAL SECTION

1"=30'

SCALE: 1" = 30'-0"

0 15' 30' 60' 90'

PROPOSED RO-RO DOCK & APMT FACILITY BERTH EXTENSION

IN : MOBILE RIVER

TRIBUTARY TO: MOBILE BAY

COUNTY OF: MOBILE STATE: ALABAMA

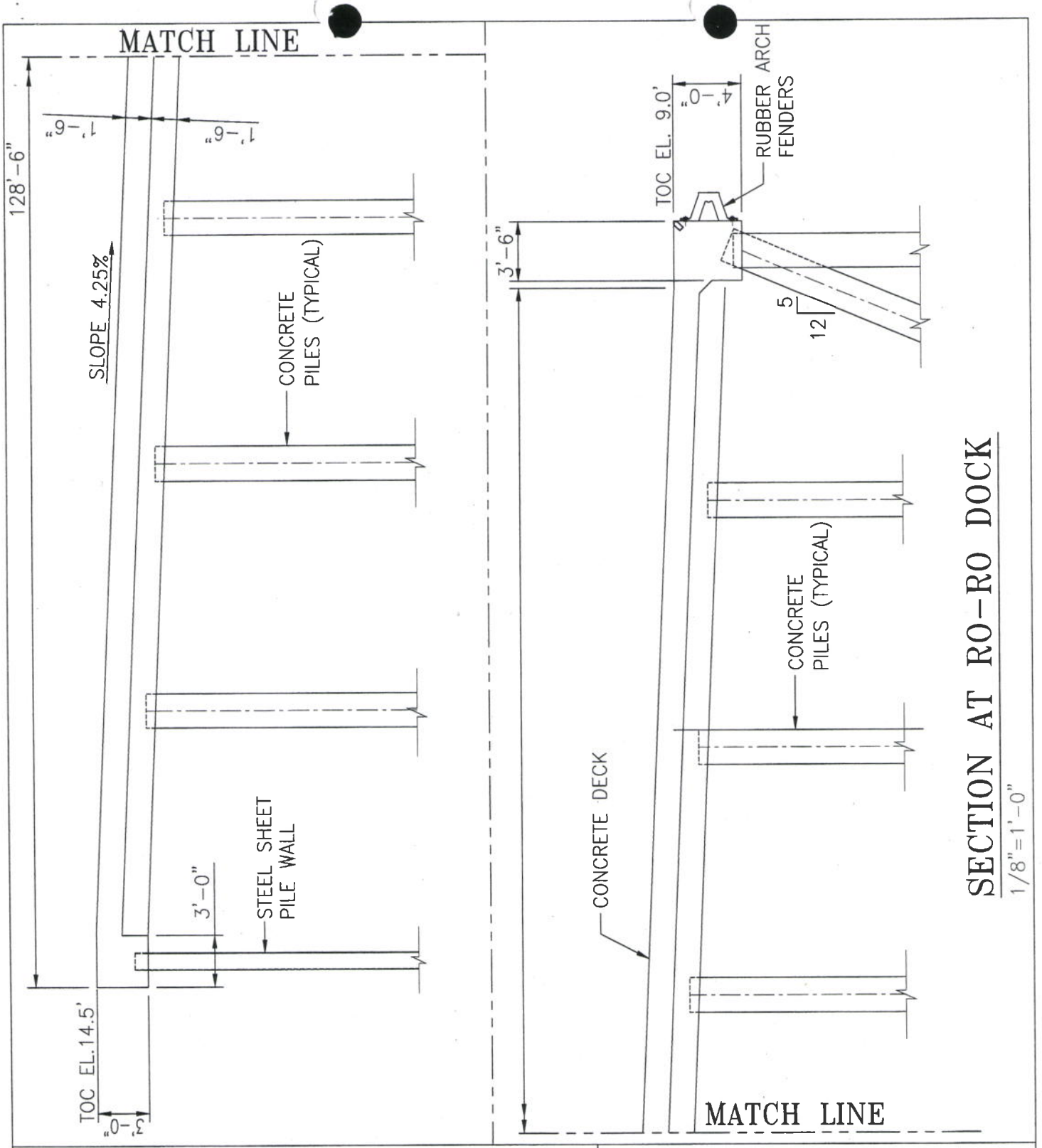
APPLICATION BY:

ALABAMA STATE PORT AUTHORITY

SHEET 4 OF 22 DATE: 01/2017

SAM-2017-00188-JSB
DEPT. OF THE ARMY

SAM-2017-00188-JSB
DEPT. OF THE ARMY



SECTION AT RO-RO DOCK

1/8"=1'-0"

8' 0 8' 16'

SCALE: 1/8" = 1'-0"

PROPOSED RO-RO DOCK & APMT FACILITY BERTH EXTENSION

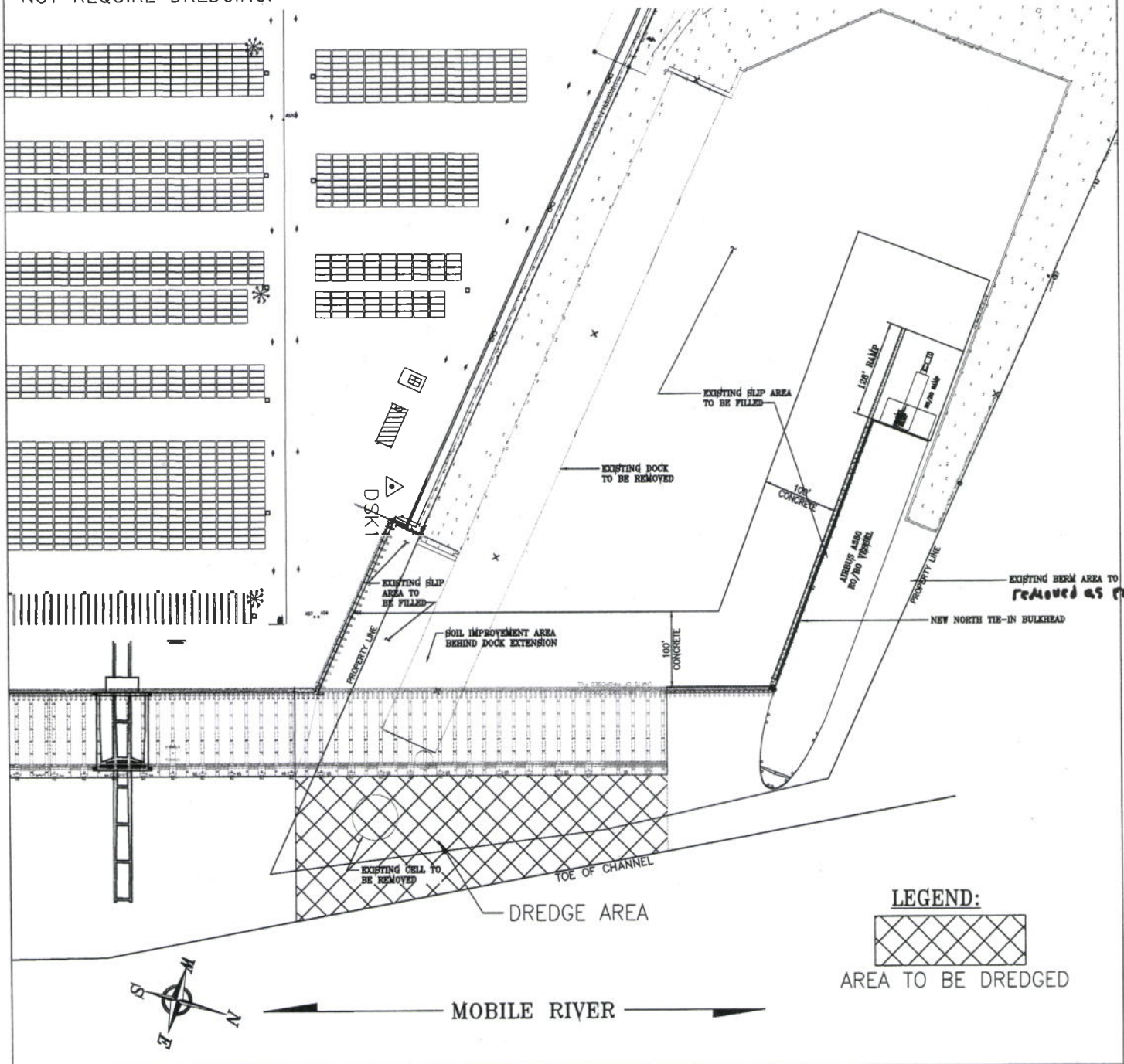
IN : MOBILE RIVER
TRIBUTARY TO: MOBILE BAY
COUNTY OF: MOBILE STATE: ALABAMA
APPLICATION BY:
ALABAMA STATE PORT AUTHORITY

SHEET 7 OF 22 DATE: 01/2017

SAM-2017-00189-JSB
DEPT. OF THE ARMY

NOTE

THE AREA TO BE DREDGED IS IRREGULAR IN SHAPE BUT WILL BE APPROXIMATELY 194ft. WIDE AND 500.4ft. LONG. THE EXISTING MUD-LINE ELEVATION FOR DREDGING WILL VARY FROM ~EL. (-)28.0 ft TO ~EL. (-)45.0ft. IT IS INTENDED TO DREDGE TO ~EL. (-) 45.0 ft. THE RO/RO AREA IS ALREADY SUFFICIENT DEPTH AND DOES NOT REQUIRE DREDGING.



