



Alabama Port Authority
Specification Booklet

Project Name Choctaw Point Container Terminal – Phase V Dock Extension

Location Mobile, Alabama

Project # 11411

Task # 6

FEBRUARY 2026

SPECIFICATIONS AND CONTRACT DOCUMENTS



PORT OF MOBILE
ALABAMA PORT AUTHORITY

Doug Otto, Director & CEO

Kay Ivey, Governor of Alabama

ISSUED BY

Engineering Services Department



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BID DOCUMENTS

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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 2:30 P.M., on April 9, 2026. Sealed bid proposals can also be hand delivered from 2:45 P.M. to 3:00 P.M., on April 9, 2026 to the Alabama Port Authority in the International Trade Center building, 250 North Water Street, 1st Floor – Lyons Conference Room (next to the 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 11411
CHOCTAW POINT CONTAINER TERMINAL
PHASE V DOCK EXTENSION
MOBILE, ALABAMA**

The work consists principally of providing bonds, labor, materials, equipment, and supervision necessary for the addition of the Phase V Dock Extension Structure between the South end of the existing APM Container Berth and the North End of the existing McDuffie No 3 berth. The work will be inclusive of all required demolition and removal work of existing marine structures in the Phase V Dock Extension limits of construction as well as indicated structure in the land area behind the Phase V Dock structure. The Phase V Dock structure will consist of but not be limited to steel pipe z piling concrete piling concrete work, crane rail installations, vessel fendering and mooring systems, crane and shore power requirement, electrical distribution, grading, drainage, lighting and fencing requirements all as indicated in 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, Brandon Taylor (251) 441-7243 (email to brandon.taylor@alports.com). For technical information, please contact the APTIM Project Manager, Mike Dye at (251) 380-1224 (email to mike.dye@aptim.com).

A Pre-Bid Meeting is scheduled for March 2, 2026 at 2:00 P.M. in the Killian Room with a site visit to follow. **Bidder attendance is MANDATORY.** At the conclusion of the Pre-Bid Meeting, a site visit will be offered to allow prospective bidders to observe the existing conditions of the project site on the McDuffie Terminal. Access to the site will require a TWIC card or Port Access Badge (please refer to Division III, Item SP-17). All bidders not possessing proper access credentials must contact the APA PM at least one week in advance to arrange an escort. Availability to escort personnel is limited. **No same day escorts will be provided.** All escorted individuals are required



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to have a valid state or federal identification. All vehicles entering APA properties are required to have proof of vehicle registration and insurance.

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 and 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 3:00 P.M., April 9, 2026, in the International Trade Center Building, 250 North Water Street, first floor – Lyons Conference Room (next to the 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.



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INSTRUCTIONS TO BIDDERS

1.0 ADDENDA AND INTERPRETATIONS

All questions about the meaning or intent of the Contract Documents shall be submitted to the Engineer in writing on or before March 27, 2026. 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-06
- e) Attach a copy of the State Contractor's License to Proposal
- f) Certificate of Compliance (pages 11-12 of this document)
- g) Completed HUD Grant Forms to be submitted with bid

One copy of Items (a) through (g) 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.



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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 11411
CHOCTAW POINT CONTAINER TERMINAL – PHASE V DOCK EXTENSION
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-03.



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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

ITEM	DESCRIPTION	APPROX. QUANTITY	UNIT PRICE	AMOUNT
1	Project Bonds & Insurance	Lump Sum	L.S.	
2	Mobilization	Lump Sum	L.S.	
I. DEMOLITION				
3	Removal of Barge Loader and Associated Conveyor C	Lump Sum	L.S.	
4	Removal of Required Bank RipRap and other obstructions	Lump Sum	L.S.	
5	Removal of AZ14 Sheetpile Wall	Lump Sum	L.S.	
6	Removal of Yard 4 Water Cannons Sluice Channels and Sump Pit	Lump Sum	L.S.	
7	Removal of McDuffie Designated Building Structures	Lump Sum	L.S.	
8	Removal of Substation Building	Lump Sum	L.S.	
9	Removal of Landside Conveyors, Stacker and Foundations	Lump Sum	L.S.	
I. SUBTOTAL DEMOLITION				
II. DOCK CONSTRUCTION				
10	Removal/Demolition Work	Lump Sum		
11	Furnish Combination Wall	2602 Tons	/Ton	
11a	Installation of Combination Wall	1235 L.F.	/Ft.	



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ITEM	DESCRIPTION	APPROX. QUANTITY	UNIT PRICE	AMOUNT
12	Furnish and Install One (1) - 30" Square Probe Pile	135 L.F.	/Ft.	
12a	Static Pile Load Test (30" square)	1 Test	/Test	
12b	Furnish Concrete Bearing Piles (30" Square)	17621 L.F.	/Ft.	
12c	Install Concrete Bearing Piles (30" square)	17621 L.F.	/Ft.	
13	Furnish and Install Seven (7) - 24" Square Probe Piles	889 L.F.	/Ft.	
13a	Static Pile Load Test (24" square)	1 Test	/Test	
13b	Furnish Concrete Bearing Piles (24" Square)	52704 L.F.	/Ft.	
13c	Install Concrete Bearing Piles (24" square)	52704 L.F.	/Ft.	
14	Furnish Concrete Batter Piles 6:12 (24" Square)	25594 L.F.	/Ft.	
14a	Install Concrete Batter Piles 6:12 (24" square)	25594 L.F.	/Ft.	
15	Furnish Concrete Batter Piles 5:12 (24" square)	2208 L.F.	/Ft.	
15a	Install Concrete Batter Piles 5:12 (24" square)	2208 L.F.	/Ft.	
16	Concrete Work			
16a	Landside Crane Rail Beam and Pile Cap	3375 C.Y.	/CY	
16b	Waterside Crane Rail Beam	1077 C.Y.	/CY	
16c	Transverse Beams	3976 C.Y.	/CY	
16d	Deck	6421 C.Y.	/CY	
16e	Deck WS of WS Rail & Fender Haunch	2737 C.Y.	/CY	
16f	Furnish Closure Wall 2	80 Tons	/Ton	
16g	Install Closure Wall 2	45 L.F.	/Ft.	
16h	Southern Closure Wall Cap	20 C.Y.	/CY	
16i	Furnish Closure Wall 3	230 Tons	/Ton	
16j	Install Closure Wall 3	125 L.F.	/Ft.	
16k	Area Paving North Dock Tie In	213 C.Y.	/CY	



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ITEM	DESCRIPTION	APPROX. QUANTITY	UNIT PRICE	AMOUNT
17	Crane Rail System	2600 L.F.	/Ft.	
18	Fender System	32 Systems	/System	
19	Bollards (90 Ton)	16 Bollards	/Bollard	
20	Bollards (225 Ton)	5 Bollards	/Bollard	
21	Timber Curb	1300 L.F.	/Ft.	
22	Water System	Lump Sum		
23	Cable Protection System	Lump Sum		
24	Pavement Markings	Lump Sum		
25	Drain Line Penetrations and Pipes (3) 42" Drain Pipe as noted on Drawings	Lump Sum		
II. SUBTOTAL DOCK CONSTRUCTION				
III. BACKLAND TRANSIT AREA				
26	EARTHWORK			
26a	Excavation	10000 C.Y.	/CY	
26b	Fill	7500 C.Y.	/CY	
27	Crushed Aggregate Base	3012 C.Y.	/CY	
28	Concrete Paving	5245 C.Y.	/CY	
29	Fencing	1690 LF	/LF	
30	Yard 4 Revised Drainage			
30a	Coal Removal	30000 C.Y.	CY	
30b	Select Fill	37000 C.Y.	CY	
30c	Grading	Lump Sum		
30d	Equipment Removal	Lump Sum		
30e	Pipe Plugging	Lump Sum		
30f	Large Drainage Box	1 EA	EA	
30g	42" Drainage Pipe	60 LF	LF	
30h	42" Drain Line Penetration	Lump Sum		
30i	Dock 3 Inlet and Drain Line Extension	Lump Sum		
III. SUBTOTAL BACKLAND TRANSIT AREA				
IV. ELECTRICAL DISTRIBUTION BASE				
31	Main Switchgear			
31a	30MVA, 22.9kVA Main Switchgear	2 EA	EA	
31b	Crane Substation C3	1 EA	EA	



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ITEM	DESCRIPTION	APPROX. QUANTITY	UNIT PRICE	AMOUNT
31c	Crane Substation C4	1 EA	EA	
31d	Main Switchgear Concrete Foundations	260 CY	CY	
31e	Main Switchgear Fencing	360 LF	LF	
32	Trayer Switch Area			
32a	13.2kV Trayer Switches	4 EA	EA	
32b	Concrete Foundations	65 CY	CY	
32c	Fencing with Gates	280 LF	LF	
32d	Permanent Ductbank (Main Switchgear to Trayer Switch Area)	1800 LF	LF	
32e	Temporary Ductbank (Trayer Switch Area to Main Switchgear)	1200 LF	LF	
32f	Electrical Conductors and Grounding	Lump Sum		
32g	Temporary Perimeter Lighting Conduit	1200 LF	LF	
32h	Electrical Manholes	9 EA	EA	
32i	Communication Manholes	6 EA	EA	
32j	Crane Manholes	4 EA	EA	
32k	Crane Ductbanks	1700 LF	LF	
32l	15 KVA, 13.2 KV-480/277V Transformer	1 EA	EA	
32m	15 KV-600A Fused Safety Disconnect	1 EA	EA	
32n	Distribution Panel w/ Main Breaker	1 EA	EA	
32o	Temporary Lightpoles	7 EA	EA	
IV. SUBTOTAL ELECTRICAL DISTRIBUTION - BASE				
33	All Remaining Items Necessary for a complete job installation	Lump Sum		
34	Demobilization	Lump Sum		
TOTAL BASE ESTIMATED COST				

- 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.



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Unit Prices for Additional Items if Required:

	<u>Without Driving</u>	<u>With Driving</u>
A) 24" Concrete Pile Buildups	\$____/Ft.	\$____/Ft.
B) 30" Concrete Pile Buildups	\$____/Ft.	\$____/Ft.

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



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BID BOND

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

_____ as Principal, and _____
as Surety, are hereby held and bound unto The Alabama 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 Choctaw Point Container Terminal – Phase V Extension, Project
#11411 Task #6.

NOW, THEREFORE,

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

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

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

Principal	
Surety	
By	



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State of _____

County of _____

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

DATE: _____

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

_____ by and between

_____ (Contractor/Grantee) and

_____ (State Agency, Department or Public Entity)

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

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

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

- a. Self-employed individuals, business entities filing articles of incorporation, partnerships, limited partnerships, limited liability companies, foreign corporations, foreign limited partnerships, foreign limited liability companies authorized to transact business in this state, business trusts, and any business entity that registers with the Secretary of State.



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- 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 _____



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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



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HUD GRANT FORMS & PROVISIONS



FY2023 Community Project Funding

Grant Forms

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 _____, 202_.

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

**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



FY2023 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 and 2 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 of 2 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.



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SUPPLEMENT 1



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All Computer Aided Design (CAD) based final submittals shall be completed using ASPA GIS Standards for CAD and CAD metadata.

DRAWINGS, GEOGRAPHIC INFORMATION SYSTEMS (GIS), AND GEOSPATIAL DATA:

All Computer Aided Design (CAD) based final submittals shall include deliverables completed using ASPA GIS Standards for CAD and layer/block protocols including minimum CAD metadata. These may include site plans, derivative drawings, record drawings, survey drawings, as-builts, and other civil “plan view” drawings (perpendicular to the surface of the earth). These GIS compliant deliverables are not expected nor intended to replace planned deliverables (i.e. those that would normally be submitted as per standards of practice) but as supplementary deliverables.

All GIS and other geospatial data (e.g. captured through remote sensing, GNSS, etc.) delivered to the port shall comply with any schema and data specifications provided or prescribed by ASPA, as well as ASPA Geospatial Data Delivery Standards and ASPA Metadata Standards.

Questions or Exemption Requests must be submitted by e-mail to the ASPA Sr. GIS Specialist at: GIS@alports.com for review prior to project initiation for a decision before delivery.

ASPA GIS Standards for CAD, ASPA Geospatial Data Delivery Standards, and ASPA Metadata Standards can be found at: <https://www.alports.com/alabama-state-port-authority-drawing-and-data-delivery-policy/> or obtained from the ASPA Project Manager.



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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:

CHOCTAW POINT CONTAINER TERMINAL – PHASE V DOCK EXTENSION
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.



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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) Secretary

(SEAL)

Witness as to Surety Principal

(Address)

ATTEST:

Witness as to Surety

(Address)

Principal

BY: _____(s)

(Address)

Surety

BY: _____
Attorney-In-Fact

(Address)

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



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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:

CHOCTAW POINT CONTAINER TERMINAL – PHASE V DOCK EXTENSION
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.



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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) Secretary

(SEAL)

Witness as to Surety Principal

(Address)

ATTEST:

Witness as to Surety

(Address)

Principal

BY: _____(s)

(Address)

Surety

BY: _____
Attorney-In-Fact

(Address)

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



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ACKNOWLEDGEMENT FOR CHANGE ORDERS

TO: ALABAMA PORT AUTHORITY

**RE: CHOCTAW POINT CONTAINER TERMINAL – PHASE V DOCK EXTENSION
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."

CONTRACTOR

BY: _____

DATE

TITLE



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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:

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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

WITNESS:

BY: _____

Contractor Party of the Second Part

BY: _____



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SP-01 DESCRIPTION OF WORK

The work consists principally of providing bonds, labor, materials, equipment, and supervision necessary for the addition of the Phase V Dock Extension structure between the South end of the existing APM Container Berth and the North End of the existing McDuffie No 3 berth. The work will be inclusive of all required demolition and removal work of existing marine structures in the Phase V Dock Extension limits of construction as well as indicated structure in the land area behind the Dock structure. The Dock structure will consist of but not be limited to steel pipe z piling concrete piling concrete work, crane rail installations, vessel fendering and mooring systems, crane and shore power requirement, electrical distribution, grading, drainage, lighting and fencing requirements all as indicated in 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 entire project within 880 calendar days after receipt of Notice to Proceed.

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



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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.



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SP-08 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-09 CONTRACTOR'S REPRESENTATIVE

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

SP-10 METHOD OF PAYMENT

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**



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- 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.



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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/>



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SECTION 10

DEFINITIONS OF TERMS

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

10-01 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.



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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.



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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,



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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.



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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



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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.



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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,



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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

<u>Contract Bid Price</u>	<u>Amount of Liquidated Damages per Day</u>
\$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



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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.



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20-14.5 Procedures

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

20-14.5.1 Procurement of Material Selected by Contractor.

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

1. Immediately upon notice to proceed or award of Contract, the Contractor in conjunction with the Construction Manager shall develop a list of items to be purchased by the Owner for incorporation into the work.
2. When the type, quantity, and price of each lot of materials, equipment or product to be purchased on a single purchase order have been determined by the Contractor, Contractor shall complete the Owner Purchase Order Form and shall sign the form to certify that the material, equipment or product described on the form complies with the requirements of the Contract Documents. The Owner Purchase Order Form, signed by the Contractor shall be forwarded to the vendor by the Contractor. The total monetary value listed on the Purchase Order Form is the cost limitation established for the Purchase Order.
3. Simultaneously, with the Contractor/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



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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.



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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.

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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.



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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.



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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.



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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 \$25,000,000 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*

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.



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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

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 not less than \$45,000,000. 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



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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

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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.



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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.



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

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

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

50-08 FINAL CLEANING UP

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



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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.



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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.



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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,



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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



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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



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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.



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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.



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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.



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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.



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SECTION 80 LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

80-01 LAWS TO BE OBSERVED

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

80-02 PERMITS, LICENSES, AND TAXES

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

80-03 PATENTED DEVICES, MATERIALS AND PROCESSES

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

80-04 RESTORATION OF SURFACES DISTURBED BY OTHERS

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

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

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



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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.



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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



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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



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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



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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



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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.



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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.



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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



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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.



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- (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 or 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.



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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.



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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.



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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.



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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.



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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.



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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.



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- (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.



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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.



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

100-09 WITHHOLDING FOR CLAIMS AND LITIGATION

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

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

100-10 FINAL PAYMENT

When the Contract work has been accepted in accordance with the requirements of the paragraph titled FINAL ACCEPTANCE of Subsection 60, and the paragraph titled Contract CLOSE-OUT above, the Engineer will prepare the final estimate of the items of work actually performed. The Contractor shall approve the Engineer's final estimate or advise the Engineer of his objections to the final estimate, which are based on disputes in measurements or computations of the final quantities to be paid under the Contract, as amended by change order or supplemental agreement. The Contractor and Engineer shall resolve all disputes (if any) in the measurement and computation of final quantities to be paid within 30 calendar days of the Contractor's receipt of the Engineer's final estimate. If, after such 30-day period, a dispute still exists, the Contractor

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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



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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.



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DIVISION 00 – GENERAL

SECTION 010000 – 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**



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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.



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-
- 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 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,



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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 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.

END OF SECTION



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DIVISION 02 – EXISTING CONDITIONS

SECTION 024100 – 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

- 3.1 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

- 4.1 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

- 5.1 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



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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



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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



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DIVISION 03 – CONCRETE

SECTION 031000 – CONCRETE FORMWORK

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, 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.
- 2.1.1 American Concrete Institute (ACI) –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 3/4 inch thickness for forms.



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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



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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 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.



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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 Faces24 Hours



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6.8 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



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SECTION 031500 – 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):



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- 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 A123/A123M – 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:
- 3.2 Shop drawings for anchor bolts indicating the size, material, coating, system, length, nuts, washers, anchor plates, etc.
- 3.3 Shop drawings for embedded frames indicating the size, material, coating system and details of the anchorage attachment.



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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.



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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.



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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



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SECTION 032100 – 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



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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:



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

- 5.4 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



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the OWNER on basis of allowable bond stress and stress in reinforcement at splice.

- 5.8 The minimum lap splice shall be 12 inches.

<u>Bar Size</u>	<u>Minimum Lap Splice (inches)</u>
#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:



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(inches)

- 5.12.1 Concrete cast against and permanently exposed to earth3
- 5.12.2 Concrete exposed to earth or weather:
- 5.12.3 #6 through #18 bars2
- 5.12.4 #5 bar & smaller, welded wire fabric2
- 5.12.5 Concrete not exposed to weather or in contact with ground:
- 5.12.6 Slab, walls, joists:
- 5.12.7 #14 and #18 bars1 1/2
- 5.12.8 #11 and smaller.....3/4
- 5.12.9 Beams, columns, primary reinforcement, ties, stirrups, spirals1 1/2
- 5.12.10 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 45° 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



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SECTION 033000 – 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



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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.

4.4.2 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



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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).



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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



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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.

<i>Class</i>	<i>Max. Water Per Bag Cement</i>	<i>Min. Bags of Cement per cu. yd.</i>	<i>Cement</i>	<i>Min. Compressive Strength @ 28 Days</i>	<i>Range in Slump</i>
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



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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



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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,



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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



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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.



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- 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, gridding 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 unevenness 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.



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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)



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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



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DIVISION 05 – METALS

SECTION 050000 – 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 A36, Class B-1, as applicable.



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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.



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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



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**SECTION 051200 – STRUCTURAL STEEL MATERIALS, FABRICATION AND
ERECTION**

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 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.



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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



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- 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



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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



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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 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.



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5.0 PERFORMANCE REQUIREMENTS

- 5.1 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.

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.



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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.

PART 2 – PRODUCTS

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.



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- 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 13/16” 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.



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- 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.



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- 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.



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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.



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- 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.

PART 3 – EXECUTION

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



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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 $\frac{3}{4}$ " 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 $\frac{5}{16}$ " and a minimum bolt size of $\frac{3}{4}$ ". 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 $\frac{1}{8}$ " seal weld. The $\frac{1}{8}$ " 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.



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- 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.



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- 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 3/8" (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 3/8" 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 not 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.



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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.



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- 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.



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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 $\frac{5}{8}$ " 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 exists when the plies of the joint are in firm 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 $\frac{1}{2}$ " 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.



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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:
 - (i) Dye penetrant of all fillet welds.
 - (ii) UT of all full penetration welds.

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



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SECTION 053000 – LONG SPAN METAL DECKING

PART 1 – GENERAL

1.0 SUMMARY

- 1.1 The requirements of this Specification Section include all materials, equipment and labor necessary to furnish and install a Long Span Floor Deck System that would be used as a stay in place form.

2.0 RELATED WORK

- 2.1 Specification SECTION 033000 – CAST-IN-PLACE CONCRETE
- 2.2 Specification SECTION 055000 – MISCELLANEOUS METALS

3.0 SUBMITTALS

- 3.1 Product Data: Submit manufacturer's specifications, section properties, load tables, dimensions and finishes.
- 3.2 Shop drawings: Submit manufacturer's fabrication and erection drawings showing profiles and material thicknesses, layout, anchorage and openings as dimensioned on the structural drawings.

4.0 REFERENCE STANDARDS

- 4.1 Section Properties: Shall be computed in accordance with the American Iron and Steel Institute (AISI S100) North American Specification for Design of Cold Formed Steel Structural Members.
- 4.2 Welding: Shall comply with applicable provisions of the American Welding Society (AWS) D1.3 Structural Welding Code - Sheet Steel.
- 4.3 Superimposed Load Capacities: Shall be computed in accordance with the requirements of the Steel Deck Institute (SDI) Floor Deck Design Manual – No. FDDM.



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5.0 DELIVERY, STORAGE AND HANDLING

- 5.1 Long Span Floor Deck units shall be protected from significant damage during delivery, storage and handling.
- 5.2 If storage at the job site is required, Long Span Floor Deck units shall be elevated above the ground, sloped to provide drainage and protected from weather with a ventilated covering.

PART 2 – PRODUCTS

6.0 MANUFACTURER

- 6.1 In accordance with the requirements of this Specification Section, long span metal deck and all associated components shall be as manufactured by EPIC METALS CORPORATION, Rankin, PA or ENGINEER approved equal.

7.0 MATERIALS

- 7.1 Long Span Floor Deck units shall be manufactured from cold-formed steel sheets conforming to ASTM A653-94 Structural Quality with a minimum yield strength 40 ksi.
- 7.2 Before forming, the steel sheets shall have received a hot-dip protective coating conforming to ASTM A924-94 with a minimum coating class of G60 as defined in ASTM A653-94.
- 7.3 The minimum uncoated thickness of materials furnished shall not be less than 95% of the design thickness.

8.0 FABRICATION

- 8.1 Long Span Floor Deck units shall be cold formed by the roll forming process to insure quality and uniformity of profile.
- 8.2 Side laps of the Long Span Floor Deck Units shall be interlocking and vertically self-aligning.
- 8.3 Long Span Floor Deck Units shall be equal to Epic Metals Corporation Type E750 – .09 metal thickness (13 gage) or approved equal. The units shall be



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capable of supporting the weight of a 29.5" total depth normal weight concrete slab plus a 50 lb/ft.2 construction load. The maximum allowable deflection is L/220. Decking manufacturer shall submit to the ENGINEER for review, in accordance with paragraph 1.3 of this specification, design documentation for specification conformance.

9.0 ACCESSORIES

- 9.1 The Contractor shall furnish and install miscellaneous items including, but not limited to, end closures, column closures, transition plates and side closures.

PART 3 – EXECUTION

10.0 GENERAL

- 10.1 The Long Span Floor Deck System shall be installed in strict accordance with the manufacturer's instructions, approved erection drawings and all applicable safety regulations.

11.0 PREPARATION

- 11.1 The Erector of the Long Span Floor Deck System shall inspect and accept the supporting frame and other related work before installing any deck material.

12.0 INSTALLATION

- 12.1 Bundles of material shall be located on the supporting frame in such a manner that overloading of any of the individual framing members does not occur.
- 12.2 Before being permanently fastened, Long Span Floor Deck Units shall be placed on the supporting frame and adjusted to final position with ends accurately aligned and adequately bearing on the supporting frame. Consistent coverage shall be maintained so that panels located in adjacent bays will be properly aligned.
- 12.3 Cutting of Long Span Floor Deck units to suit job site conditions shall be performed in a neat and workmanlike manner. Only those openings indicated on the structural drawings shall be cut. Other openings shall be cut and reinforced by those requiring the opening as approved by the ENGINEER.



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- 12.4 Long Span Floor Deck units shall be fastened to all supporting members with 0.750" diameter puddle welds at a spacing of 12" o.c. or as indicated on the manufacturer's erection drawings.
- 12.5 The sides of Long Span Floor Deck units located at the perimeter of the pour shall be fastened to supporting members at a minimum spacing of 36" o.c. or less as indicated on the manufacturer's erection drawings.
- 12.6 The sidelaps of cellular type Long Span Floor Deck units shall be fastened together by 1" long welds or button punching at a maximum spacing of 36" o.c. as indicated on the manufacturer's erection drawings.
- 12.7 Accessory items and reinforcement for openings shall be fastened as indicated on the manufacturer's erection drawings.
- 12.8 Mechanical fasteners may be substituted for puddle welds to permanently fasten Long Span Floor Deck units to the supporting frame. The mechanical fastener manufacturer shall provide documentation as to the equivalent load capacity and proper installation procedure for each type of fastener being used.

13.0 AFTER INSTALLATION

- 13.1 The Long Span Floor Deck System shall be inspected by the ENGINEER for damage that may have occurred during the installation procedure. Damaged material shall be repaired or replaced, at no additional cost to the OWNER, so that its proper function as a floor deck system is maintained.
- 13.2 Construction loads shall not be applied to Long Span Floor Deck units until after the units are permanently fastened to supporting members and shall not exceed the load carrying capacity of the units.
- 13.3 Items such as pipe hangers shall be suspended from Long Span Floor Deck units as directed by the ENGINEER.

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



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DIVISION 11 – EQUIPMENT

SECTION 111313 – FENDER SYSTEM

PART 1 – GENERAL

1.0 INTRODUCTION

- 1.1 The work included under this section shall consist of the Design, Fabrication and Delivery to the OWNER's facility of all components required for the complete installation of the fender system as specified herein and/or indicated on the drawings.

2.0 PANEL FENDER SYSTEM

2.1 Arrangement

- 2.1.1 The proposed fender system shall be comprised of rubber fender units with a steel frontal frame complete with weight, and tension chains and all related hardware including anchor plates, bolts, threaded rods, and any related hardware required for a complete installation.

- 2.1.2 Each system shall be capable of the following rated performance for the type of vessel listed:

Vessel (assume 2 systems contacted)

Rated Energy Absorption 1074 ft.-kips

Hull Pressure.....4.2 ksf

- 2.1.3 Fender manufacturer shall verify the load requirements shown based on the vessel parameters listed below.

MAERSK E CLASS

LOA (Length Overall).....1312 ft.

Beam185 ft.

Draft (Max.)52.5 ft.

Max. Displacement219,000 LT



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Berthing Velocity (normal to berth)4 ft/sec.

Approach Angle6 Degrees

Allow. Hull Pressure4.2 ksf

- 2.1.4 Fender system shall account for barge contact forces to occur close to the water line.
- 2.1.5 Above performance values may be subject to a manufacturing tolerance of no more than +/-10%.
- 2.1.6 Above performance must be verified by full scale testing, see Section 3.3.
- 2.1.7 Each system shall be capable of absorbing a horizontal shearing force equal to 30% of its rated reaction while simultaneously absorbing the above-defined minimum energy without exceeding the defined maximum reaction.
- 2.1.8 Maximum reaction force from fender system to the dock structure is 674 kips. Maximum-allowable, undeflected standoff is 4 ft – 9.5 inches.

PART 2 – PRODUCTS

3.0 MATERIALS (RUBBER UNITS)

- 3.1 The rubber for proposed fender to be used must be of vulcanized natural or synthetic rubber or a mixture of them. These shall be reinforced with carbon black and resistant to aging, seawater, abrasion, and ultraviolet rays.
- 3.2 The rubber must be homogenous in quality and free from foreign materials, bubbles, injuries, cracks and other harmful defects.
- 3.3 The embedded fixing steel plates shall be firmly bonded into the rubber body through the process of vulcanization, and completely encapsulated so that no steel is exposed. The steel shall be encased with a minimum rubber thickness of 1/16”.



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3.4 Rubber Properties

Property Tested	Test Method	Acceptance Requirements
Hardness (Before Aging)	ASTM D2240 Shore A	78° Max
Tensile Strength (Before Aging)	ASTM D412 Die C	16 MPa (2320 psi) Min
Ultimate Elongation (Before Aging)	ASTM D412 Die C	300% Min
Change in Hardness (After Aging)	ASTM D573 96 hrs @ 70°C	+10° Max
Change in Tensile Strength (After Aging)	ASTM D573 96 hrs @ 70°C	-20% Max
Change in Ultimate Elongation (After Aging)	ASTM D573 96 hrs @ 70°C	-20% Max
Compression Set	ASTM D395 Method B 22 hours at 70°C	30% Max
Ozone Resistance	ASTM D1171 Method B	100%
Water Resistance	ASTM D471 70 hours at 100°C	+10% Max by Volume
Low Temperature Resistance	ASTM D2137 Method A 3 minutes at -40°C	No Cracks
Adhesion	ASTM D429 Method B	7 kN/m (40 lb/in) Min
Tear Resistance	ASTM D624 Die B	70 kN/m (400 lb/in) Min

3.5 Rubber Composition (To be Confirmed by Submitted TGA Testing Acceptance Requirement)

Property Tested	Test Method	Acceptance Requirements
Density	ISO 2781 Method A	Max 1.2 glcc
Polymer %	ASTM D6370	Min 45%
Carbon Black %	ASTM D6370	Min. 20%
Ash	ASTM D297	Max 5%



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Property Tested	Test Method	Acceptance Requirements
Rubber filler ration		>1.2

3.6 Performance Verification

- 3.6.1 Full scale load deflection tests shall be conducted on 10% of the fender elements supplied. The performance of the fender is expressed by the value of the energy absorbed during compression of the fender up to the designed deflection and the maximum value of the reaction load thus generated.
- 3.6.2 In the performance test of the fender, compression shall be applied toward the top face of the fender. The compression speed shall follow current PIANC Fender Performance Testing guidelines and shall be recorded during testing. Deflection of the fender is to be repeated for three times up to the designed deflection. A fourth cycle shall be conducted, after a minimum 1 hour wait period, and used for the performance of the fender. The fourth cycle performance value shall be more than the designed performance value for the energy absorption and less than the designed performance value for the maximum reaction load.
- 3.6.3 For the performance test of the fender, the room temperature at the time of the tests shall be recorded.
- 3.6.4 All testing must be conducted in the United States of America and shall either be witnessed by a recognized accreditation agency such as Lloyds Register or conducted by a 3rd party independent laboratory. Velocity corrections will not be allowed nor will scale model tests be allowed as an alternative. The Port Authority reserves the right to retest selected fender elements.
- 3.6.5 Certified performance curves for each fender shall be supplied and the OWNER reserves the right to witness testing and/or test the fenders again upon delivery.