DREDGE SITE

0 100' 200' 400' 600'

SCALE: 1" = 200'-0"

PROPOSED RO-RO DOCK & APMT FACILITY BERTH EXTENSION

IN : MOBILE RIVER

TRIBUTARY TO: MOBILE BAY

COUNTY OF: MOBILE STATE: ALABAMA

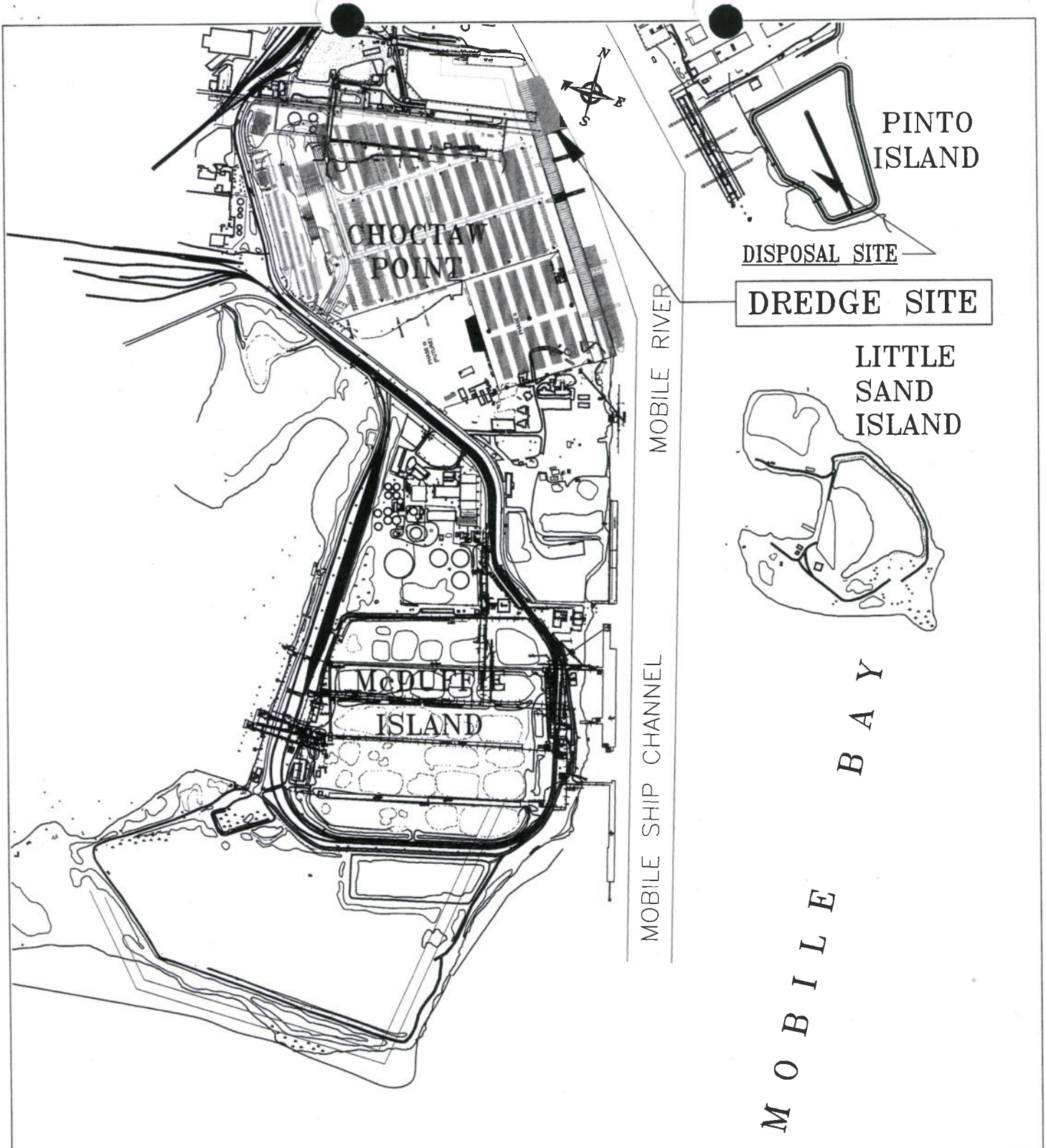
APPLICATION BY:

ALABAMA STATE PORT AUTHORITY

SHEET 8 OF 22 DATE: 01/2017

SAM-2017-00189-JSB

DEPT. OF THE ARMY



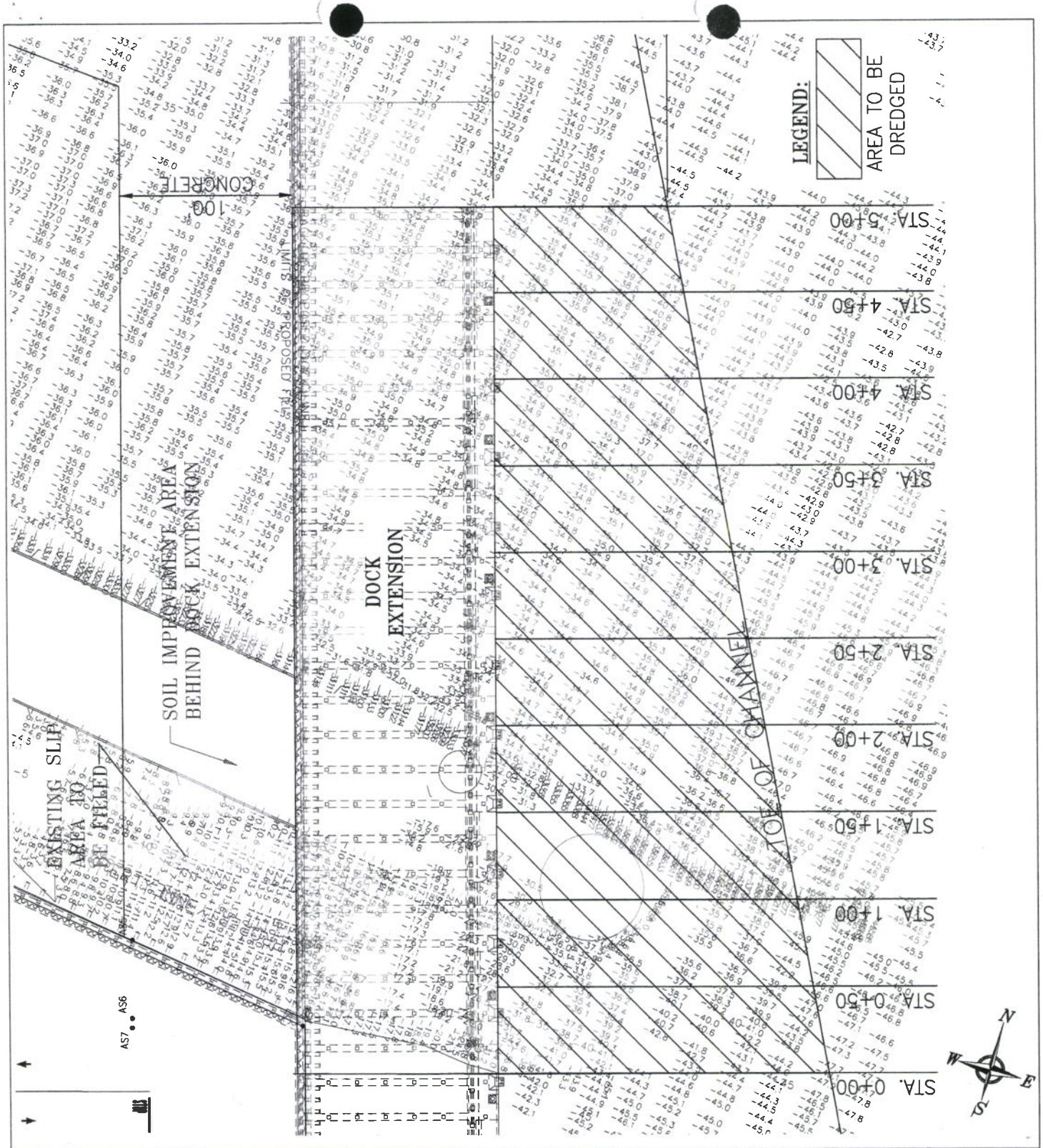
DISPOSAL SITE PLAN

SCALE: 1" = 1200'

0 600' 1200' 2400' 3600'

PROPOSED RO-RO DOCK & APMT FACILITY BERTH EXTENSION
IN : MOBILE RIVER
TRIBUTARY TO: MOBILE BAY
COUNTY OF: MOBILE STATE: ALABAMA
APPLICATION BY:
ALABAMA STATE PORT AUTHORITY
SHEET 9 OF 22 DATE: 01/2017

SAM- 2017 - 00189 - YEB
DEPT. OF THE ARMY



DREDGE PLAN

0 40' 80' 160' 240'