3.7 Sampling

- 3.7.1 The specimen for testing and inspection of the materials, dimensions, and performance shall be sampled as specified below. The specimen to



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be used for the material test shall be taken directly from the product or from the rubber prepared in the quality check and under the condition of the same vulcanization as the products.

Test Item	Number of Sampling
Material	1 set from the lot of compound for the manufacture of the fenders.
Dimensions	All fenders.
Performance	1 piece per 10 pieces of fender. (To raise the fraction to a unit.)

3.8 Hardware

- 3.8.1 All hardware for mounting of the fender to the panel shall be supplied by the fender manufacturer. All hardware for mounting the fender to the concrete face including threaded rods, nuts, and washers shall be included. Manufacturer shall be responsible for recommending the desired core hole depth for the retrofit in the existing dock structure and the type of epoxy bonding agent to use. All mounting hardware shall be 316 stainless steel. Any socket type embedment shall have a 316 stainless steel female socket. The size and grade of the mounting hardware shall be according to the fender manufacturers published information.
- 3.8.2 All bolts, nuts, and washers for attaching fender elements to the contact panels, steel structures and to embedded anchor sleeves shall be of the size required per the manufacturer's published data. All exposed hardware shall be 316 stainless steel, embedded hardware shall be hot-dip-galvanized.

4.0 PANEL

4.1 Design and Construction

- 4.1.1 The proposed panel shall be of the size and shape as shown on the drawings. The panel shall be designed and constructed according to the



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AISC Steel Construction Manual Specifications. All welding shall be in accordance with AWS D1.1 latest edition standards. All fillet welds shall be seal welds to prevent corrosion. All steel shall be ASTM A-36, or as necessary from stress calculations. All bolt holes shall be drilled.

4.1.2 Panel design shall be as shown on the drawings. Panel tops shall not be higher than elevation (+)15' and panel bottom shall extend to elevation (-) 1.5'. Face of panel shall be approx. 4'- 9 1/2" stand off from face of dock as shown on the drawings.

4.1.3 Minimum steel thickness shall be 1/2" for external plate and 3/8" for internal plates if of a closed box design and 1/2" if an open grillage design.

4.1.4 Consider the following cases in determining maximum moment to be resisted by panels:

- a. Vertical line load in middle of panel or middle of span between elements
- b. Any other load case which generates stresses exceeding the stresses from the above load cases

4.2 Coating

4.2.1 The proposed panel shall be coated with a two coat coal tar epoxy such as International Intertuf® 708 or an approved equal. All preparation and application shall be in compliance with the coating manufacturer's recommendations for immersion service. Surface preparation shall be by abrasive blast to SSPC-SP10 "Near White Blast Cleaning" with an anchor profile of 50 to 75 microns. The D.F.T. of the coating shall be 400 microns minimum. The finish coat shall be free of sags, voids, and orange peel and resistant to impact and abrasion. Minimum accepted rated adhesion strength of the coating system shall be 800 psi.

4.3 Hardware

4.3.1 Chains

- a. The proposed chain system shall prevent excessive top tension, bottom tension, horizontal shear, vertical shear and weight-induced deflection of the fender. All hardware such as shackles and turnbuckles/Dogbone shackles required for attaching the chains shall



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be included and supplied by fender manufacturer. All chains and related hardware shall be hot dipped galvanized.

- b. The chains and related hardware shall be sized considering the maximum possible shearing and tension forces on the fender. Shearing forces on the panel shall be calculated from the maximum reaction of the fender and the coefficient of friction of the proposed UHMW face pads.
- c. Sizing of the weight chains shall include the shearing force from friction as well as the weight of the panel and one-half the weight of the proposed fenders. All metal chains and components shall be galvanized per ASTM A123 or A153. No chain assembly shall have a breaking strength of less than 50,000 pounds no shall metal chains have a stock size of less than $\frac{3}{4}$ ".

4.3.2 Anchor Plates

- a. All anchor plates for attaching the proposed chains to the concrete face shall be included and supplied by the fender manufacturer prior to pouring of concrete as well as proper plates for installation into the existing dock concrete. All hardware for attaching the anchor plates including threaded rods, nuts, and washers shall be provided. All hardware shall be hot dipped galvanized.

4.4 Face Pads

- 4.4.1 UHMW face pads shall cover the face of the panel including the faces of the bevels. The pads shall be minimum of 1 $\frac{1}{2}$ " thick and yellow in color. The proposed UHMW must be UV stabilized. UHMW materials must meet the following minimum standards. Test data for proposed UHMW must be submitted as part of bid submittal documentation.

4.4.2 Properties

Property	Test Method	Acceptance Requirements
Specific Gravity	ASTM D792	0.926 gm/cc
Ultimate Tensile Strength	ASTM D638A	4,000 psi, min
Izod Impact, Double	ASTM D256A	18 ft-lbs/in, min



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Property	Test Method	Acceptance Requirements
Notch		
Abrasion Wear (carbon stl = 100)	Sand Slurry	18 max.
Water Absorption	ASTM D570	Nil
Coefficient of Friction	ASTM D1894	0.20 max
Color	Not Applicable	yellow

* Industry Standard testing method using slurry of 60% aluminum oxide and 40% water at a rotation speed of 1750 rpm for 2 hours. A lower number indicates better abrasion resistance.

4.4.3 UHMW Installation

- a. The pads shall be drilled and counter bored for the mounting bolts. Mounting bolts shall be a minimum of 5/8" diameter and shall be 316 stainless steel. The face of the bolt head shall be a minimum of 1/2" below the face of the UHMW pad. All exposed edges of the UHMW shall include 3/4" X 3/4" bevels.

PART 3 – EXECUTION

5.0 PACKAGING

- 5.1 The rubber fenders shall be packaged while being delivered to the Port so as to prevent damage to the fenders. The fender manufacturer, prior to shipment to the jobsite shall install the UHMW for the panels on the steel panels. All chain and hardware shall be packaged for shipment to the customer. Fender sections shall be safely stacked and blocked to provide safe storage until the marine contractor shall collect the materials for installation. All labor, equipment, and wood cribbing required to deliver and provide storage on the site shall be included in the supplier's proposal. The supplier shall make arrangements for offload prior to arrival of materials at the jobsite.



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6.0 SUBMITTALS (PANEL FENDER SYSTEM)

6.1 Submittals Due with Bid

- 6.1.1 Items to be included with the bid proposal shall include at a minimum the following items:
- A bill of materials drawing showing the general arrangement of the fender system and noting all included hardware with quantities.
 - Performance curves for reaction, energy, and deflection for the proposed fender.
 - Recently conducted same size element fender test reports
 - Price for supply of all fender systems required number and all items required to complete and mount the system including all crating and shipping to jobsite.
 - Confirmation of on-site installation supervision by manufacturer's engineer for 2 days during installation.
 - Supply list demonstrating that the manufacturer has been in the business of manufacturing molded/bonded buckling type rubber marine fenders for at least 10 years and show proof of 5 buckling type fender installations within the USA each having been in service for at least 5 years.
 - List of references including contact name and phone numbers.
- 6.1.2 Proposal shall be inclusive of all costs, duties, inland transportation to jobsite and offloading and stockpiling of materials as directed by the OWNER.

6.2 Submittals Due at Award

- 6.2.1 Items to be provided upon award of the project shall include at a minimum the following items:
- Final drawings of the complete proposed fender system with weld details, material dimensions, thicknesses, and fabrication specifications.
 - Calculations justifying the proposed design for the steel panels, link pieces and chains.



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- c. Welding procedures and individual qualifications and certifications.
- d. Submittal must include drawings stamped by a P.E. within the United States.
- e. UHMW material test data.
- f. Fender performance curves and material specifications.

6.3 Submittals Due with Delivery

- 6.3.1 Items to be provided upon delivery of the fender systems shall include at a minimum the following items:
 - a. Test certificates for the rubber material properties as required in this specification.
 - b. Performance test certificates for fender performance as required in this specification.
 - c. Detailed installation procedures for the supplied fender system. (For both the new dock and the retrofit on the existing dock)

7.0 GENERAL SUPPLIER REQUIREMENTS

7.1 Warranty

- 7.1.1 Manufacturer shall provide a two (2) year warranty on supplied materials from damage caused by normal use.

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



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DIVISION 26 – ELECTRICAL

SECTION 260000 – ELECTRICAL - GENERAL

PART 1 – GENERAL

1.0 REQUIREMENTS

1.1 Reference Specification 010000 – “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



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- 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



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- 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 010000 “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



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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.



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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 SECTION 010000 – 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



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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



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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 SECTION 260526 – GROUNDING, Section 3.0.

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



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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.



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- 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



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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



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SECTION 260500 – ELECTRICAL – BASIC MATERIALS AND METHODS

PART 1 – GENERAL

1.0 REQUIREMENTS

- 1.1 This electrical specification section is part of each electrical specification 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



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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; Racor, 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-



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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. 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. 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. Rigid non-metallic conduit shall have PVC fittings suited for the purpose and joined together by a method approved for the purpose.



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Schedule 80 conduit sections shall be joined together with threaded fitting connectors.

- 5.4 Electrical Metallic Tubing (EMT). Electrical metallic tubing 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. 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. 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. 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. 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. 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. 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



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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.



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- 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 SECTION 260543 – 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 SECTION 260519 – 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



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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 SECTION 260526 – 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.



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- 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



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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 conduits 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.



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- 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. Concret 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



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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



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- 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.



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- 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 PART 2 – 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.



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- 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.
- 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



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and pull boxes where injury to insulation or deformation of wire would occur due to excessive pulling resistance.

12.19 Wire Pulling Lubrication – Reference Section PART 2 – 10.6 for requirements.

12.20 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.

12.21 Underground Work. Reference SECTION 16375 – UNDERGROUND / UNDER WHARF WORK

12.22 Caulking and Seals. At bulkheads and dock conduit penetrations, completely seal clearances around the conduit and make watertight with an ENGINEER approved product.

12.23 Finishes and Painting.

12.23.1 Painting for all work in these Specifications shall be by the electrical CONTRACTOR unless specified otherwise.

12.23.2 Finish in areas not listed or otherwise noted shall be black enamel.

12.23.3 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.

12.23.4 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.

12.23.5 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



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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 260519 – 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.



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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 PART 2 – 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 260526 – GROUNDING. Ground and bond in accordance with NEC Article 250 and other applicable articles for crane rails.

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



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SECTION 260519 – 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



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-
- 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



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SECTION 260526 – 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.



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- 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 finish 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.



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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.



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- 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.



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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



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SECTION 260543.1 – CABLE TRENCH SYSTEM

PART 1 – GENERAL

1.0 GENERAL

- 1.1 This Section covers the furnishing and installing of a prefabricated cable trench system with a flexible cover to protect crane power cables while allowing over access from vehicular traffic. The CONTRACTOR shall furnish all materials, equipment, tools, labor and supervision to accomplish the work in accordance with this Specification Section and the Contract Drawings.
- 1.2 Preferred supplier, unless noted otherwise, shall be Gantrex USA Inc, 14300 Cornerstone Village Drive, Suite 117, Houston, TX 77014; Phone: (281) 893-0027; Fax: (281) 893-4512, or OWNER approved equal.

PART 2 – PRODUCTS

2.0 MATERIALS

2.1 Prefabricated Cable Trench System:

- 2.1.1 The prefabricated cable trench system shall be a Super Panzerbelt System made by Cavotec SA or OWNER approved equal.

2.2 Prefabricated Channel Profile:

- 2.2.1 The steel channel shall consist of pre-formed interlocking sections which will be embedded in concrete. Each channel section shall be provided with polystyrene inserts to be used for maintaining channel alignment during concrete pour.
- 2.2.2 Channel sections shall be manufactured from 16 gage type 304SS stainless steel in appropriate section lengths, as determined by the manufacturer, to minimize cost and maximize ease of construction. Channel sections shall be self anchoring and reinforced in the belt securing area. Allowance for wharf's expansion joints shall be included and indicated in submittals. Channel sections shall be interlocking to provide a positive fit ensuring no sharp edges interfering with the cable operation. Channel depth shall be as indicated on the drawings.



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(Manufacturer shall verify that supplied system is capable of handling up to six (6) 50mm diameter power cables.)

- 2.2.3 The channel shall be pre-drilled along the hinge area to assist in installation of the belt. A method for locating the pre-drilled holes shall be supplied. Each channel section shall be electrically connected to the other along one side with two (2) grounding straps per channel length. Additionally, the channel strips shall be adequately grounded to the cable horns and the crane rail grounding at expansion joints and ends.
- 2.2.4 The Channels shall be provided with openings to properly interface with the cable horns. (Shop Drawings shall be supplied).
- 2.2.5 The Channel sections shall be supplied fully assembled and are to include a high density Styrofoam cable slot filled to control channel geometry during shipment and installation.

2.3 Flexible Cover:

- 2.3.1 The channel cover shall be a high-quality flexible rubber, steel cord and nylon reinforced Super Panzerbelt P400 series or equal for heavy traffic loading.
 - a. The channel cover shall be a flexible reinforced rubber belt able to resist stresses caused by vehicles passing both across and along the channel. It must be able to support a load equivalent to 580 psi across the channel slot without damage. It shall be composed of:
 - (i) 75% Styrene Butadiene Rubber
 - (ii) 15% Steel Cord
 - (iii) 10% Nylon Synthetic Fibers
- 2.3.2 The belt reinforcement shall consist of four layers of reinforcement as follows:
 - a. Two layers of steel cord over the cable slot area and one layer of steel cord in the hinge area comprised of:
 - (i) Longitudinal cords of RFL dipped nylon yarn rated to a breaking load of 12kN (2,700#).
 - (ii) Transverse cords of brass coated steel rated to a breaking load of 720kN (160,000#).



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b. Two layers of specially woven synthetic fibers located between the steel cords and continuing completely through the hinge area comprising:

- (i) A longitudinal element of polyester yarn rated to a breaking load of 20kN (4,500#).
- (ii) A transverse element of polyamide yarn rated to a breaking load of 20kN (4,500#).

2.4 The reinforcement shall render the belt inflexible only in the transverse direction with the exception of the hinged area. The belt shall remain sufficiently flexible lengthwise to allow the necessary lifting performance of the belt during reeling up and depositing of the cables.

2.5 The belt layers shall be assembled by a hot vulcanization process incorporating highly abrasion resistant rubber compounds on the external surfaces and high adhesion rubber compounds adjacent to the steel cord layers.

2.6 The belt shall be fixed to the channel with hot dip galvanized steel strips. The strips shall be located in a recess, molded into the belt and fixed with 0.20” (5mm) dia. Stainless steel rivets at 3” (78mm) intervals. The rivet head shall remain below the surface of the fixing strips in pre-drilled countersunk holes.

2.7 The belt shall have a series of longitudinal grooves, molded in the upper edge adjacent to the fixing strips to act like a hinge and ensure the belt will open and close efficiently and adequately return to the horizontal resting position after being lifted.

2.8 Belt splices shall be supplied with each length of belt and shall be hot dip galvanized and fastened with stainless steel rivets.

2.9 The belt shall be furnished in approx. 164 ft. (50m) lengths to allow efficient handling and installation (Manufacturer shall verify that belt lengths supplied conform to the construction requirements of the Dock).

3.0 PERFORMANCE



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- 3.1 The manufacturer shall provide a written five (5) year warranty against defects in materials or workmanship. Warranty shall commence when the facility is first placed into service.
- 3.2 The manufacturer shall have a minimum of three similar successful North American installations, each in service for over five years.
- 3.3 The reinforced belt shall be capable of opening a minimum of 90° by way of a specially developed hinge area and the belt shall always return to a flat horizontal resting position after being opened.
- 3.4 The belt shall have an anticipated life in excess of 250,000 opening and closing cycles.

4.0 QUALITY CONTROL

- 4.1 The manufacturer shall provide a representative, directly employed by the manufacturer and personally familiar with the system, to provide training to the installation CONTRACTOR prior to beginning the installation.
- 4.2 The manufacturer's representative shall be made available, as required, during construction to ensure the system is installed according to the manufacturer's recommendations.
- 4.3 The manufacturer shall provide written installation procedures for use by the installation CONTRACTOR which shall be strictly adhered to.

5.0 SHOP DRAWINGS

The CONTRACTOR shall prepare and submit for prior written approval by the ENGINEER, complete shop drawings showing component and installation details of the steel items, flexible cover and attachment as indicated herein and on the Contract Drawings.

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



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260543 – 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



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- 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



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- 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

2.0 MATERIALS



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2.1 Conduit – Conduit and conduit sleeves shall comply with the following standards:

- 2.1.1 Rigid Metal Conduit UL 6, galvanized steel, threaded type.
- 2.1.2 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.
- 2.1.3 Intermediate Metal Conduit UL 1242, galvanized steel, threaded type.
- 2.1.4 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.
- 2.1.5 Plastic Conduit and Tubing, NEMA TC 2, EPC 40 PVC or EPC 80 PVC as indicated.
- 2.1.6 Plastic Utilities Duct for Concrete Encasement, NEMA TC 8, ASTM F 512, Type EB 35.

2.2 Fittings

- 2.2.1 Metal Fittings, UL 514B, threaded type.
- 2.2.2 PVC Conduit Fittings, NEMA TC 3 [UL 514B] [UL 651] as applicable.
- 2.2.3 PVC Duct Fittings, NEMA TC 9.
- 2.2.4 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.

2.3 Tape

- 2.3.1 Insulating Tape, UL 510, plastic insulating tape, capable of performing in a continuous temperature environment of 80 degrees C.



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2.3.2 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.

2.4 Pull Wire

2.4.1 Reference Specification SECTION 260000 – ELECTRICAL – GROUNDING, 2.9(F) for pull wire requirements.

2.5 Conductors

2.5.1 Reference Specification SECTION 16100 – ELECTRICAL – BASIC MATERIALS AND METHODS, 2.8 “CONDUCTORS” for conductor requirements.

2.5.2 Wire and Cable manufactured more than 12 months prior to the date of delivery to the site shall not be used.

2.5.3 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.

2.6 Grounding and Bonding Equipment (UL 467)

2.6.1 Reference Specification SECTION 260526 – ELECTRICAL – GROUNDING.

2.7 Manholes and Handholes

2.7.1 Reference Specification SECTION 033000 – CAST-IN-PLACE CONCRETE for construction specifications. See project Manhole and Handhole construction drawings for details.



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2.7.2 The word "ELECTRIC" shall be cast in the top face of the power manhole cover unless noted otherwise on construction drawings.

2.7.3 The word "COMMUNICATIONS" shall be cast in the top face of the communications handhole cover unless noted otherwise on construction drawings.

2.8 Cable Racks, Arms and Insulators

2.8.1 The wall bracket shall be channel steel.

2.8.2 Metal portion of racks and arms shall be zinc coated after fabrication.

2.8.3 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.

2.8.4 Cable rack arms shall be steel or malleable iron or glass reinforced nylon and shall be of the removable type.

2.8.5 Insulators for metal rack arms shall be dry process glazed porcelain. Insulators are not required for nylon arms.

2.9 Cable Tags in Manholes, Handholes and Vaults

2.9.1 Reference Specification 16100, "Electrical General Requirements".

PART 3 – EXECUTION

3.0 INSTALLATION

3.1 Installations shall comply with NEC (NFPA 70) and ANSI C2 requirements.

3.2 Duct Banks and Conduit Installation

3.2.1 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.

3.2.2 Run conduit in straight lines except where a change of direction is necessary.

3.2.3 Except at conduit risers, accomplish changes in direction of runs exceeding a total of 10 degrees, either vertical or horizontal, by long



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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.

- 3.2.4 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.
- 3.2.5 Except where rigid galvanized steel conduit is indicated or specified, underground conduit shall be PVC Type EB 35.
- 3.2.6 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.
- 3.2.7 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.

3.3 Multiple Conduits

- 3.3.1 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.
- 3.3.2 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



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- 3.3.3 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.

3.4 Conduit Plugs and Pull Rope

- 3.4.1 New conduit indicated as being unused or empty shall be provided with plugs on each end. Plugs shall contain a weep hole 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 section 260500 – ELECTRICAL – BASIC MATERIALS AND METHODS.

3.5 Partially Completed Duct Banks

- 3.5.1 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.

3.6 Connections to New Manholes

- 3.6.1 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.

3.7 Conduit Protection at Concrete Penetrations

- 1.1.1 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



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first coupling or fitting outside the concrete (minimum of six (6) inches from penetration).

3.8 Manholes and Handholes

3.8.1 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 pulling 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.



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3.9 Cable Racks

3.9.1 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:

- a. Provide a 5/8-inch diameter by 5-inch-long anchor bolt with a 3-inch foot cast in structure wall with a 2-inch protrusion of threaded portion of bolt into structure. Provide a 5/8-inch steel square head nut on each anchor bolt. Coat threads of anchor bolts with white lead immediately prior to installing nuts.
- b. 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.
- c. 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 a 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.

3.10 Grounding in Manholes:

- 3.10.1 Grounding shall be as shown in drawings.
- 3.10.2 Metal frames and covers shall be grounded.
- 3.10.3 Provide one ground rod for each manhole and handhole.
- 3.10.4 Provide No. 6 AWG bare copper grounding pigtailed on walls of each manhole and handhole. The pigtailed 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 pigtailed shall be provided in each manhole and handhole and shall be accessible for future grounding



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requirements. If manholes are pre-cast and installed in separate pieces, each piece will be required to have two pigtails installed and grounded.

3.11 Power Wire and Cables

- 3.11.1 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.

3.12 Cable Pulling

- 3.12.1 Test existing duct lines with a mandrel and thoroughly swab out to remove foreign material before pulling cables.
- 3.12.2 Pull cables down grade with the feed in point at the manhole or buildings of the highest elevation.
- 3.12.3 Use flexible cable feeds to convey cables through manhole opening and into duct runs.
- 3.12.4 Accumulate cable slack at each manhole or junction box where space permits by training cable around the interior to form one complete loop.
- 3.12.5 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.
- 3.12.6 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.

3.13 Cable Lubricants

- 3.13.1 Reference Specification SECTION 260500 – ELECTRICAL - BASIC MATERIALS AND METHODS, 2.8(F) for Cable Lubricant requirements.

3.14 Cable Pulling Tensions



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- 3.14.1 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.
- 3.14.2 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 for future cables. Provide one spare three insulator rack arm for each cable rack in each underground structure.

3.15 Cable Tags in Manholes and Handholes

- 3.15.1 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.

3.16 Grounding Systems

- 3.16.1 Install as indicated on construction drawings. Reference Specification SECTION 260526 - GROUNDING For requirements.

4.0 FIELD TESTING

- 4.1 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.

5.0 FIELD QUALITY CONTROL

- 5.1 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



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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.

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



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SECTION 261200 – SUBSTATION TRANSFORMERS

PART 1 – GENERAL

1.0 SCOPE OF WORK

- 1.1 The SUPPLIER shall furnish 23.0kV/4.16kV, DELTA-WYE unit-substation transformer with neutral resistor (grounding impedance device) on the load side as required by NEC 2023-250.187 and NEC 2023-250.188 as specified herein and as shown on the contract drawings. Substation transformer kVA rating to be as shown on the contract drawings and SECTION 9.3 of this Specification.
- 1.2 The OWNER shall be responsible for offloading the transformer when it is delivered to McDuffie Coal Terminal. A two (2) week notice of delivery shall be given by the SUPPLIER before transformer delivery to the McDuffie Coal Terminal.

2.0 REFERENCES

- 2.1 The unit substation transformer shall be designed, manufactured, and tested in accordance with the latest applicable standards of NEMA, ANSI and IEEE.

3.0 DOCUMENTATION

3.1 Submittals – For Review/Approval

- 3.1.1 A submittal review by the ENGINEER is required prior to fabrication to ensure compliance with the specifications. All items in the documents must comply with the specifications and variance will not be accepted unless these items are specifically called out in the documents as a variation from the specifications. If items in the documentation do not meet specifications or design requirements and are not specifically called out as non-compliant but make it through the Review/Approval process and fabrication has started, the SUPPLIER/manufacture will still be required make these items compliant at no additional cost to the OWNER.
- 3.1.2 All information listed for review should be submitted in one package. A designated SUPPLIER/manufacture's representative that is familiar



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with this project should be readily available by telephone, during business hours, during the review period to answer all questions.

3.1.3 The following information shall be submitted to the ENGINEER:

- a. Master drawing index
- b. Front view elevation and weight
- c. Plan view
- d. Schematic diagrams
- e. Nameplate diagram
- f. Component list
- g. Conduit entry/exit locations
- h. Ratings including:
 - (i) kVA
 - (ii) Primary and secondary voltage
 - (iii) Taps
 - (iv) Primary and secondary continuous current
 - (v) Basic Impulse Level
 - (vi) Impedance
 - (vii) Insulation class and temperature rise
 - (viii) Sound level
- i. Cable terminal sizes
- j. Product data sheets.
- k. Busway connection

3.1.4 After the return of approval drawings or after any change made to previously approved drawings, the manufacturer shall submit a record copy of any and all drawings that contained revisions.

3.1.5 Each revision of any drawing/document must have a revision number/letter and the date the revision was issued.



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3.1.6 After completion of the inspection and testing procedures, the manufacturer shall submit a complete set of "as built" drawings. These drawings shall function as a record of the final construction of the equipment at the time it left the factory.

3.1.7 Each drawing prepared by manufacturer shall show, at a minimum, the name, jobsite location, purchase order or contract number, and equipment identification number in addition to any information required by manufacturer.

3.2 Submittals – for Close-Out

3.2.1 The following information shall be submitted for record purposes:

- a. Final as-built drawings
- b. Wiring diagrams
- c. Certified production test reports
- d. Installation information
- e. Seismic certification.

3.2.2 The final (as-built) drawings shall include the same drawings as the construction drawings and shall incorporate all changes made during the manufacturing process.

3.3 Test Documentation

3.3.1 Certified production test reports indicating satisfactory completion of all inspection and test procedures shall be provided.

3.4 Operating and Maintenance Manuals

3.4.1 At time of shipment the manufacturer shall provide four (4) copies of the operating and maintenance instructions for all major components.

3.4.2 Operation and maintenance manuals shall include the following information:

- a. Instruction books and/or leaflets
- b. Recommended renewal parts list
- c. As-built drawings of the equipment.



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3.4.3 Each complete set of manuals shall be bound and shall contain a table of contents to allow for easy reference.

3.5 For all transmittals, submit five (5) hard copies of all documentation unless otherwise stated herein. In addition to paper copies, all drawings shall be supplied on a CD in AutoCAD 2024 format.

4.0 QUALIFICATIONS

4.1 The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the ENGINEER, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

5.0 WARRANTY

5.1 The SUPPLIER/manufacturer warrants that the equipment specified within this specification will be free from all defects in design, materials, equipment and workmanship, for a period of not less than two (2) years from the Project Acceptance date. This warranty shall include all structures, mechanisms and components that are manufactured or provided by the manufacturer. In the event that any part of the equipment appears to be defective in design, manufacture, materials, fabrication, or workmanship within the period of warranty, the OWNER will immediately notify the SUPPLIER/manufacturer in writing of the alleged defect or failure. The SUPPLIER/manufacturer will thereupon promptly correct any defect or failure without cost to the OWNER, or it will authorize the OWNER to make, for the manufacturer's account, such repairs or replacements as may be necessary to correct the defect or failure. No allowance will be made for any repairs made by the OWNER, or others, unless and until the OWNER has given the manufacturer notice of the alleged defect or failure prior to the commencement of such repairs or replacements. However, if the defect is such as to interfere with the OWNER's operation, the OWNER may, after notification, proceed forthwith to repair the same at the expense of the manufacturer.

6.0 REGULATORY REQUIREMENTS

6.1 UL label required.



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7.0 DELIVERY, STORAGE AND HANDLING

- 7.1 Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

8.0 SERVICE AND ENVIRONMENTAL CONDITIONS

- 8.1 Unless otherwise specified, this equipment is intended for use in ambient temperatures that do not exceed a maximum of 45 degrees C (113 degrees F) or a minimum of -30 degrees C (-22 degrees F).

PART 2 – PRODUCTS

9.0 LIQUID TRANSFORMERS

9.1 Manufacturers

- 9.1.1 Siemens
- 9.1.2 Cutler-Hammer
- 9.1.3 ABB

- 9.2 The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. All other manufacturers will require approval by the OWNER and the ENGINEER.

9.3 Ratings

- 9.3.1 The ratings of the transformer shall be as follows or as shown on the drawings:
- a. kVA Rating kVA [OA]*
 - b. Impedance [ANSI Standard Tolerance]
 - c. HV 23.0kV [DELTA]
 - d. HV BIL 150kV
 - e. HV De-energized Taps +/- 2 - 2-1/2% full capacity



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f. LV 4.16kV [WYE]

*7500kVA, 10,000kVA, 12,000kVA, 15,000Kva ratings shall be provided in the proposal, the OWNER intends to purchase one (1) or two (2) of these units as part of this project.

9.4 Construction

- 9.4.1 The unit shall be filled with Biotemp or any listed “less flammable liquid” similar to Biotemp as required by 2023 NEC 450-23.
- 9.4.2 The transformer shall carry its continuous rating with average winding temperature rise by resistance that shall not exceed 65 degrees C, based on an average ambient of 30 degrees C over 24 hours with a maximum of 40 degrees C.
- 9.4.3 Transformer shall include provisions for devices, wiring, fans, and auxiliary equipment necessary for automatic temperature controlled forced air cooling to obtain an additional 25% capacity. Control power for fans shall be 230 VAC, single phase furnished from a separate control power source.
- 9.4.4 The transformer shall be designed to carry short time emergency overloads in accordance with ANSI C57.12.92 as applicable. Duration and magnitude of designed withstand capability shall be as outlined in ANSI C57.12.90 and the latest draft of the IEEE short-circuit test code.
- 9.4.5 The transformer shall be designed to meet the sound level standards for liquid transformers as defined in NEMA TR1. The measurement procedure shall be as specified in ANSI C.57.12.90.
- 9.4.6 High-voltage and low-voltage windings shall be aluminum. Insulation between layers of the windings shall be by Insuldur paper or equal.
- 9.4.7 The main transformer tank and attached components shall be designed to withstand pressures 25% greater than the required operating design value without permanent deformation. Construction shall consist of carbon steel plate reinforced with external sidewall braces. All seams and joints shall be continuously welded.
- 9.1.1 Each radiator assembly shall be removable with valves and receive a quality control pressurized check for leaks. The entire tank assembly shall receive a similar leak test before tanking. A final six-hour leak test shall



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be performed after the transformer is tanked, welded and completed to ensure that there are no leaks before shipment.

- 9.4.8 All equipment shall be of the type normally furnished for unit substation applications, shall be designed for satisfactory operation under conditions of heavy exposure to sand, dust and salt laden moisture, and shall be adequately treated or protected against corrosion, moisture, salt, mold, dust, sand, and other destructive elements to which it may be exposed during operation. The equipment shall be suitable for tropical environments.