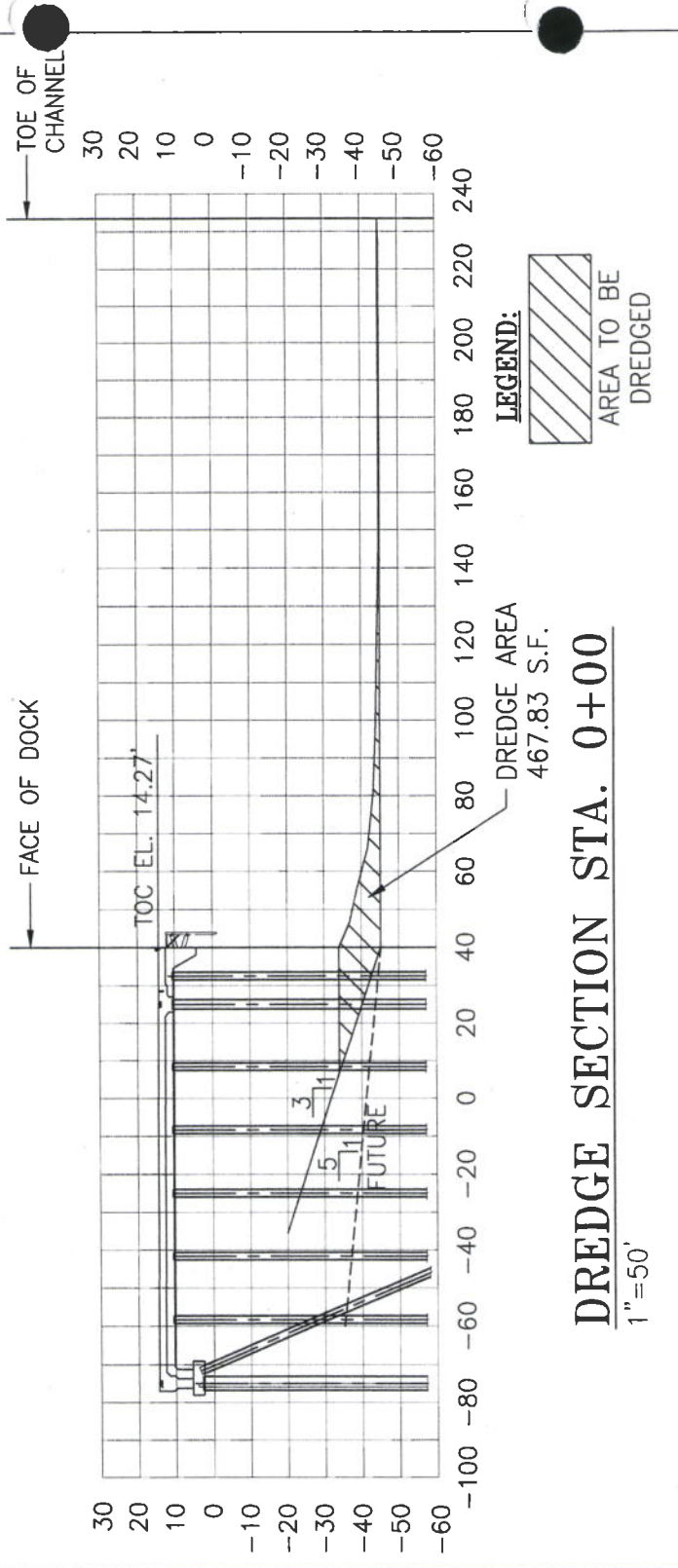
SCALE: 1" = 80'-0"

PROPOSED RO-RO DOCK & APMT FACILITY BERTH EXTENSION

IN : MOBILE RIVER
TRIBUTARY TO: MOBILE BAY
COUNTY OF: MOBILE STATE: ALABAMA
APPLICATION BY:
ALABAMA STATE PORT AUTHORITY

SHEET 10 OF 22 DATE: 02/2017

SAM- 2017 - 00189 - JGB
DEPT. OF THE ARMY



DREDGE SECTION STA. 0+00

1"=50'

STATION 0+00

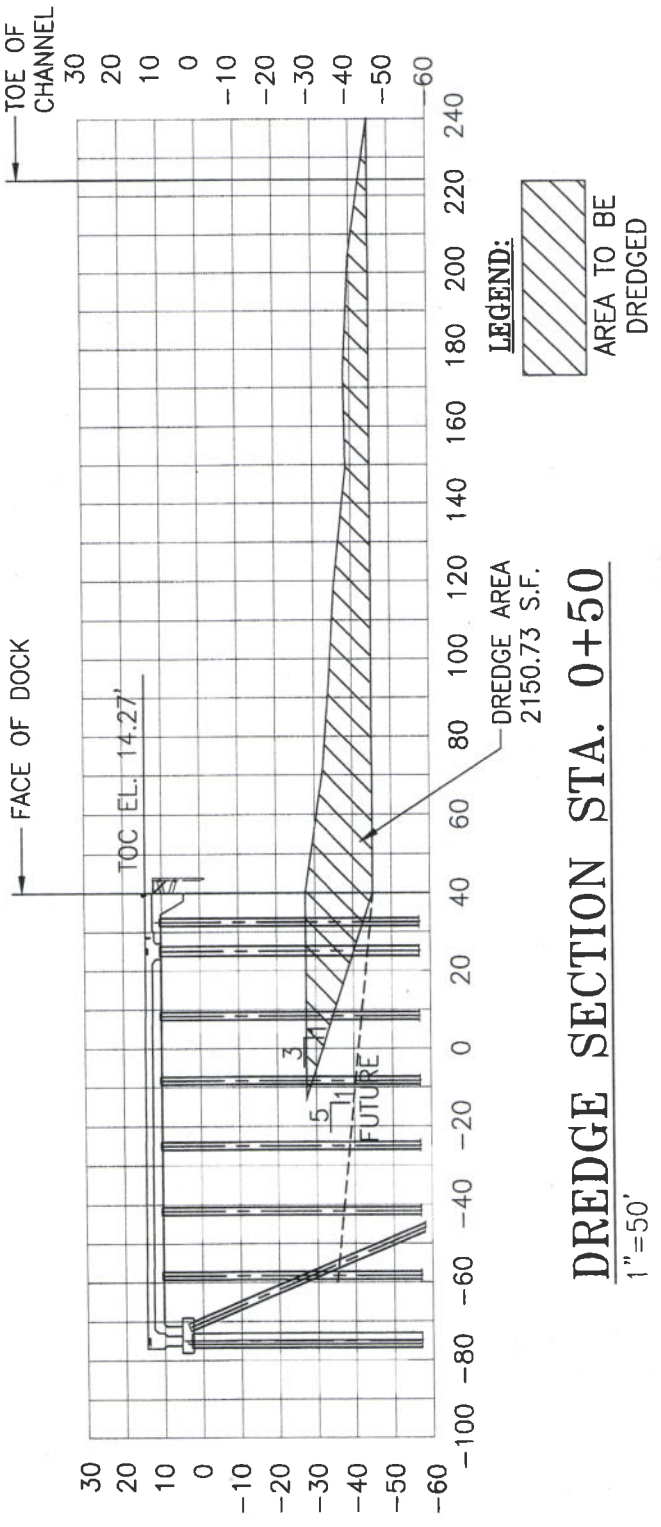
0 25' 50' 100' 150'

SCALE: 1" = 50'-0"

PROPOSED RO-RO DOCK &
APMT FACILITY BERTH EXTENSION
IN : MOBILE RIVER
TRIBUTARY TO: MOBILE BAY
COUNTY OF: MOBILE STATE: ALABAMA
APPLICATION BY:
ALABAMA STATE PORT AUTHORITY

SHEET 11 OF 22 DATE: 02/2017

SAM-2017-00189-JSB
DEPT. OF THE ARMY



DREDGE SECTION STA. 0+50

1"=50'

STATION 0+50

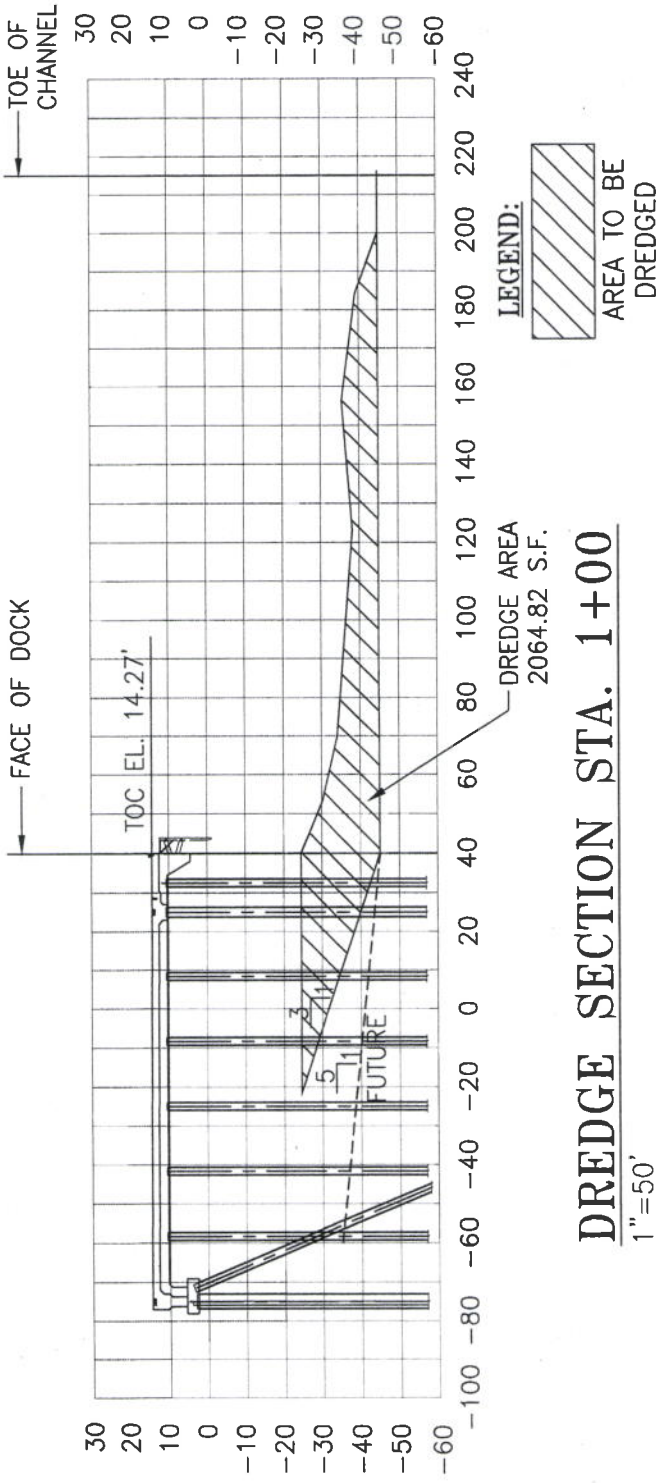
0 25' 50' 100' 150'