9.5 Accessories

9.5.1 Transformer features and accessories shall include:

- a. De-energized tap changer with cover mounted, externally operated, pad lockable handle.
- b. Combination drain and filter valve and sampling device
- c. Manual gas pressure test connection
- d. Filling plug and filter press connection in cover
- e. Dial-type top liquid thermometer
- f. Magnetic liquid level gauge
- g. Provisions for lifting, provisions for jacking, base designed for skidding or rolling in two directions.
- h. Ground pad – stainless steel
- i. Instruction nameplate – stainless steel
- j. Pressure vacuum gauge
- k. Welded-on main tank cover and handhole in cover
- l. Pressure relief device

9.5.2 Neutral resistor with controls on the high side as required by NEC 2023-250.186 and NEC 2023-250.188 for this application.

- a. Neutral resistor shall be rated for (TBD) amps at 4.16kv for 10 seconds. (23.2 +/- 10% ohms @ 25 Degrees C)



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- b. Shall include a ground current monitor with adjustable trip settings and will have a contact that will be used to trip the main MV breaker.
- c. The resistors shall be installed in a suitable, stainless steel, well-ventilated, weather-protecting enclosure (NEMA 3R). The resistors should be cooled by means of natural convection. The resistors shall be suitable for outdoor service and storage in salty environmental conditions including 100% humidity. The enclosure shall provide protection from rainfall, adequate heat dissipation and shall not require opening of louvers for operation. All resistors shall consist of stainless-steel grid elements. The resistor banks shall be designed to provide satisfactory continuous duty operation in an ambient temperature of 45°C.
- d. The controls shall be installed in a suitable, stainless steel, weather-protecting enclosure (NEMA 4X). The external controls shall be suitable for outdoor service and storage in salty environmental conditions including 100% humidity.
- e. Conduit entry shall be bottom feed.
- f. System shall include the following as a minimum:
 - (i) Current sensing ground fault detection
 - (ii) Ground current ammeter
 - (iii) Indicating lights: Red (ground fault), Green (Normal)
 - (iv) Ground Fault Contacts (1-NO/1-NC)
 - (v) Shorting Terminal block for ground current CT's
 - (vi) UL Label
 - (vii) Wire Markers

9.5.3 Primary Side Integral Vacuum Fault Interrupter (VFI). The VFI shall have a maximum interrupting rating of 1200A RMS symmetrical with resettable fault protection up through 35kV. The VFI shall also include a Tri-Phase electronic breaker control with over 100 minimum trip settings and 5 selectable time current curves.



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- 9.6 Finish – The paint shall be applied using an air spray with air dry acrylic topcoat system to a minimum of three mils average thickness. Outdoor liquid transformer units shall include suitable outdoor paint finish for installation in a high humidity, salt corrosive environment.
- 9.7 Terminal Compartments/Flange Connections – The transformer shall have no exposed electrical parts and its design shall meet the requirements of 2023 NEC 110.31 in the fact that no additional guarding or fencing shall be required for this equipment for the protection of personnel. The unit supplied shall include a completely enclosed HV and LV cable termination compartment that connects directly to the medium voltage switchgear. The unit supplied shall include HV and LV cable termination connection lugs.

PART 3 – EXECUTION

10.0 FACTORY TESTING

- 10.1 The following standard factory tests shall be performed on all equipment provided under this section. All tests shall be in accordance with the latest version of ANSI and NEMA standards.
- 10.1.1 Resistance measurements of all windings on the rated voltage connection of each unit and at the tap extremes of one unit only of a given rating on this project
 - 10.1.2 Ratio tests on the rated voltage connection and on all tap connections
 - 10.1.3 Polarity and phase-relation tests on the rated voltage connections
 - 10.1.4 No-load loss at rated voltage on the rated voltage connection
 - 10.1.5 Exciting current at rated voltage on the rated voltage connection
 - 10.1.6 Impedance and load loss at rated current on the rated voltage connection of each unit and on the tap extremes of one unit only of a given rating on this project.
 - 10.1.7 Applied potential test.
 - 10.1.8 Induced potential tests.
- 10.2 The manufacturer shall provide three (3) certified copies of factory test reports.



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11.0 FIELD QUALITY CONTROL

- 11.1 SUPPLIER to provide the services of a qualified factory-trained manufacturer's representative to assist the OWNER with installation and start-up of the equipment specified under this section. The manufacturer's representative shall provide technical direction and assistance to the OWNER regarding the general assembly of the equipment, connections and adjustments, and testing of the assembly and components contained herein.
- 11.2 The SUPPLIER shall provide three (3) copies of the manufacturer's field start-up report.

12.0 MANUFACTURER'S CERTIFICATION

- 12.1 A qualified factory-trained manufacturer's representative shall certify in writing that the equipment has been installed, adjusted and tested in accordance with the manufacturer's recommendations.
- 12.2 The SUPPLIER shall provide three (3) copies of the manufacturer's representative's certification.

13.0 TRAINING

- 13.1 The SUPPLIER shall provide a training session for up to five (5) OWNER's representatives for one normal workday at a jobsite location determined by the OWNER.
- 13.2 The training session shall be conducted by a manufacturer's qualified representative. Training program shall include instructions on the transformer, auxiliary devices and other major components.

14.0 INSTALLATION

- 14.1 The OWNER shall install all equipment per the manufacturer's recommendations and the contract drawings.
- 14.2 All necessary hardware to secure the assembly in place shall be provided by the SUPPLIER.



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15.0 FIELD MEASUREMENTS

15.1 Measure primary and secondary voltages and make appropriate Tap adjustments following installation and start-up.

16.0 FIELD TESTING

16.1 The following tests shall be performed:

16.1.1 Measure primary and secondary voltages for proper tap settings.

16.1.2 Megger primary and secondary windings

16.1.3 Test oil for dielectric strength.

16.2 The SUPPLIER shall provide three (3) copies of the manufacturer's field-testing reports.

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 SPECIFICATION



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SECTION 262816 – VACUUM LOOP SWITCH CIRCUIT BREAKER ASSEMBLY

PART 1 – GENERAL

1.0 SUMMARY

- 1.1 This specification applies to three-phase, group operated, 60 Hz, pad mounted, load and fault interrupting vacuum switch assembly, liquid insulated, with maximum ratings of 600 A and 15.5 kV, and utilizing separable insulated connectors. The assembly, hereinafter designated as a “Loop-Tap Switch”, shall contain overcurrent and other relay and fault-indicating equipment as specified.

2.0 REFERENCES

- 2.1 American National Standards Institute (ANSI)
- 2.2 Institute of Electrical and Electronics Engineers (IEEE)
- 2.3 American Iron and Steel Institute (AISI)
- 2.4 C37.72-1987 ANSI Requirements for Manually Operated, Dead- Front Padmounted Switchgear with Load Interrupting Switch.
- 2.5 IEEE C57.12.29 IEEE Standard for Pad-Mounted Equipment - Enclosure Integrity for Coastal Environments
- 2.6 IEEE Standard 386-2006 for Separable Insulated Connector Systems for Power Distribution Systems above 600 V.

3.0 SYSTEM DESCRIPTION

- 3.1 The crane medium voltage switchgear shall be pad mounted, 3-way, 2-way switched one-way vacuum fault interrupter-protected, oil-insulated vacuum switchgear assembly.
- 3.2 The units will come complete with oil installed and will be constructed entirely of stainless steel.
- 3.3 The vacuum fault interrupter will have (1) key interlock with (2) keys (hold and release function). There will also be (3) potential transformers connected line to-



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ground, one on each phase, and those transformers will each be protected by a current-limiting fuse in a dry well fuse holder.

- 3.4 The vacuum fault interrupter (VFI) shall have a 304 stainless steel control cabinet mounted on the rear side of the switch tank. This control cabinet will house one (1) SEL 351 relay for overcurrent protection of the two VFI ways, one (1) ground fault, ground check monitor relay and one (1) TTIP Lite UPS. The unit will also contain a key interlock block. On this cabinet there shall be installed a separate enclosure fitted with push buttons to close, open, and trip the vacuum fault interrupter, three (3) single phase fault indicators and a break-glass type pushbutton to allow the fire department to trip the VFI in the event of an emergency.
- 3.5 The high voltage cabinet will be deep enough to allow stacking (2) 600-amp elbows on top of each other on the 600-amp bushings. The switchgear tank will also have a drain valve and (3) single-phase fault indicators with remote fish eye and no auxiliary contacts.
- 3.6 The contractors shall be responsible of performing all the setups, calibrations and adjustments required by the switch and its components to perform at optimal levels for the installation. The CONTRACTOR shall be responsible of obtaining switch units identical to what have been installed on site.

4.0 SUBMITTALS

- 4.1 Submit the following in accordance with the requirements of SECTION 010000 – GENERAL PROVISIONS and SECTION 016000 – ELECTRICAL – GENERAL of these specifications.

- 4.1.1 Shop Drawings:

- a. Overall arrangement of the Loop-Tap Switch, including:
 - (i) Overall dimensions and arrangement on its foundation along with all conduit stub-ups
 - (ii) Shipping packaging
 - (iii) Identification of units
 - (iv) Unit locations



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- (v) Locations of incoming and outgoing line bushings
- (vi) Mounting dimensions
- (vii) Available conduit entrance areas
- (viii) Bushings and Bushing Stands; Phase and Ground
- (ix) Enclosure with description of weatherproof construction and specified finishes.
- (x) Interlocking scheme including keying with type of interlocking equipment
- b. Schematic and elementary diagrams for individual unit, and master terminal boards consisting of drawings which identify:
 - (i) Electrical devices
 - (ii) Electrical connections
 - (iii) Terminal numbering designations
- c. Overall Schematic Diagram for the entire assembly showing all power, control and signal interconnections of all equipment and devices
- d. Documentation for the installation, operation and maintenance of solid-state protective relaying, monitoring and metering equipment that clearly demonstrates the equipment's ability to function as intended in this project.

4.1.2 Catalog Cuts

- a. Vacuum Switches
- b. Nameplates
- c. Overcurrent Relays
- d. Metering Equipment
- e. Circuit breakers
- f. Ground Check Relay
- g. Connection Bushings and Test Point Connectors
- h. Fault Indicators



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i. Other factory or field mounted devices shown on the Contract Drawings

4.1.3 Manufacturer's certifications.

4.1.4 At time of acceptance of the Loop-Tap Switch Assembly, deliver all copies of all software with associated documentation for the installation, operation, maintenance and troubleshooting for all of the digital equipment installed.

5.0 DELIVERY, STORAGE AND HANDLING

5.1 Loop tap switch assemblies shall be delivered with all electrical devices, including but not limited to circuit breakers, switches, relays, fault indicators and control power transformers shall be in place and wired. Packaging materials shall be such to prevent damage to components due to vibration, jarring and the like during transportation and handling.

5.2 Electrical devices shipped loose shall be delivered in the manufacturer's original unopened protective packaging and shall be identified with suitable, non-corrosive tags.

5.3 Where possible, maintain protective coverings until installation is complete and remove such coverings as part of the final cleaning up.

5.4 Touch up any damage to finishes to match adjacent surfaces.

PART 2 – PRODUCTS

6.0 MANUFACTURER:

6.1 Trayer Engineering Corporation

7.0 DEFINITIONS

7.1 The definitions of terms contained in this specification, or in other standards referred to in this document, are not intended to embrace all the legitimate meanings of the terms. They are applicable only to the subject treated in this specification.



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- 7.1.1 Bus (as used in this specification) – A three-phase junction common to two or more ways.
- 7.1.2 Way – a three-phase circuit entrance to a switching assembly.
- 7.1.3 Switched Way – a way connected to the bus through a three-pole, group operated switch.
- 7.1.4 Tapped Way – a way solidly connected to the bus.
- 7.1.5 Breaker Protected Way – a way with breaker mechanism utilizing vacuum fault interrupting contacts to minimize fault interruption time.

8.0 GENERAL DESCRIPTION

- 8.1 The purpose of the Loop-Tap Switch assembly is to provide a link in the loop feeder system that will also provide a tap to feed each crane. The switches can isolate the tap from either of the two sections of the loop or can connect the two sections together to complete the loop through the assembly. This arrangement allows the loop, normally operated with one open switch, to continue in service while segregating a faulted section of the loop without causing an interruption to any crane. The normally open switch would generally be located at the electrical load center of the loop, the source ends of which are connected to two separate bus sections through two step-down transformers at the Main Substation. Through operation of selected loop switches, further reliability is provided by allowing the entire loop to operate from one of the Main Substation busses in case of an interruption of service on one of the Terminal's incoming feeders or transformer.
- 8.2 The Circuit Breaker Tap is a standard vacuum switch with ratings as described below that is equipped with additional equipment to allow tripping through overload or ground fault conditions as well as providing certain monitoring and metering functions. The tap Circuit Breaker shall incorporate a third position for grounding the outgoing tap feeder to the crane for servicing. All equipment is provided within the Loop-Tap Switch enclosure. The equipment is stand-alone in that no outside control power or circuits are required for its normal operation.
- 8.3 Within the switches, load interruption arcing shall take place in a vacuum to keep system switching transients to a minimum.
- 8.4 Fault clearing shall take place in a vacuum to minimize clearing time.



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- 8.5 Nominal Voltage of all switches is 15 kV
- 8.6 Basic Insulation Level (BIL) of all switches is 95 kV
- 8.7 One Minute Withstand (60 Hz) of all switches is 35 kV
- 8.8 Continuous Current (Maximum in Amps) of all switches is 600 Amps.
- 8.9 Load switching of all switches is 600 Amps.
- 8.10 Number of full load switching operations of load interrupting mechanism of all switches is 10,000.
- 8.11 Maximum three-time Interrupting Capacity of load break mechanism in Symmetrical Amps is 2,000.
- 8.12 Maximum interrupting current of circuit breaker in Symmetrical Amps 16,000.
- 8.13 Momentary & Make & Latch (Asymmetrical Amps) 20,000
- 8.14 Way Electrical Description.
 - 8.14.1 2 ways switched terminating with 600 amp bushings/(wells).
 - 8.14.2 1 ways vacuum breaker protected terminating with 200 Amp bushings/(wells).
 - 8.14.3 Other Ways as indicated on drawings
- 8.15 Protective Relay Description
 - 8.15.1 Overcurrent relays shall be of the solid state, multifunction, draw out type such that the elements can be removed and tested and calibrated with conventional switchgear relay test equipment and/or a portable or remote computer.
 - 8.15.2 The relay shall be capable of tripping the breaker manually by pushing a manual trip button when the capacitor trip device is energized.
 - 8.15.3 The solid-state overcurrent relays shall be designed to match the time current characteristic curves of conventional induction disk overcurrent relays for easy coordination with upstream and downstream electromechanical relays and fuses.