SCALE: 1" = 50'-0"

PROPOSED RO-RO DOCK &
APMT FACILITY BERTH EXTENSION
IN : MOBILE RIVER
TRIBUTARY TO: MOBILE BAY
COUNTY OF: MOBILE STATE: ALABAMA
APPLICATION BY:
ALABAMA STATE PORT AUTHORITY

SHEET 12 OF 22 DATE: 02/2017

SAM-2017-00189-JSD
DEPT. OF THE ARMY



DREDGE SECTION STA. 1+00

1"=50'

STATION 1+00

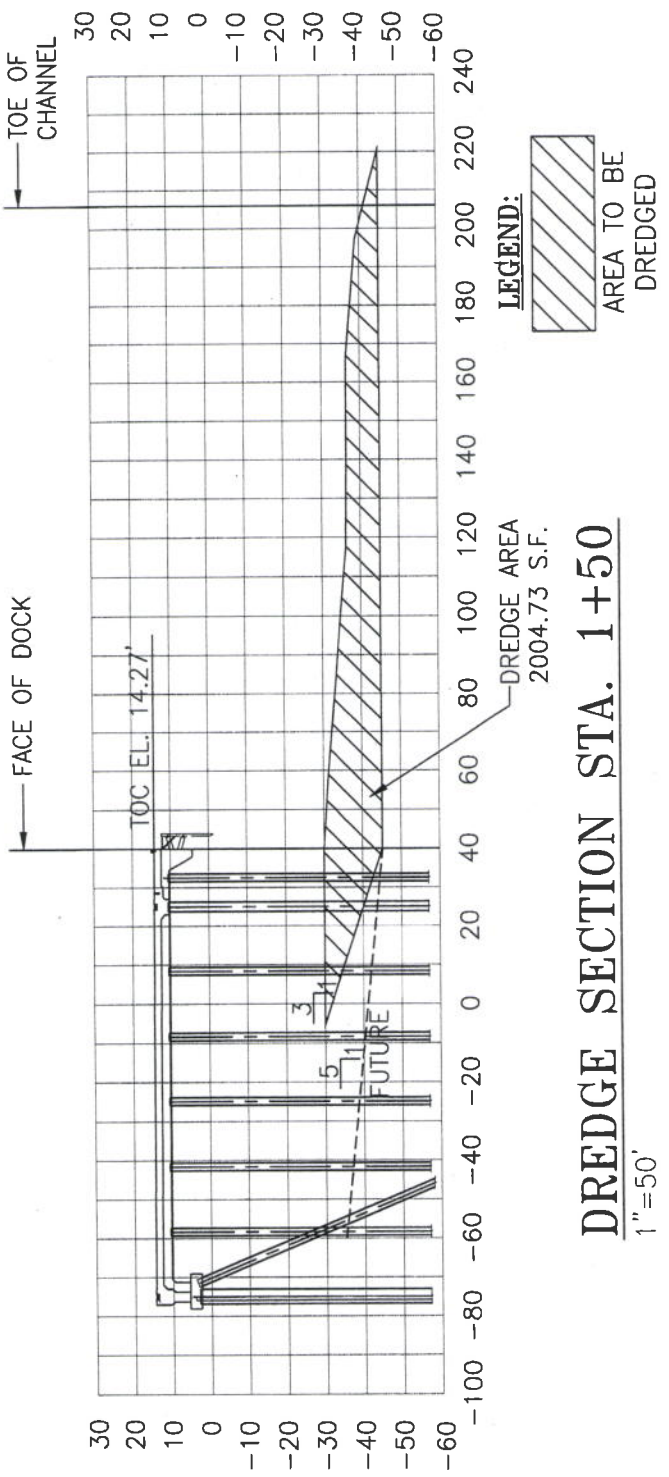
0 25' 50' 100' 150'

SCALE: 1" = 50'-0"

PROPOSED RO-RO DOCK &
APMT FACILITY BERTH EXTENSION
IN : MOBILE RIVER
TRIBUTARY TO: MOBILE BAY
COUNTY OF: MOBILE STATE: ALABAMA
APPLICATION BY:
ALABAMA STATE PORT AUTHORITY

SHEET 13 OF 22 DATE: 02/2017

SAM-2017-00189-JKB
DEPT. OF THE ARMY



DREDGE SECTION STA. 1+50

1"=50'

STATION 1+50

0 25' 50' 100' 150'

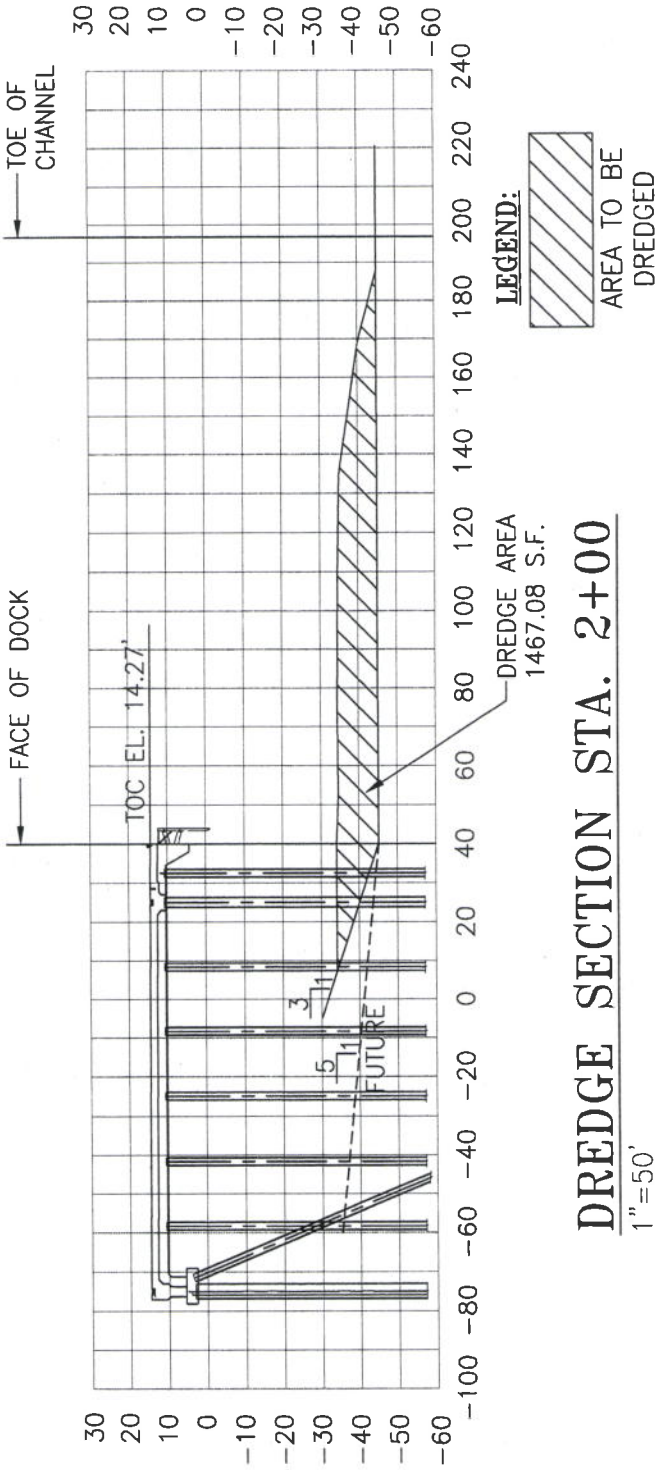
SCALE: 1" = 50'-0"

PROPOSED RO-RO DOCK & APMT FACILITY BERTH EXTENSION

IN : MOBILE RIVER
TRIBUTARY TO: MOBILE BAY
COUNTY OF: MOBILE STATE: ALABAMA
APPLICATION BY:
ALABAMA STATE PORT AUTHORITY

SHEET 14 OF 22 DATE: 02/2017

SAM-2017-00189-JKB
DEPT. OF THE ARMY



DREDGE SECTION STA. 2+00

1"=50'

STATION 2+00

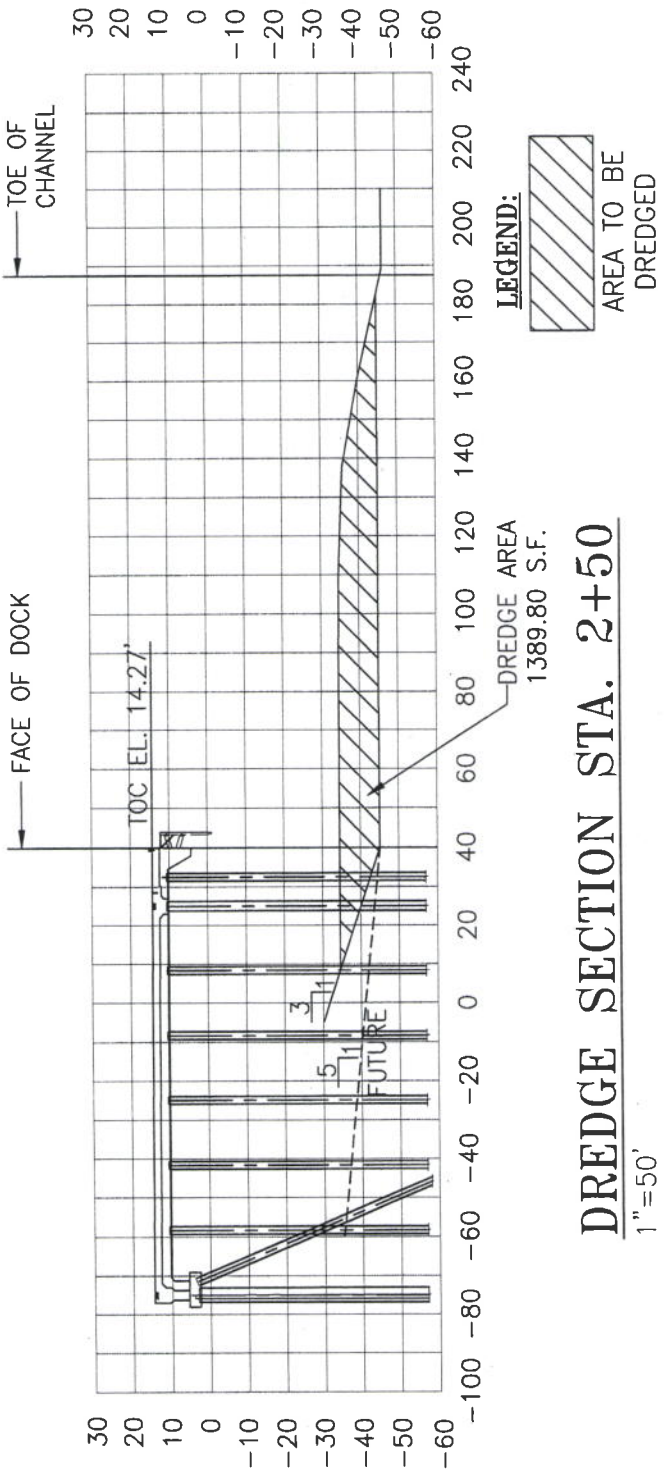
0 25' 50' 100' 150'

SCALE: 1" = 50'-0"

PROPOSED RO-RO DOCK &
APMT FACILITY BERTH EXTENSION
IN : MOBILE RIVER
TRIBUTARY TO: MOBILE BAY
COUNTY OF: MOBILE STATE: ALABAMA
APPLICATION BY:
ALABAMA STATE PORT AUTHORITY

SHEET 15 OF 22 DATE: 02/2017

SAM-2017-00189-JEB
DEPT. OF THE ARMY



DREDGE SECTION STA. 2+50

1"=50'

STATION 2+50

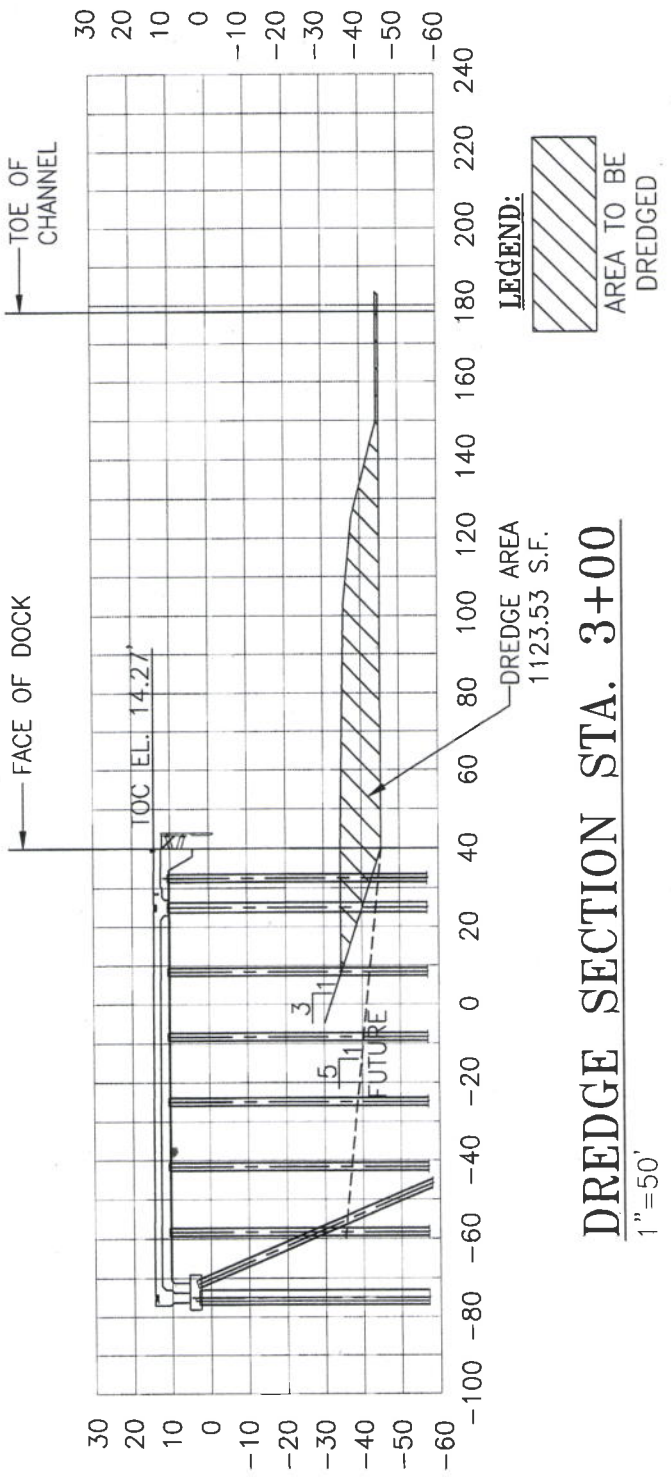
0 25' 50' 100' 150'

SCALE: 1" = 50'-0"

PROPOSED RO-RO DOCK & APMT FACILITY BERTH EXTENSION
IN : MOBILE RIVER
TRIBUTARY TO: MOBILE BAY
COUNTY OF: MOBILE STATE: ALABAMA
APPLICATION BY:
ALABAMA STATE PORT AUTHORITY

SHEET 16 OF 22 DATE: 02/2017

SAM-2017-00189-TSB
DEPT. OF THE ARMY



DREDGE SECTION STA. 3+00

1"=50'

STATION 3+00

0 25' 50' 100' 150'

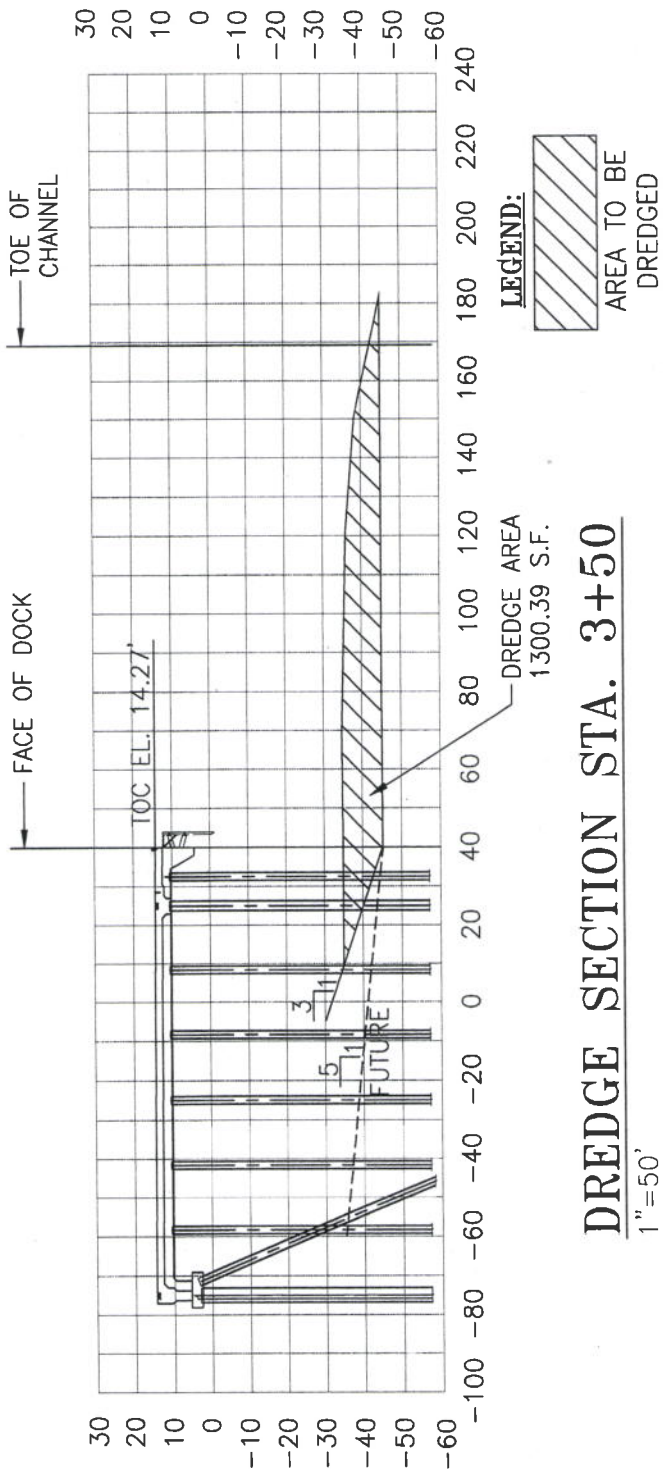
SCALE: 1" = 50'-0"

PROPOSED RO-RO DOCK & APMT FACILITY BERTH EXTENSION

IN : MOBILE RIVER
TRIBUTARY TO: MOBILE BAY
COUNTY OF: MOBILE STATE: ALABAMA
APPLICATION BY:
ALABAMA STATE PORT AUTHORITY

SHEET 17 OF 22 DATE: 02/2017

SAM-2017-00185-JSB
DEPT. OF THE ARMY



DREDGE SECTION STA. 3+50

1"=50'