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- 8.15.4 The solid-state overcurrent relays shall be operated from standard current transformers with 5 Ampere secondary ratings.
- 8.15.5 The solenoid shall be tripped by a solid state overcurrent relay actuated by bushing current transformers. Stored energy for powering the relays and solenoid shall come from a capacitor trip device powered by diodes arranged such that any diode can fail by opening or shorting without causing system failure. Provide two fused voltage transformers to transform the incoming power to 120-volts for charging the capacitors along with a transfer switch for connecting the charging circuit to whichever transformer might be energized.
- 8.15.6 The protective relay shall contain at least the following features:
 - a. Two Phase Time Overcurrent Elements with Voltage Restraint
 - b. Two Phase Instantaneous Overcurrent Elements
 - c. Ground Time and Instantaneous Overcurrent
 - d. Sensitive Ground Time and Instantaneous Overcurrent
 - e. Two Bus Undervoltage Elements
 - f. Two Line Undervoltage Elements
 - g. Two Overvoltage Elements
 - h. Two Under/Over Frequency Elements
 - i. i) Frequency Decay
 - j. Breaker Failure with Current Supervision
 - k. Reverse Power (to be taken out of service)
- 8.15.7 The relay shall contain at least the following monitoring and metering features:
 - a. Power Factor
 - b. Fault Locator
 - c. Demand (I a , I b , I c , MW, MVA, MVA)
 - d. Average Current
 - e. Average Line and Phase Voltage



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- f. Energy (MWh, MVArh)
- g. Last and Maximum Demand (I a , I b , I c , MW, MVAr, MVA)
- h. Breaker Operation Failure
- i. Trip and Close Coil Monitors
- j. VT Failure
- k. Provide interfaces for local computer connection for data acquisition, monitoring and making settings plus full remote communications capability with two RS485 ports, one of which can be configured with the Modbus RTU communications protocol. Provide a communications module that provides ModBus communications allowing future connection to fiber optic LAN and WAN network systems by others

8.15.8 The Contractor shall insure that the Relay manufacturer coordinates with the crane manufacturer to guarantee trouble-free operation of all relay protection, monitoring and metering functions in conjunction with the anticipated solid state crane drive equipment and the harmonic current and voltage content generated therefrom

8.15.9 The Contractor shall insure that the Loop-Tap Switch manufacturer coordinates with the Relay manufacturer to assure proper mounting and operation of all controlled equipment to satisfy the requirements of the project.. Of particular importance is that the Loop-Tap Switch energy storage equipment provide sufficient power to operate the relay and trip the circuit breaker during fault conditions.

8.16 An emergency trip pushbutton station shall be mounted on the outside of the Loop Tap Switch enclosure to provide a means to trip the crane circuit breaker without having to open the loop switch enclosure. The pushbutton shall be painted red with a break-glass feature installed in a NEMA 4, weatherproof enclosure. Provide all connections and wiring for its intended purpose. Provide an adjacent weather proof sign stating “Crane Circuit Breaker – Emergency Trip” in red letters engraved into a white background. Crouse-Hinds Type EFS or approved equal. The product manufacturer shall provide an anti-fungal conformal coating suitable for a harsh environment on all electronic parts



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8.17 The Contractor shall provide all software and documentation necessary for the installation, local and remote operation, maintenance and troubleshooting functions of the digital relay.

8.18 The relay equipment is to be as manufactured by GE Industrial Systems Power Management, their Model 750 Feeder Management Relay or an approved equal.

8.19 Ground Check Monitor

8.19.1 General Specification

- a. The ground check monitor shall be provided to:
 - (i) Detect open ground-check conductor throughout the crane's 15 kV electrical system.
 - (ii) Detect open ground return.
 - (iii) Detect ground-check conductor short circuiting to ground.
- b. The ground check monitor shall include a Zener-diode termination for reliable ground-check verification. The monitor shall not require a ground-check loop-resistance calibration.
- c. The device shall include an LED Indication of ground-check Trip, Valid, Open, and Short as well as a power "on" LED. A minimum of eleven ground-fault setpoints shall be provided.
- d. The power supply shall be coordinated with the available range of ac and dc voltages.
- e. For operation with the container cranes a DFT (harmonic filter) shall be provided to prevent nuisance tripping.
- f. Ground-check functions shall fail-safe and shall include current-sensor (CS) verification and indication.
- g. The ground check circuit shall utilize a non-hazardous voltage and have a wide ground-fault set-point range.
- h. The Contractor shall provide all software and documentation necessary for the installation, operation, maintenance and troubleshooting functions of the digital relay.
- i. The ground check device shall be as manufactured by Startco Engineering Ltd., Saskatoon, Canada, their Model SE-134C with an



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SE-CS10 current sensor and an SE-TA6A termination device or approved equals.

- j. Provide an auxiliary UPS module that will prevent the relay from initiating a “trip” signal whenever the input power supply is interrupted for a short time. The UPS shall be sized at no less than 50 VA and integrated by the switchgear manufacturer into the ground check system.

8.20 Fault Direction Indicator

8.20.1 General Specification

- a. The fault indicator is selected to facilitate location of faulted sections of loop circuits to avoid lengthy field tests and trial and error detection methods. The device shall be expressly designed to be installed on leading manufacturer’s load break elbows with the separable connectors rated for 600A with a voltage test point. The device shall include a stored energy design that utilizes the capacitively coupled voltage present at the elbow test point to operate a “fault” flag in a remote display window attached to the exterior of the loop tap switch enclosure. When the system is re-energized, the indicator shall reset automatically.
- b. The fault indicator shall incorporate an inrush restraint feature of 200 ms to ignore current spikes and inrush currents caused by switching transients.
- c. A low pass filter shall be provided to prevent the indicator from tripping on high frequency transients.
- d. Provide all components including a remote display unit with remote cord and all necessary attachments and mounting means for the indicator and its display unit.
- e. Provide one set of three indicators at each loop tap switch, one for each phase conductor.
- f. Fault Indicator to be as manufactured by Cooper Power Systems, their Model S.T.A.R, Type TPR S320-40 or an approved equal.



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9.0 CONSTRUCTION REQUIREMENTS

9.1 Electrical.

9.1.1 Load Break Switch

- a. The switch shall utilize vacuum interrupters having load and fault break capabilities and shall have minimum life of 10,000 600-amp interruptions without changing insulation, relieving pressure or replacing parts.

9.1.2 Circuit Breaker

- a. The circuit breaker shall utilize vacuum interrupters and be rated to carry 600 amps continuously, break 600 amps load and interrupt fault current of 16,000 amps symmetrical within 2½ cycles after energization of the trip coil.

9.2 Bussing.

- 9.2.1 All internal switch bussing shall be copper.

9.3 Grounding Provision.

- 9.3.1 One stainless steel grounding pad with a 1/2-inch 13 NC hole, 7/16 inches (11.1 mm) deep, shall be provided for each way and shall be located near the center bushing of each way.
- 9.3.2 Provide two sets of three grounding harnesses with appropriate connectors for maintenance purposes. Deliver to the OWNER's representative as directed by the ENGINEER.

9.4 Manual Operating Provisions.

- 9.4.1 Manual operating handles shall move in to close and out to open. The direction of operation shall be apparent.
- 9.4.2 Manual operating handles shall be located where they can be operated either to open or to closed positions with standard live-line tools. The force required to operate the handle shall be such that one person in a standing position can readily operate it.
- 9.4.3 The switch mechanism shall be designed so that operation does not require any special skills, and the closing and opening speeds of the



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contacts are independent of the speed at which the operating handle is operated.

9.4.4 Manual operating handles shall be capable of being padlocked in both the open and closed positions.

9.4.5 Two interlocking schemes are required for the Loop Tap Switch assemblies. The Contractor shall be responsible for developing these schemes to properly function with the switches and equipment actually furnished. For this project, only two Loop Tap Switches are to be furnished with interlocks, but the scheme shall be developed for the full buildout of six units. The scheme descriptions are as follows:

- a. Provisions only shall be made to install a Kirk Key Interlock device on the crane tap circuit breaker to be furnished by others but with the mounting means and drilling arrangement installed by the Contractor. The device will be designed to prohibit closing of the crane circuit breaker after the interlocking key has been withdrawn.
- b. The Contractor will be given the details as well as a sample of the interlock device by the Authority to allow the proper mounting means to be designed by the manufacturer of the loop tap switch to be installed in the field. When the Loop Tap Switches have been installed, the crane circuit breaker interlocks will then be furnished and installed by others. The companion interlock will also be furnished and installed on the associated crane by others.
- c. Interlocks shall also be provided on the two incoming switches of the entire line-up of the Loop-Tap Switch assemblies. These interlocks are to be arranged to insure that at least one of the eventual six switches is to remain open. This is to prevent a voltage from being back fed from one of the two incoming feeders into the other. Thus, If one of the feeder breakers (for example Feeder Breaker C1-01-01) at the Main Substation were opened and tagged out by an electrician for servicing, there must not be any chance that a voltage from the remaining feeder (C2-01-10) being fed through the group of Loop Tsp Switches back to the Main Substation and presenting a danger to the electrician working in Sub C1.



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9.5 Load Break Switch Operating Mechanism.

9.5.1 The switch shall be equipped with an internal operating mechanism design so that speed of opening and closing of the interrupter contacts will be independent of the external operator. All contacts of the three phases shall be operated simultaneously with no possibility of single phasing due to teasing of switch handle.

9.5.2 The switch shall be quick-make, quick-break type. Contacts shall be stable in open and closed positions without use of mechanical latches, sear pins or detents.

9.6 Circuit breaker mechanism.

9.6.1 The vacuum circuit breaker shall be equipped with an internal operating mechanism design such that the speed of opening and closing of the vacuum contacts will be independent of the external operator, and such that the tripping mechanism used for tripping under fault conditions is not worn down by load interrupting operations. All contacts of the three phases shall be operated simultaneously by a gang bar so there is no possibility of single phasing due to teasing of the circuit breaker handle or discontinuity of control wiring. A yellow-colored trip flag shall indicate when the breaker has been tripped and tripping will not occur during normal load break operations.

9.6.2 The manual operating handle will close the breaker when pushed to the closed position from the open position. If the breaker is tripped by solenoid action the breaker can be reclosed by first moving the handle to the open position and then moving it to the closed position. The breaker can be opened any time by moving handle to the open position.

9.6.3 See above for the provisions for installing a Kirk Key Interlock on the circuit breaker.

9.7 Three Phase Visible Disconnects

9.7.1 In addition to the above Position Indicators, the loop switch assembly shall be provided with a “visible open” by means of separate oil switch disconnect whose contacts can be easily viewed through a window to doubly confirm the switch position as safe. The visible disconnect shall be in a series with the source side switch position as safe. The visible disconnects shall be in series with the source side vacuum load



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interrupter switches. The 3-phase visible disconnects in series with the vacuum contacts shall be rated at least 20,000-Amps asymmetrical momentary, 600-amperes continuous and 150kV BIL so as to not limit the rating of the overall assembly. The operating handle shall be mechanically interlocked with the vacuum load interrupter handle such that the vacuum interrupter always opens first and closes last. The visible disconnect needs to be opened when operating conditions require a visible disconnect or padlocking open and its contacts shall be visible through a gasketed transparent window. The viewing window shall be located so that the operator can see the visible contacts moving as he operates the lever to open or close them. The visible disconnect shall be hermetically sealed within the tank, be oil immersed and protected from the outside environment.

9.8 Position Indicators.

9.8.1 Switches shall be provided with position indicators or other suitable means that clearly and positively indicate the open and closed positions of the contacts.

9.8.2 The indicators shall be visible with the enclosure open.

9.9 Insulating Medium Quantity Indicators.

9.9.1 Procedures or devices that require exposing the insulating medium to the outside environment are not permitted.

9.9.2 Provision shall be made for personnel to readily determine safe insulating liquid level with the switch energized.

9.9.3 Low Insulation Level indication device shall have no moving parts and shall display "LOW OIL" with white letters against a red background when insulation falls below safe level.

9.10 Sampling and Addition Provisions.

9.10.1 Provisions shall be made to facilitate replacement of the insulating medium with the pad mounted switchgear de-energized.

9.10.2 Provisions shall be made for adding the insulating medium to the tank with the switch energized.



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9.11 Access Door and Tank Construction

- 9.11.1 The tank shall be constructed of 7 gage AISI 304 stainless steel. The cabinet and doors shall be constructed of 11 gage AISI 304 stainless steel. The cabinet doors shall be capable of being latched in the open position.
- 9.11.2 All access door hinge pins and appurtenances shall be made of AISI 304 stainless steel to maintain corrosion resistance properties.
- 9.11.3 All hinged doors shall be equipped with a positive latching device to prevent unintentional closing.
- 9.11.4 All bushings or bushing wells to be welded to make them an integral part of the tank.
- 9.11.5 All tank penetrations shall be double "O" ring sealed.
- 9.11.6 No external portion of the tank or accessories shall trap water.
- 9.11.7 Lifting lugs shall be welded to the tank so that the switch will remain level when being lifted. The lugs shall be designed and located to avoid interference between lifting slings and any attachments.
- 9.11.8 Parking stands located such that any elbow can be easily parked with a minimum distance of travel, and elbows from one way can be all parked.

9.12 Enclosure:

- 9.12.1 Exterior enclosure shall be painted galvanized steel.
- 9.12.2 Enclosure shall be factory coated in accordance with the testing procedure in IEEE C57.12.29 IEEE Standard for Pad-Mounted Equipment.
- 9.12.3 Exterior dimensions of the enclosure shall be as detailed on the drawing. Other size enclosures can be accepted subject to the approval of the ENGINEER and to the requirement that the Contractor shall provide an alternate foundation sized accordingly at no extra cost to the OWNER.



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9.13 Terminations:

- 9.13.1 The switch bushings shall accommodate cable terminations in accordance with ANSI/IEEE Std. 386-2006. Provide enclosure room to accommodate piggyback connectors.

9.14 Bushing Designation:

- 9.14.1 The switch bushings shall be identified and legibly marked adjacent to each bushing with the appropriate phase designation, using a nameplate of corrosion resistant material.

9.15 Tank Nameplate:

- 9.15.1 A nameplate of stainless steel shall be provided.
- 9.15.2 The nameplate shall be tack welded securely to the top of the tank by means of AISI 308 stainless steel filler.
- 9.15.3 All letters, schematics and numbers shall be photo engraved on the nameplate.
- 9.15.4 The nameplate shall contain at least the following information:
- The words “Vacuum Switch”.
 - Name of manufacturer.
 - Date of manufacture (month and year, for example, 1-90).
 - Serial Number.
 - Model number or style number.
 - Rated maximum voltage.
 - Rated impulse withstand voltage.
 - Rated continuous current.
 - Rated load interrupting current.
 - Rated fault interrupting current.
 - Rated momentary current.
 - Rated making current.



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- m. A three-line bushing-oriented schematic diagram, using standard symbols (this may be put on a separate nameplate).
- n. Total weight (including insulating medium).
- o. Type and quantity of insulating medium.

9.16 Enclosure Nameplates

- 9.16.1 Provide nameplates as described above mounted on exterior of enclosure with the words, "Crane No. X" with the actual crane number substituted for the letter "X".

9.17 Factory Testing Requirements

9.17.1 Tank

- a. The finished tank shall be pressurized to 7 pounds per square inch and tested for leaks using suitable leak detection methodology.

9.18 Electrical

- 9.18.1 Thirty-four kV AC hipot shall be conducted for one minute phase-to-phase, phase-to-ground, and across open contacts on all ways.
- 9.18.2 Provide continuity test for all circuits.
- 9.18.3 Provide resistance test for all circuits.
- 9.18.4 Provide initial operation test for all protective relaying, monitoring and metering equipment.

9.19 Shipping Requirements

9.19.1 Preparation

- a. The switch shall be completely assembled and include all appurtenances and the required insulating medium.
- b. Switches shall be properly packaged and braced to prevent damage during shipment.

9.19.2 Documentation

- a. Instructions, documentation and checklists for the inspection, installation and maintenance of the switch and all appurtenances, including software, shall be provided.



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PART 3 – EXECUTION

10.0 PREPARATION

- 10.1 Each crane shall be identified, and each Assembly shall be clearly labeled with the identification of actual crane served. Furnish the Loop-Tap Switch Assembly manufacturer the actual nameplate data from each crane served by the Assembly.
- 10.2 Furnish the Loop-Tap Switch Assembly manufacturer the details and sample of the Kirk Key Interlock device to be installed on each circuit breaker. The sample is not to be installed but only used as a model for the mounting means.

11.0 EXAMINATION

- 11.1 Verify that the electrical installation, structural, and related Work performed under other Sections of the Specifications, satisfy the requirements for the performance of the Work in accordance with the Contract Drawings in this Section and as specified in this Section.