STATION 3+50

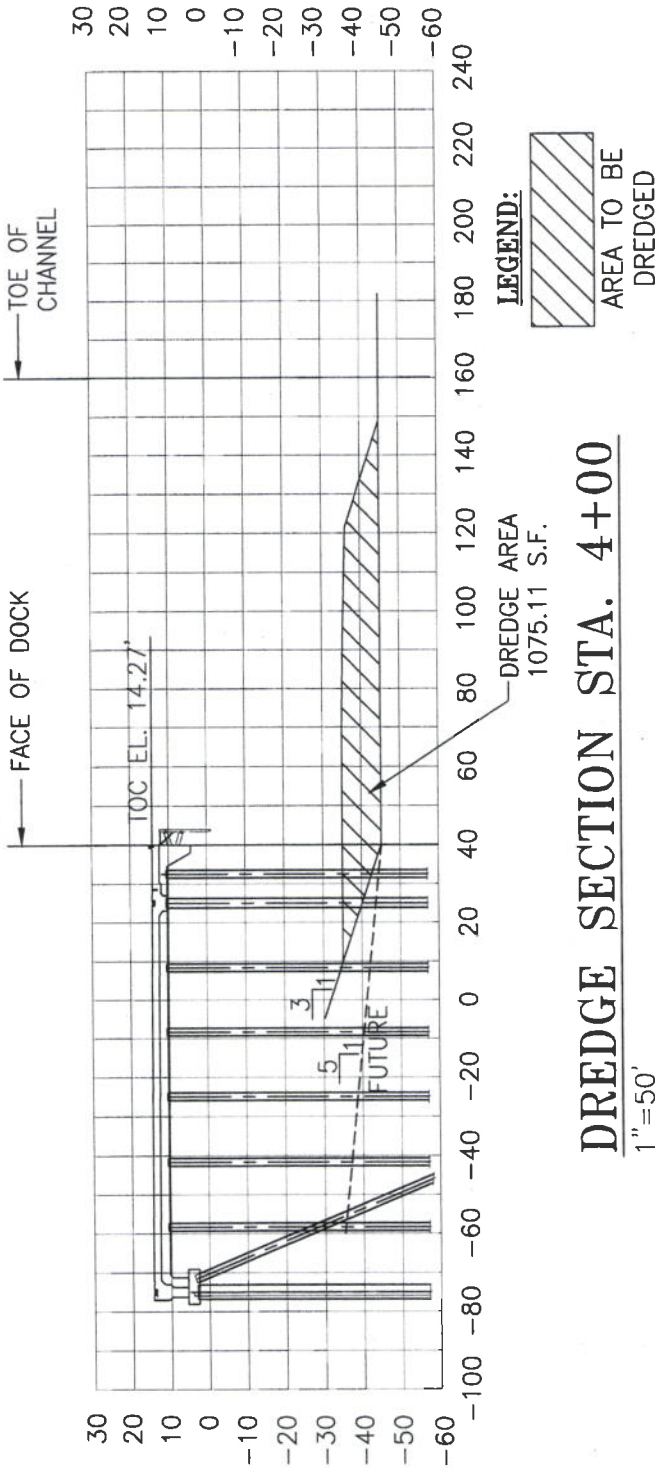
0 25' 50' 100' 150'

SCALE: 1" = 50'-0"

PROPOSED RO-RO DOCK &
APMT FACILITY BERTH EXTENSION
IN : MOBILE RIVER
TRIBUTARY TO: MOBILE BAY
COUNTY OF: MOBILE STATE: ALABAMA
APPLICATION BY:
ALABAMA STATE PORT AUTHORITY

SHEET 18 OF 22 DATE: 02/2017

SAM-2017-00189-JSB
DEPT. OF THE ARMY



DREDGE SECTION STA. 4+00

1"=50'

STATION 4+00

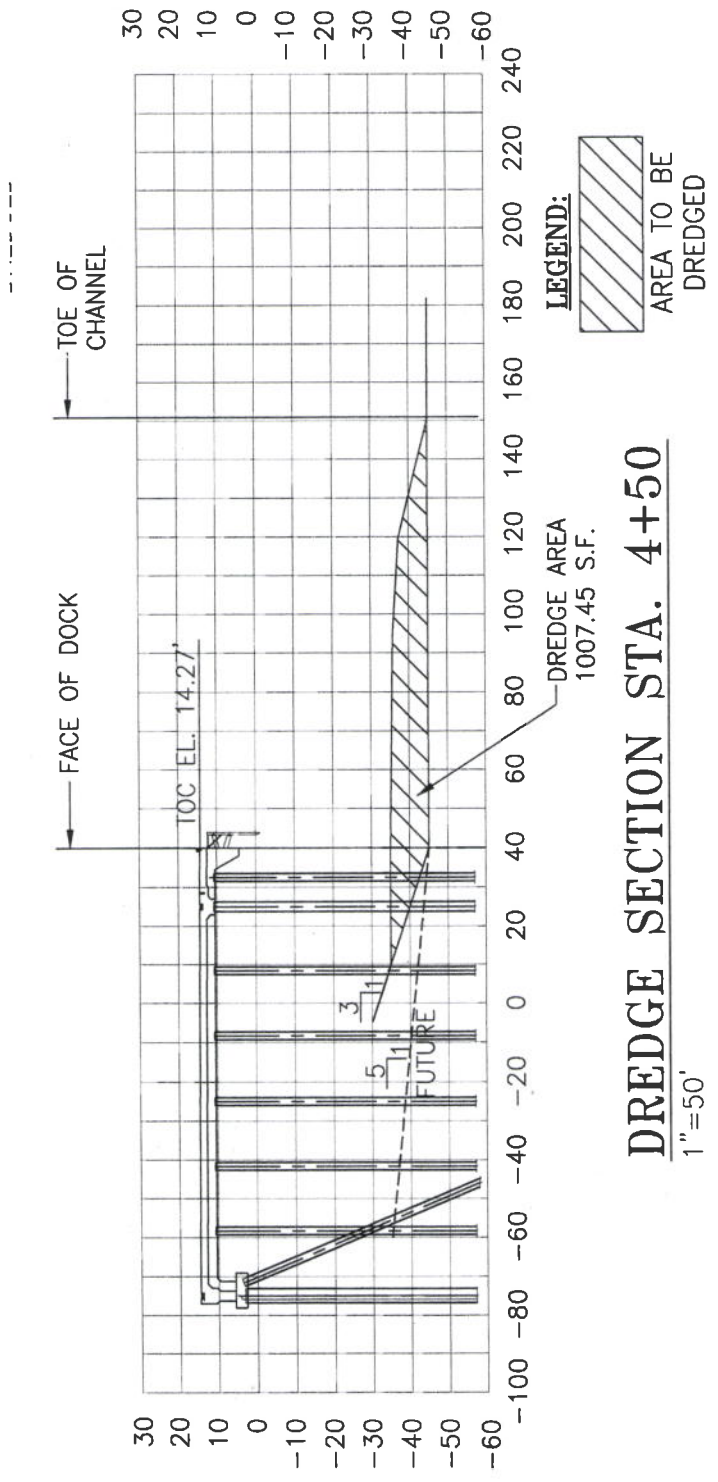
0 25' 50' 100' 150'

SCALE: 1" = 50'-0"

PROPOSED RO-RO DOCK &
APMT FACILITY BERTH EXTENSION
IN : MOBILE RIVER
TRIBUTARY TO: MOBILE BAY
COUNTY OF: MOBILE STATE: ALABAMA
APPLICATION BY:
ALABAMA STATE PORT AUTHORITY

SHEET 19 OF 22 DATE: 02/2017

SAM-2017-00189-JSB
DEPT. OF THE ARMY



DREDGE SECTION STA. 4+50

1"=50'

STATION 4+50

0 25' 50' 100' 150'

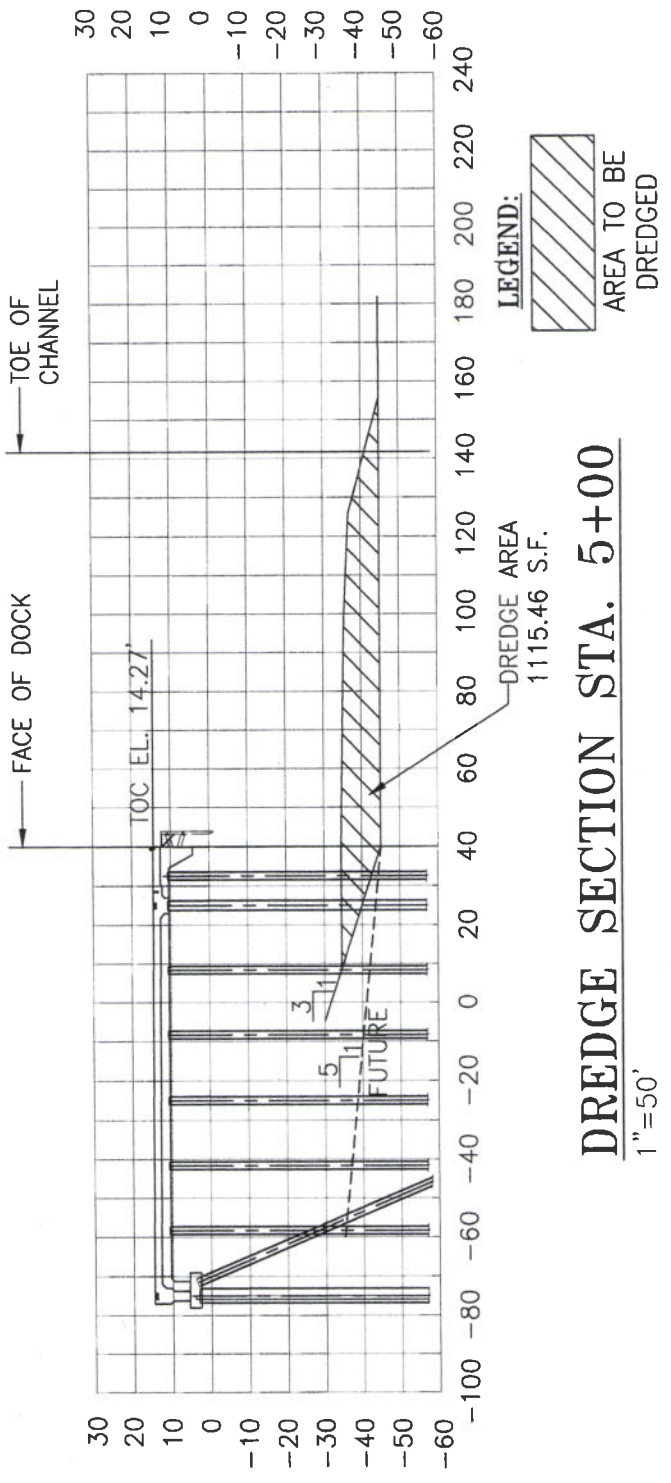
SCALE: 1" = 50'-0"