12.0 FIELD SUPERVISION

- 12.1 Provide the services of a qualified, factory-trained Loop-Tap Switch Assembly manufacturer's representative to provide technical field support in the installation and start-up of the equipment specified in this Section. The manufacturer's representative shall provide technical direction and assistance in the following:
 - 12.1.1 Direct the Switchgear Assembly, removal of blocking, etc.
 - 12.1.2 Perform Required Equipment Adjustments
 - 12.1.3 Equipment Checkout and Calibration, including all protective relays, monitoring and metering functions
 - 12.1.4 Trouble Shooting

13.0 EXAMINATION

- 13.1 The Contractor is responsible for notifying the ENGINEER as soon as he finds conditions which prevent the proper installation of materials or methods specified in this Section.



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14.0 INSTALLATION

- 14.1 Switchgear shall be transported within the construction site, unloaded, uncrated, handled, stored, installed, including assembly of all component parts, and wired in accordance with the manufacturer's recommendations, applicable ANSI standards, and the requirements specified in this Section.
- 14.2 Provide all equipment, supervision, labor, rigging, tools, including, but not limited to, special equipment such as cranes.
- 14.3 Before setting the switchgear, the concrete pad and openings for conduits cables shall be checked for accuracy of position.
- 14.4 Switchgear shall be set on foundations at the locations shown on the Contract Drawings. Provide floor sills and set level on a concrete pad with an elevation of approximately 2-inches above the foundation. Follow the manufacturer's recommendations for preparation of the mounting surface and the fastening of the equipment. The switchgear shall be set, adjusted, and leveled in place, using shims where necessary. Allow an air space of approximately 6-inches between enclosures to avoid the collection of debris and to allow cleaning.
- 14.5 The Contractor shall obtain from the manufacturer written Certificates that the switches, circuit breakers and protective/monitoring/metering devices have been properly installed and adjusted and that the proper overloads have been installed. Prior to startup of equipment, submit the manufacturer's certification to the ENGINEER for approval.
- 14.6 Cables shall be neatly racked and bundled with nonflammable nylon ties, routed into the enclosure compartment. Minimum bending radii as recommended by cable manufacturers shall not be reduced. Install test point type elbow connectors as recommended by the assembly manufacture to match the bushing provided.
- 14.7 Bushings and grounding connections shall be cleaned and insulated by the insulating boots on the connectors. Make all grounding connections to the equipment as recommended by the manufacturer and as shown on the drawings.
- 14.8 Covers or enclosures of individual equipment items shall all be securely bolted in place.



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- 14.9 Install, wire, and connect the Ground Check Relay in accordance with the Contract Drawings and manufacturer's drawings and instructions. The companion connections on the crane and the installation of the circuit terminating Zener Diode will be by others. This item shall be turned over to the ENGINEER for transferring to the crane manufacturer's commissioning crew for installation. Coordinate with the crew for wiring checks and troubleshooting.
- 14.10 All damaged paint areas shall be properly prepared by the Contractor for an application of primer and finish coats of paint, which shall be supplied by the manufacturer for this purpose. The Contractor shall apply the primer and finish paint coats.
- 14.11 After each item of equipment is installed and connected, the Contractor shall make a thorough inspection of the installation, cleaning all bushings and connectors and cleaning all compartments of debris and foreign matter. Prior to final acceptance of the Work, and field testing, the Contractor shall clean the equipment of all construction dust and dirt. A careful check shall be made to ensure that all members included for shipping purposes have been removed.

15.0 FIELD TESTS

- 15.1 Field tests and inspection for commissioning the Loop-Tap Switch Assembly shall be performed in accordance with only applicable portions of SECTION 16998 entitled, "MEDIUM VOLTAGE SYSTEM COMMISSIONING TESTS," included on these Specifications. Those tests performed by the equipment manufacturer in the field need not be repeated to comply with this specification section. Advise the ENGINEER, in writing, upon failure of any equipment or material to pass the tests performed, or to function properly as intended. In the event that testing does not meet the requirement for proof of satisfactory performance specified herein, the Contractor shall repeat the test. The ENGINEER reserves the right to decide whether a test must be repeated. Devices failing the repeated tests and deemed un-repairable by the ENGINEER, shall remain the property of the Contractor.



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16.0 PROTECTION

- 16.1 Protect all equipment and facilities against damage, mechanical or otherwise and provide maintenance until issuance of the Certificate of Final Completion. The equipment shall be kept clean, dry, and protected at all times.

17.0 TRAINING

- 17.1 Provide training sessions at the construction site for the number of Authority personnel, as specified on the Contract Drawings for two (2) eight (8) hour days.
- 17.2 The training sessions shall be conducted by a manufacturer's qualified representative. The training program shall consist of the instruction on the operation of the assembly, circuit breakers, major components and the protective relaying, ground check relaying, monitoring and metering equipment within the assembly, including all software and associated documentation.

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



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SECTION 265600 – 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).



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- 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



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- 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.



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- 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.
- f. 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



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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.



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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.



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- 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.



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- 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).



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- 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



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d. U_o – Illuminance Uniformity (E_{min} / E_{ave}), 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.



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- 1.1.1 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 1/2-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



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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 PART 2 – 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.



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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 260526 –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 260526 - GROUNDING.



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- 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 260526 – 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.



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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 PART 1 – 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



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DIVISION 31 – EARTHWORK

SECTION 312000 – 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.



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- 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.



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- 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.



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- 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 with 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).



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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



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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.



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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

8.5.3 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:

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

8.5.4 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 PREPARATION OF GROUND SURFACE FOR FILL

9.1 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.



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10.0 SUBGRADE PREPARATION

- 10.1 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.
- 10.2 Compaction – Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

11.0 FINISHING

- 11.1 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.

12.0 SUBGRADE AND FILL PROTECTION

- 12.1 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.



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13.0 DETERMINATION OF DENSITY

13.1 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.

13.1.1 Underground piping and electrical duct banks – Every 250 LF

13.1.2 Each side of trench drain – Every 100 LF

13.1.3 Each side of trench drain at junction box locations

13.1.4 General Area – Every 10,000 SF

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

13.3 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.

14.0 DISPOSAL OF UNSUITABLE OR EXCESS MATERIAL

14.1 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.

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



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SECTION 312500 – 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:



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- 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.



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- 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.



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- 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



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(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



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SECTION 316213 - PRESTRESSED CONCRETE PILING

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 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 ASTM D1143/D1143M – Standard Test Methods for Deep Foundation Elements Under Static Axial Compressive Load
 - 2.1.4 ASTM D4945 – Standard Test Method for High-Strain Dynamic Testing of Deep Foundations
 - 2.1.5 AASHTO - Standards Specifications for Highway Bridges
 - 2.1.6 ACI 318 – Building Code Requirements for Structural Concrete and Commentary
 - 2.1.7 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.



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- 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 Pile driving records shall be submitted within one day of installation of the individual piles.
- 3.1.5 Pile reinforcing stress calibration data
- 3.1.6 Pile template details
- 3.1.7 A preconstruction wave equation analysis as outlined in Section 8.0 of this specification. The results of wave equation analysis shall include an Inspector's Chart relating blow count, hammer energy (stroke), and pile capacity.

PART 2 – MATERIALS

4.0 MANUFACTURERS

- 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).



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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



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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".



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- 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



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5.0 LENGTH OF PILES

- 5.1 Probe Piles In order to verify pile design and develop driving characteristics, the CONTRACTOR will drive seven (7) 24-inch square and one (1) 30-inch square precast-prestressed concrete piles of the lengths, sizes and locations as shown on the Drawings. Probe piles will become working piles and must be accurately located in accordance with the drawings.
- 5.2 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



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- 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

- 8.1 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.
- 8.2 Approval of the proposed driving system by the ENGINEER shall be based upon the wave equation analyses indicating that the proposed driving system can develop a pile capacity of at least 2.5 times the pile design load at a driving resistance of 10 blows per inch within allowable driving stress limits. The hammer should also be sized such that the penetration per blow at the required ultimate capacity does not exceed 0.5 inches.
- 8.3 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



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9.0 PROBE PILE PROGRAM

- 9.1 As outlined in Section 5.1, eight (8) probe piles will be driven to assess driving characteristics and provide piles for testing.
- 9.2 Probe piles shall be driven to 3 inches above design grade or to pile practical refusal as specified in Section 8.2.

10.0 PILE TESTING

- 10.1 After a minimum waiting period of 72 hours after initial driving, all probe piles will be re-driven with dynamic testing as outlined in specification Section 316217 – HIGH STRAIN DYNAMIC TESTING OF PILE FOUNDATIONS. The restrike driving sequence shall be performed with a warmed-up hammer and shall consist of striking the pile for 50 blows or until the pile penetrates an additional three inches, whichever occurs first. In the event the pile movement is less than ¼ inch after 20 blows of the hammer, the restrike may be terminated.
- 10.2 Static Load Test – A static load test will be performed on one 24-inch square and one 30-inch square precast-prestressed concrete pile. The load tests will be conducted in accordance with the latest edition of ASTM D1143.
 - 10.2.1 General – The CONTRACTOR shall furnish all loading platforms and applied loads, reaction frames, hydraulic jacks for applying test loads to piles, calibrated hydraulic gages for connection to the jacks, quality control measuring instruments and any other special equipment required for determining the reaction of test piles. In addition, the CONTRACTOR shall provide all materials, labor, and the use of any construction equipment to be regularly employed on the job which, in the opinion of the ENGINEER, is necessary for the satisfactory completion of the pile test as specified herein.
 - 10.2.2 Test Loads – Test loads shall be applied by hydraulic jacks reacting against a loaded platform or reaction frame in such a manner as to ensure concentric loading and to permit developing and holding the required test loads for periods of time as directed. The loading equipment shall be of sufficient capacity to apply a compression test load of not less than 600 tons for the 24-inch pile and 700 tons for the 30-inch pile. The CONTRACTOR shall submit his proposed test



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methods to the ENGINEER no later than seven (7) days prior to driving the probe piling.

10.2.3 Access to the Test Pile Location(s). The Contractor shall provide access for the testing lab personnel as required for instrumentation set-up and recording during the performance of the load test(s).

10.2.4 Test Loading of Piles. The load tests will be performed as described herein and in general conformance with ASTM D1143, using standard method. Loading frames and equipment shall be ready to place in operation as soon as the test piles have been driven. Loading of test piles shall be initiated when directed by the ENGINEER. In general, the piles will be required to remain in place for a period of approximately 72 hours before loading. The test loads shall be applied in increments and at intervals of time as directed by the ENGINEER. Each increment of load shall be maintained constant until progressive settlement has nominally stopped in accordance with ASTM D1143.

11.0 DRIVING

11.1 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.

11.2 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.

11.3 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



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the driving is stopped by causes which could not reasonably have been anticipated.

- 11.4 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.
- 11.5 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.
- 11.6 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.
- 11.7 The CONTRACTOR will retain a testing consultant to monitor pile driving and record data during installation. Pile Driving Records shall include:
 - 11.7.1 Project name and number
 - 11.7.2 Contractor Name
 - 11.7.3 Pile location and designation
 - 11.7.4 Pile dimensions
 - 11.7.5 Final tip and cut off elevation of piles after driving the pile group
 - 11.7.6 Depth of pre-auguring or jetting
 - 11.7.7 Records of re-driving
 - 11.7.8 Elevation of splices
 - 11.7.9 Type, make, model, weight and energy of hammer
 - 11.7.10 Actual hammer stroke and blow rate
 - 11.7.11 Type of pile driving cap used



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- 11.7.12 Cushion material and thickness
- 11.7.13 Pile driving start and finish times and total driving time
- 11.7.14 Number of blows for every 12 inches of penetration and number of blows per inch for the last six (6) inches of driving
- 11.7.15 Pile deviation from design location and plumb/batter angle
- 11.7.16 Special procedures or unusual circumstances during pile driving
- 11.7.17 As-built drawing indicating piling location, batter, tip elevation and cut off elevation.

12.0 **HEAD ADAPTER**

- 12.1 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.

13.0 **DAMAGED AND MISPLACED PILES**

- 13.1 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.
- 13.2 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.

14.0 **CUT-OFFS.**

- 14.1 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



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methods shall be used which will not damage the portion of the pile to be left in place nor the pile reinforcement.

14.2 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.

14.3 Cut-off segments and other debris generated while cutting off piles shall not be left in the Mobile River or the MRT slip.

15.0 SPLICING

15.1 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.

15.2 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.

15.3 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.

15.4 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.



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16.0 MEASUREMENT AND PAYMENT

- 16.1 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.
- 16.2 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.
- 16.3 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.
- 16.4 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.



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- 16.5 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



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SECTION 316216 – STEEL PILING

PART 1 – GENERAL

1.0 SCOPE OF WORK

- 1.1 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 and steel sheet piling/tie back system. The CONTRACTOR is responsible to unload and stockpile all delivered materials.

2.0 SUBMITTALS

- 2.1 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 Sheet piling and tie back system to achieve the in place dimensional requirements of the wall system as shown on the drawings.
- 3.1.3 Any other miscellaneous items (corner pieces, tie-in pieces, etc.) as required for a complete system installation as shown on the Drawings and Specifications.
- 3.1.4 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).



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- 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 combination wall 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:

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 (feet)
COMBINATION WALL				
PNZ54/NZ19	–	153.7	49	–
54” Dia. Pipe	0.625 (Wall)	–	–	86
NZ19	0.375	–	–	70
SHEET PILE WALL				
NZ42	0.589	78.17	42.24	90 / 85

- 3.2.6 Structural Steel – All structural steel for plate washers and wales shall conform to current requirements of ASTM A-572 Grade 50.
- 3.2.7 Tie rods shall be the Dywidag rod system and rod components shall conform to ASTM A-615 (Grade 75)
- 3.2.8 Tie Rod Nuts. Tie rod nuts shall conform to ANSI B18.2.2, “Square and Hex nuts.” Nuts shall be hex head, heavy duty and meet requirements for a No. 20 Dywidag rod.
- 3.2.9 Couplers. Couplers as required shall be of the size shown on the drawings and shall be those as manufactured for the specified Dywidag rod system



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- 3.2.10 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.



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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**



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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

6.1.1 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.

6.1.2 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



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concrete less than seven (7) days old, unless otherwise authorized by the ENGINEER.

6.1.3 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.

6.1.4 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.

6.2 WELDING FOR ELECTRICAL CONTINUITY

6.2.1 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.

7.0 MEASUREMENT AND PAYMENT

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

END OF SECTION



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SECTION 316217 – 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



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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.



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- 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



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DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 321600 - TIMBER CURB

1.0 SCOPE

- 1.1 This section covers furnishing and installing the timber curb on the entire length of the dock as detailed on the drawings.

2.0 MATERIALS

2.1 Treated Timbers

- 2.1.1 General. All timbers shall be rough size, not to exceed nominal dimensions, treated Southern Pine. Timbers shall be completely fabricated to length with all daps, holes, counterbores, chamfers and other cuts prior to treatment.
- 2.1.2 Treatment. Preservative treatment shall be chromated copper arsenate (CCA) with a 2.5 PCF retention. The method of treatment shall be based on Use Category UC4A as defined by AWP A U1 - Latest Edition.
- 2.1.3 All timbers shall be Dense No. 1SR in accordance with Southern Pine Inspection Rules - Latest Revision.
- 2.1.4 Malleable Iron Washers shall be a commercial grade approved by the ENGINEER and hot-dip galvanized as specified for unfinished bolts and nuts.
- 2.1.5 Threaded Inserts. Threaded inserts for timber curbs shall be fabricated from internally threaded 304 stainless steel sleeve attached to A36 base plate by welding as detailed on the drawings. A commercial insert with comparable corrosion resistance may be submitted for possible approval.