PROPOSED RO-RO DOCK & APMT FACILITY BERTH EXTENSION

IN : MOBILE RIVER
TRIBUTARY TO: MOBILE BAY
COUNTY OF: MOBILE STATE: ALABAMA
APPLICATION BY:
ALABAMA STATE PORT AUTHORITY

SHEET 20 OF 22 DATE: 02/2017

SAM-2017-00185-JKB
DEPT. OF THE ARMY



DREDGE SECTION STA. 5+00

1"=50'

STATION 5+00

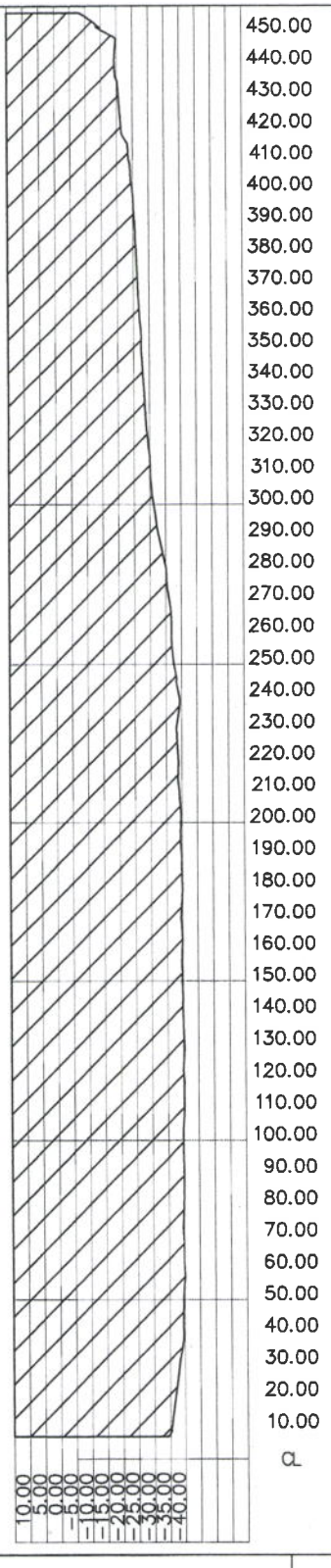
0 25' 50' 100' 150'

SCALE: 1" = 50'-0"

PROPOSED RO-RO DOCK &
APMT FACILITY BERTH EXTENSION
IN : MOBILE RIVER
TRIBUTARY TO: MOBILE BAY
COUNTY OF: MOBILE STATE: ALABAMA
APPLICATION BY:
ALABAMA STATE PORT AUTHORITY

SHEET 21 OF 22 DATE: 02/2017

SAM- 2017 - 00189 - JKD
DEPT. OF THE ARMY



TYPICAL FILL SECTION

1"=60'

SLIP FILL SECTION

0 30' 60' 120' 180'

SCALE: 1" = 60'-0"

PROPOSED RO-RO DOCK &
APMT FACILITY BERTH EXTENSION
IN : MOBILE RIVER
TRIBUTARY TO: MOBILE BAY
COUNTY OF: MOBILE STATE: ALABAMA
APPLICATION BY:
ALABAMA STATE PORT
AUTHORITY

SHEET 22 OF 22 DATE: 02/2017

SAM-2017-00189-JKB
DEPT. OF THE ARMY

LANCE R. LEFLEUR
DIRECTOR

KAY IVEY
GOVERNOR

Alabama Department of Environmental Management
adem.alabama.gov

1400 Coliseum Blvd. 36110-2400 ▪ Post Office Box 301463
Montgomery, Alabama 36130-1463
(334) 271-7700 ▪ FAX (334) 271-7950

July 31, 2017

Mr. Robert Harris
Alabama State Port Authority
C/O Mr. Stan Gottlieb, Agent
CB & I Port Services LLC
3600 Springhill Business Park, Suite 200
Mobile, Alabama 36608-1212

RE: State of Alabama Water Quality Certification (WQC) Pursuant to Clean Water Act (CWA) §401(a)
Alabama State Port Authority, Mobile, Mobile County, Alabama
U.S. Army Corps of Engineers (USACE) File No.: SAM-2017-00189-JEB
Alabama Department of Environmental Management (ADEM) Tracking Code: 2017-137-WQC-COE-IP

Dear Mr. Harris

Please read this letter carefully and in its entirety as it contains very important information about Alabama State Port Authority's project.

The ADEM received a copy of the Alabama State Port Authority's application to the USACE on January 31, 2017 and has completed its review of all submitted materials related to the Alabama State Port Authority's application to place fill in approximately 9.25 acres of waterbottoms at an existing berthing area for construction of a Roll-On Roll Off (Ro Ro) Berth for the handling of the Airbus supply vessel. Approximately 34,800yd^3 of dredge material will be removed from the adjacent area to support navigation. The ADEM understands the purpose of this project is to provide a berthing space for an Airbus materials ship as well as enhance the Port's container operation by providing simultaneous berthing of two post-panamax ships. The project will aid in the transportation of cargo between the United States and other countries.

Action pertinent to WQC is required by CWA §401(a)(1), 33 U.S.C. §1251, et. seq. If conducted in accordance with the conditions prescribed herein, there is reasonable assurance that the discharge resulting from the proposed activities will not violate applicable water quality standards established under §303 of the CWA and §22-22-9(g), Code of Alabama (1975). By this letter, the ADEM hereby notifies the Alabama State Port Authority and the USACE that CWA §401 WQC is **granted**. This WQC is limited to the approved activities as mentioned above and detailed in the final site plans attached to the July 13, 2017 USACE request for the ADEM's final determination regarding project certification. This WQC terminates coincidentally with the expiration of SAM-2017-00189-JEB. This WQC only addresses potential discharges to state waters resulting from approved activities. This WQC does not obviate the Alabama State Port Authority's responsibility to acquire all other needed permits nor does this WQC, in any way, imply that the proposed activities comply with the requirements of any other jurisdictional entity nor does it imply that the project can or will be approved by any other jurisdictional entity. Deviation from the approved project design **must not** be implemented without prior written notice and approval from the ADEM. Upon such notice, the Director may require the submission of additional information and or a new permit application, and additional fees may be required.

In recognition that projects are site specific in nature and conditions can change during project implementation, the ADEM reserves the right to require the submission of additional information or require additional management measures to be implemented, as necessary on a case-by-case basis, in order to ensure the protection of water quality and coastal resources.

ADEM certifies that there are no applicable effluent limitations under §301 and §302 nor applicable standards under §306 and §307 of the CWA in regard to the activities specified. However, regulations promulgated by the EPA requiring discharge permits for storm water runoff (i.e. NPDES permits) from individual and commercial facilities may be applicable. This WQC does not address the requirements of those regulations.

Birmingham Branch
110 Vulcan Road
Birmingham, AL 35209-4702
(205) 942-6168
(205) 941-1603 (FAX)

SAM-2017-00189-JEB
DEPT. OF THE ARMY
ADEM WQ-3 pages

Mobile Branch
2204 Perimeter Road
Mobile, AL 36615-1131
(251) 450-3400
(251) 479-2593 (FAX)

Mobile-Coastal
3664 Dauphin Street, Suite B
Mobile, AL 36608
(251) 304-1176
(251) 304-1189 (FAX)

By accepting this WQC from the State of Alabama, the Alabama State Port Authority must allow any duly authorized employee of the ADEM or its contractors, or Attorney General or District Attorney to enter upon the premises on which this project is occurring for the purposes of ascertaining compliance with ADEM's Administrative Code.

Liability and responsibility for compliance with the requirements of this WQC are not delegable by contract or otherwise. The Alabama State Port Authority must ensure that any agent, contractor, subcontractor, or other person employed by, under contract, or paid a salary by them understands the approved project design. Any violations of the ADEM's Administrative Code may be considered violations of this WQC and may result in an enforcement action.

This WQC does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to persons or property or invasion of other private rights, trespass, or any infringement of Federal, State, or local laws or regulations and in no way purports to vest in the Alabama State Port Authority title to lands now owned by the State of Alabama nor shall it be construed as acquiescence by the State of Alabama of lands owned by the State that may be in the Alabama State Port Authority's possession. This certification is not transferable without prior written notice and approval of the ADEM. Upon such notice, the Director may require submission of additional information and/or a new permit application, and additional fees may be required.

To protect water quality, the following conditions must be incorporated as part of SAM-2017-00189-JEB:

1. The Alabama State Port Authority and/or its assigns must implement and maintain appropriate, effective Best Management Practices (BMPs) for prevention and control of nonpoint sources of pollutants, including sediment loss, originating on site during and after site development activities to prevent fill material from entering wetland areas and/or State waters in which disposal of fill has not been authorized by the ADEM. Effective erosion control measures, sediment control measures, and other site pollution management practices are required to be designed, implemented, and continually maintained consistent with the Alabama Handbook for Erosion Control, Sediment Control, and Stormwater Management on Construction Sites and Urban Areas.

2. The Alabama State Port Authority and/or its assigns shall implement appropriate BMPs to minimize turbidity impacts to the maximum extent practicable. Turbidity generated by the activity must not cause substantial visible contrast nor result in an increase of more than fifty (50) Nephelometric turbidity units above background in state waters. If turbidity generated from project exceeds acceptable levels, the Alabama State Port Authority and/or its assigns must cease operations until turbidity is restored to acceptable levels and immediately notify the ADEM Mobile Coastal office at (251) 304-1176 of resultant work stoppage.

3. Upon the loss or failure of any treatment facility, BMP, or other management control measure as identified by responsible on-site staff during day to day construction operations or as identified by ADEM technical staff during facility inspections, the Alabama State Port Authority and/or its assigns shall, where necessary to maintain compliance with this WQC, suspend, cease, reduce, or otherwise control work/activity and all discharges until effective treatment is restored and immediately notify the ADEM Mobile-Coastal office at (251) 304-1176 of resultant work stoppage.

4. Effective solid waste management practices shall be implemented at the site. All construction debris (e.g. excess construction materials, packaging material, trash, garbage, etc.) must be contained while on-site and regularly removed and disposed of in an approved manner. There shall be regular monitoring and removal of any construction debris or wastes from wetland areas, State waters, or adjacent offsite areas.

5. All materials used as fill shall be non-toxic, non-leaching, non-acid forming, and free of solid waste or other debris.

And finally, upon receipt of the USACE permit, make careful note of the expiration date. Expired permits cannot simply be reactivated or extended. If the project will not be completed prior to the expiration of the permit, the Alabama State Port Authority must notify the USACE and the ADEM - preferably 60 days before the permit expiration date. If the permit expires before regulated activities authorized therein are completed, a new permit application will have to be submitted to the resource agencies for a full review which will include but not be limited to: public noticing, resolution of public comments, and remittance of new project review fees. In this circumstance, work may have to cease until a new permit has been issued.

Contact the Mobile-Coastal office anytime with questions. Always include the ADEM tracking code above when corresponding on this matter. C. Allen Phelps is the Mobile-Coastal office contact for this project; he may be reached by phone at 251.304.1176 or by e-mail at cap@adem.alabama.gov.

Sincerely,

Anthony Scott Hughes, Chief
Field Operations Division

cc: Eric Buckelew, USACE (Sent Via Email Only: james.e.buckelew@usace.army.mil)
Rosemary Hall, USEPA (Sent Via Email Only: Hall.Rosemary@epa.gov)
Phillip Hinesley, ADCNR (Sent Via Email Only: Phillip.Hinesley@dcnr.alabama.gov)

ASH/jsb/cap

File: CZCERT/683

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July 31, 2017

Mr. Robert Harris
Alabama State Port Authority
C/O Mr. Stan Gottlieb, Agent
CB & I Port Services LLC
3600 Springhill Business Park, Suite 200
Mobile, Alabama 36608-1212

RE: State of Alabama Coastal Consistency Concurrence
Alabama State Port Authority, Mobile, Mobile County, Alabama
U.S. Army Corps of Engineers (USACE) File No.: SAM-2017-00189-JEB
Alabama Department of Environmental Management (ADEM) Tracking Code: 2017-137-FC-FLP-COE-IP

Dear Mr. Harris:

Please read this letter carefully and in its entirety as it contains very important information about the Alabama State Port Authority's project.

The ADEM received the Alabama State Port Authority's certification of coastal consistency on January 31, 2017 and has completed its review of all submitted materials related to the Alabama State Port Authority's application to place fill in approximately 9.25 acres of waterbottoms at an existing berthing area for construction of a Roll-On Roll-Off (Ro Ro) Berth for the handling of the Airbus supply vessel. Approximately 34,800yd^3 of dredge material will be removed from the adjacent area to support navigation. The ADEM understands the purpose of this project is to provide a berthing space for an Airbus materials ship as well as enhance the Port's container operation by providing simultaneous berthing of two post-panamax ships. The project will aid in the transportation of cargo between the United States and other countries. Public noticing requirements of Title 15C.F.R. §930.61 have been completed.

As required by Title 15C.F.R. §930.62, by this letter the ADEM hereby notifies the Alabama State Port Authority and the USACE of its **concurrence** with the Alabama State Port Authority's coastal consistency certification, conditional upon continued compliance with the Alabama Coastal Area Management Program (ACAMP). This concurrence is limited to the approved activities as described in the final site plans attached to the July 13, 2017 USACE request for ADEM's coastal consistency decision. Any deviation from the approved project design must not be implemented without prior written notice and approval from the ADEM as the Alabama State Port Authority may be required – pursuant to Title 15C.F.R §930.66 - to prepare and submit for review a supplemental coastal consistency certification. In such a case, the Director may require the submission of additional information and or a new permit application, and additional fees may be required. This coastal consistency concurrence only addresses the approved activities which are also regulated under the enforceable policies of the ACAMP as codified in ADEM Admin. Code R. 335-8 and does not obviate the Alabama State Port Authority's responsibility to acquire all other needed permits nor does this concurrence, in any way, imply that the proposed activities comply with the requirements of any other jurisdictional entity nor does it imply that the project can or will be approved by any other jurisdictional entity.

In recognition that projects are site specific in nature and conditions can change during project implementation, the ADEM reserves the right to require the submission of additional information or require additional management measures to be implemented, as necessary on a case-by-case basis, in order to ensure the protection of water quality and coastal resources.

Pursuant to Title 15C.F.R §930.65, the ADEM and the USACE cooperate in the effort to monitor authorized activities to verify that those activities continue to conform to both federal and state requirements. By accepting this concurrence, the Alabama State Port Authority

Birmingham Branch
110 Vulcan Road
Birmingham, AL 35209-4702
(205) 942-6168
(205) 941-1603 (FAX)

SAM-2017-00189-JEB
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2204 Perimeter Road
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251 450-3400
251 479-2593 (FAX)

Mobile-Coastal
3664 Dauphin Street, Suite B
Mobile, AL 36608
(251) 304-1176
(251) 304-1189 FAX

must allow any duly authorized employee of the ADEM or its contractors, or Attorney General or District Attorney to enter upon the premises on which this project is occurring for the purposes of ascertaining compliance with ADEM's Administrative Code. Any violations of the ADEM's Administrative Code may be considered violations of this concurrence and may result in an enforcement action.

Liability and responsibility for compliance with this concurrence are not delegable by contract or otherwise. The Alabama State Port Authority must ensure that any agent, contractor, subcontractor, or other person employed by, under contract, or paid a salary by them understands the approved project design.

This concurrence does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to persons or property or invasion of other private rights, trespass, or any infringement of Federal, State, or local laws or regulations and in no way purports to vest in the Alabama State Port Authority title to lands now owned by the State of Alabama nor shall it be construed as acquiescence by the State of Alabama of lands owned by the State that may be in the Alabama State Port Authority's possession. This concurrence is not transferable without prior written notice and approval of the ADEM. Upon such notice, the Director may require submission of additional information and/or a new permit application, and additional fees may be required.

To ensure continued compliance with the ACAMP, the following conditions must be incorporated as part of **SAM-2017-00189-JEB:**

1. Pursuant to the requirements of ADEM Admin. Code r. 335-8-2-.02(5), all materials used as fill shall be non-toxic, non-leaching, non-acid forming, and free of solid waste or other debris.

2. Pursuant to the requirements of ADEM Admin. Code r. 335-8-2-.01, should cultural resources be encountered during the course of conducting the activities authorized herein, construction activities must cease and the Alabama State Port Authority and/or its contractors shall notify the ADEM and the Alabama Historical Commission immediately of any historical, cultural, or archaeological resources that are discovered. This condition should be placed on the site construction plans to ensure contractors are aware of it.

And finally, upon receipt of the USACE permit, make careful note of the expiration date. Expired permits cannot simply be reactivated or extended. If the project will not be completed prior to the expiration of the permit, the Alabama State Port Authority must notify the USACE and the ADEM - preferably 60 days before the permit expiration date. If the permit expires before regulated activities authorized therein are completed, a new permit application will have to be submitted to the resource agencies for a full review which will include but not be limited to: public noticing, resolution of public comments, and remittance of new project review fees. In this circumstance, work may have to cease until a new permit has been issued.

Contact the Mobile-Coastal office anytime with questions. Always include the ADEM tracking code above when corresponding on this matter. C. Allen Phelps is the Mobile-Coastal office contact for this project; he may be reached by phone at 251.304.1176 or by e-mail at cap@adem.alabama.gov.

Sincerely,

Anthony Scott Hughes, Chief
Field Operations Division

cc: Eric Buckelew, USACE (Sent Via Email Only: james.e.buckelew@usace.army.mil)
Phillip Hinesley, ADCNR (Sent Via Email Only: Phillip.Hinesley@dcnr.alabama.gov)
Rosemary Hall, USEPA (Sent Via Email Only: Hall.Rosemary@epa.gov)

ASH/jsb/cap

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