3.0 TIMBER CURB FABRICATION AND INSTALLATION

- 3.1 General. All timbers shall be accurately cut to length and drilled to fit the stainless-steel inserts without field alteration. All exposed corners shall be chamfered 1" X 1". Location of inserts shall be verified before timbers are fabricated. Timbers attach to the structure with 1" diameter bolts with head and



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malleable iron washers in countersunk holes. Holes for bolts shall be 1-1/8" diameter. Countersunk holes shall be filled with an acceptable sealant material (Sikaflex-2c SL or equal) after installation.

4.0 MEASUREMENT AND PAYMENT

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

END OF SECTION



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SECTION 321723 – 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.



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- 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.



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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.



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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 strippers, hand spray or stencil trucks, apply with equipment meeting requirements of this section. Hand brushes or rollers shall not be used.



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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

- 13.1.3 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.



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- 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: $\pm 1/8$ 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



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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



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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



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SECTION 323113 – 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



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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



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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:

<i>Type of Gate</i>	<i>Single Gate Opening (ft)</i>	<i>Double Gate Opening (ft)</i>	<i>NPS</i>	<i>Weight (lb/ft)</i>
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.



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- (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:



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- (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.



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- 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.



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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



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DIVISION 33 – UTILITIES

SECTION 331100 – FACILITY WATER DISTRIBUTION SYSTEM

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 ANSI/AWWA B300 – Hypochlorites
 - 2.1.2 ANSI/AWWA B301 – Liquid Chlorine
 - 2.1.3 ANSI/AWWA C104/A21.4 – Cement-Mortar Lining for Ductile Iron Pipe and Fittings
 - 2.1.4 ANSI/AWWA C105/A21.5 – Polyethylene Encasement for Ductile-Iron Pipe Systems
 - 2.1.5 ANSI/AWWA C110 – Ductile-Iron and Gray-Iron Fittings
 - 2.1.6 ANSI/AWWA C111/A21.11 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
 - 2.1.7 ANSI/AWWA C115/A21.15 – Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
 - 2.1.8 AWWA C150/A21.50 – Thickness Design of Ductile-Iron Pipe
 - 2.1.9 ANSI/AWWA C151/A21.51 – Ductile-Iron Pipe, Centrifugally Cast



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- 2.1.10 ANSI/AWWA C153/A21.53 – Ductile-Iron Compact Fittings
- 2.1.11 ANSI/AWWA C500 – Metal-Seated Gate Valves for Water Supply Service
- 2.1.12 ANSI/AWWA C600 – Installation of Ductile-Iron Mains and Their Appurtenances
- 2.1.13 ANSI/AWWA C651 – Disinfecting Water Mains

2.2 ASTM International:

- 2.2.1 ASTM A47/A47M– Standard Specification for Ferritic Malleable Iron Castings
- 2.2.2 ASTM A53/A53M – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- 2.2.3 ASTM A139/A139M – Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe
- 2.2.4 ASTM A377 – Standard Index of Specifications for Ductile Iron Pressure Pipe
- 2.2.5 ASTM B32 – Standard Specification for Solder Metal
- 2.2.6 ASTM B61 – Standard Specification for Steam or Valve Bronze Castings
- 2.2.7 ASTM B62 – Standard Specification for Composition Bronze or Ounce Metal Castings

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.



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4.0 QUALITY ASSURANCE

4.1.1 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 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.
- 5.5 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.
- 5.6 Ductile Iron Pipe – (Pipe size 3 inches through 10 inches).
 - 5.6.1 Pipe shall be Ductile Iron and conform to ANSI/AWWAC150/A21.50, Class 53 push-on type (buried piping), or to ANSI/AWWA C115/A21.15, flanged type (exposed piping – water vaults, meter pits, etc.). Pipe shall have cement mortar lining per ANSI/AWWA



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C104/A21.4 inside and asphaltic coating per ANSI/AWWA
C151/A21.51 outside.

5.6.2 Fittings shall be ductile iron per ANSI/AWWA C110/A21.10. fittings shall have cement mortar lining per ANSI/AWWA C104/A21.4 inside and asphaltic coating per ANSI/AWWA C110/A21.10 outside. Fittings 16” and smaller may be manufactured according to ANSI/AWWA C153/A21.53. Pressure rating shall be 350 psi minimum.

5.6.3 Joints for exterior buried piping shall be mechanical joint type for fittings and push-on type for pipe, rubber ring gasket type conforming to ANSI/AWWA C111/A21.11.

a. Tyton Joint® Pipe as manufactured by U.S. Pipe Co.

b. Tyton® Joint Pipe” as manufactured by Clow Water Systems Co. or approved equal.

5.6.4 Joints for exposed piping (meter pits, water vaults, etc.) shall be flanged joints conforming to ANSI/AWWA C115/A21.15 and to ANSI B16.1, 125-pound template.

5.6.5 All piping and fittings shall be certified by the NSF for use in potable water systems.

5.7 Ductile Iron Pipe – (Pipe size 12 inches and larger).

5.7.1 All items from Section 5.6 apply, except pipe is to be Class 54

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.



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- 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.



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9.0 EXCAVATION AND FOUNDATION

- 9.1 Trench excavation, backfilling and compaction shall be performed in accordance with SECTION 312000 - 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 such 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 Pipeséal as manufactured by Flexicraft 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.



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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.



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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 ANSI/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



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compensation given for the additional testing. The maximum leakage allowed shall be determined by the following formula:

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

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



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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 SPECIFICATION



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SECTION 331219 – 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 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 C502 – Dry-Barrel Fire Hydrants.
 - b. AWWA C550 – Protecting Interior Coating for Valves and Hydrants.
 - c. 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.



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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.



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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.



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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 3 – 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:
- 11.2 Required lines, levels, contours and datum locations.
- 11.3 Utilities to remain shall be located, identified, and protected from damage.
- 11.4 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.



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

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

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

11.6 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.



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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 SPECIFICATION



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SECTION 331419 – 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 M55 – PE Pipe - Design and Installation
 - e. 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.



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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.



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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:



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- 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".

12.0 ACCESSORIES

- 12.1 Concrete for thrust restraints shall be as per the details shown on the design drawings.
- 12.2 Concrete type shall be as specified in Section 03300.

PART 3 – EXECUTION

13.0 EXAMINATION

- 13.1 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.
- 13.2 Invert elevations of existing work shall be verified prior to excavation and installation of valves.



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14.0 PREPARATION

14.1 The following shall be identified prior to installation:

14.2 Required lines, levels, contours and datum locations.

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

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

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

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

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

15.0 INSTALLATION

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

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

16.0 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

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

17.0 FIELD QUALITY CONTROL

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

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



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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 SPECIFICATION



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SECTION 334200 - STORMWATER CONVEYANCE

PART 1 – GENERAL

1.0 RELATED DOCUMENTS

- 1.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

2.0 SUMMARY

- 2.1 Section Includes:
 - 2.1.1 Concrete pipe and fittings.
 - 2.1.2 Junction Boxes and Manholes.

3.0 ACTION SUBMITTALS

- 3.1 Product Data: For each type of product.
- 3.2 Shop Drawings:
 - 3.2.1 Manholes: Include plans, elevations, sections, details, frames, and covers.
 - 3.2.2 Catch basins. Include plans, elevations, sections, details, frames, covers, and grates.
 - 3.2.3 Stormwater Detention Structures: Include plans, elevations, sections, details, frames, covers, design calculations, and concrete design-mix reports.
- 3.3 Product Certificates: For each type of pipe and fitting, from manufacturer.

4.0 QUALITY ASSURANCE

- 4.1 Piping materials shall bear label, stamp, or other markings of specified testing agency.

5.0 DELIVERY, STORAGE, AND HANDLING



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- 5.1 Do not store plastic pipe and fittings in direct sunlight.
- 5.2 Protect pipe, pipe fittings, and seals from dirt and damage.
- 5.3 Handle manholes in accordance with manufacturer's written rigging instructions.
- 5.4 Handle catch basins in accordance with manufacturer's written rigging instructions.

PART 2 – PRODUCTS

6.0 CONCRETE PIPE AND FITTINGS

- 6.1 Reinforced-Concrete Sewer Pipe and Fittings: ASTM C76.
 - 6.1.1 Bell-and-spigot or tongue-and-groove ends and gasketed joints with ASTM C443, rubber gaskets
 - 6.1.2 Class III, Wall B.

7.0 JUNCTION BOXES AND MANHOLES

- 7.1 Standard Precast Concrete Manholes and Junction boxes:
 - 7.1.1 Description: ASTM C478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
 - 7.1.2 Diameter: 48 inches minimum unless otherwise indicated.
 - 7.1.3 Ballast: Increase thickness of precast concrete sections or add concrete to base section as required to prevent flotation.
 - 7.1.4 Base Section: 6-inch minimum thickness for floor slab and 6-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
 - 7.1.5 Riser Sections: 6-inch minimum thickness, and lengths to provide depth indicated.
 - 7.1.6 Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated, and top of cone of size that matches grade rings.
 - 7.1.7 Joint Sealant: ASTM C990, bitumen or butyl rubber.



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7.1.8 Steps: ASTM A615, deformed, 1/2-inch steel reinforcing rods encased in ASTM D4101, PP, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 48 inches.

7.1.9 Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover, and height as required to adjust manhole frame and cover to indicated elevation and slope.

7.2 Manhole Frames and Covers:

7.2.1 Description: Ferrous; 24-inch ID by 7- to 9-inch riser with 4-inch-minimum width flange and 26-inch-diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."

7.2.2 Material: ASTM A536, Grade 60-40-18 ductile iron unless otherwise indicated.

8.0 CONCRETE

8.1 General: Cast-in-place concrete in accordance with ACI 318, ACI 350, and the following:

8.1.1 Cement: ASTM C150, Type II.

8.1.2 Fine Aggregate: ASTM C33, sand.

8.1.3 Coarse Aggregate: ASTM C33, crushed gravel.

8.1.4 Water: Potable.

8.2 Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

8.2.1 Reinforcing Fabric: ASTM A1064, steel, welded wire fabric, plain.

8.2.2 Reinforcing Bars: ASTM A615, Grade 60 deformed steel.

8.3 Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.



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8.3.1 Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

a. Invert Slope: 1 percent through manhole.

8.3.2 Benches: Concrete, sloped to drain into channel.

a. Slope: 4 percent.

8.4 Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.

8.4.1 Reinforcing Fabric: ASTM A1064, steel, welded wire fabric, plain.

8.4.2 Reinforcing Bars: ASTM A615, Grade 60 deformed steel.

PART 3 – EXECUTION

9.0 EARTHWORK

9.1 Excavation, trenching, and backfilling are specified in Section 312000 "Earthwork."

10.0 PIPING INSTALLATION

10.1 General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

10.2 Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings in accordance with manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

10.3 Install manholes for changes in direction unless fittings are indicated.

10.4 Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.



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10.5 When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.

10.6 Install gravity-flow, non-pressure drainage piping in accordance with the following:

10.6.1 Install piping pitched down in direction of flow.

10.6.2 Install piping with 24-inch minimum cover.

10.6.3 Install reinforced-concrete sewer piping in accordance with ASTM C1479 and ACPA's "Concrete Pipe Installation Manual."

11.0 PIPE JOINT CONSTRUCTION

11.1 Join gravity-flow, non-pressure drainage piping in accordance with the following:

11.1.1 Join reinforced-concrete sewer piping in accordance with ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.

12.0 JUNCTION BOX AND MANHOLE INSTALLATION

12.1 General: Install manholes, complete with appurtenances and accessories indicated.

12.2 Install precast concrete manhole sections with sealants in accordance with ASTM C891.

12.3 Where specific manhole construction is not indicated, follow manhole manufacturer's written instructions.

12.4 Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.

13.0 CONCRETE PLACEMENT

13.1 Place cast-in-place concrete in accordance with ACI 318.

14.0 FIELD QUALITY CONTROL



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14.1 Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

14.1.1 Submit separate reports for each system inspection.

14.1.2 Defects requiring correction include the following:

- a. **Alignment:** Less than full diameter of inside of pipe is visible between structures.
- b. **Deflection:** Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
- c. **Damage:** Crushed, broken, cracked, or otherwise damaged piping.
- d. **Infiltration:** Water leakage into piping.
- e. **Exfiltration:** Water leakage from or around piping.

14.1.3 Replace defective piping using new materials and repeat inspections until defects are within allowances specified.

14.1.4 Reinspect and repeat procedure until results are satisfactory.

15.0 INTERNAL VIDEO INSPECTION

15.1 **General:** The Contractor shall furnish a mobile television inspection studio, all television equipment including a pan and tilt color camera and other necessary types of equipment, and all materials, electricity, labor, technicians, etc., as may be needed to perform the closed circuit television inspection of storm sewers for the purpose of documenting materials of construction, defects, lateral locations, manhole locations and other physical features of the sewer main. The video inspections, software/equipment, and operator shall be certified in accordance with the latest standards of the National Association of Sewer Service Companies (NASSCO's) Pipeline Assessment and Certification Program (PACP).

15.2 Inspection Procedures:

15.2.1 The storm sewer shall be fully cleaned before inspection begins. The internal Inspection shall be performed in one section of sewer at a time between adjacent manholes. The inspection shall be performed by transporting the camera with a mechanical transport device through the



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section of the storm sewer along the axis of the pipe. The camera shall travel in the direction of flow or from the upstream manhole to the downstream manhole unless an obstruction in the pipe requires traveling from the downstream manhole to the upstream manhole (reverse setup). In accordance with the PACP standard, the speed of the camera shall be no more than 30 feet/minute. At all lateral connections and defects, the camera shall stop, pan, and tilt such that the lateral connection or defect is seen from a perpendicular field of view, and an identification code and description shall be recorded during the video inspection in accordance with PACP standards. Each lateral and defect shall be extensively filmed and described.

15.2.2 The distances measured to defects and laterals shall be referenced or “zeroed” to the center of the manhole at which recording is started and in all subsequent manholes if multiple segments are videoed at the same time. The location within the pipe shall be shown in 0.1-foot increments on the video recording and shall have an accuracy of +/- one (1) foot. Re-videoing of the pipe at no additional cost will be required if the specified accuracy is not met.

15.3 Inspection Report: The report shall be provided in PACP Exchange Format. A copy of the report, typed and bound, shall be delivered to the Engineer. There shall be no discrepancies between the video and its report.

15.4 Video Inspection Recordings: The purpose of the video recordings shall be to supply a continuous visual record of the inspection. The video shall be created and documented in accordance with NASSCO’s PACP standards. The data shall be provided to the Engineer via hard drive or DVD and in PACP exchange format.

15.5 Major Defect: Prior to final street surfacing, it is the responsibility of the Contractor to provide the Engineer with a quality control construction video that clearly shows work that is free of defects and completed in accordance with plans and specifications. The Contractor shall notify the Engineer immediately upon discovering a major defect in the storm drain system that will require a repair or some other corrective action to correct the defect.

16.0 CLEANING

16.1 Clean interior of piping of dirt and superfluous materials.



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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



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**DIVISION 41 – MATERIAL PROCESSING AND HANDLING
EQUIPMENT**

SECTION 412200 - CRANE RAILS AND APPURTENANCES

PART 1 – GENERAL

1.0 **SCOPE**

- 1.1 This section covers furnishing and installing all crane rails, including all anchor bolts, soleplates, washers, nuts, rail clips, fillers, epoxy grout and thermite welding required for the installation of the rails as shown on the drawings.
- 1.2 The design of the crane rail system, inclusive of the crane rail, rail clips, rail pad, soleplates, anchor bolts and epoxy grout shall be the responsibility of the crane rail system supplier. The individual components as well as the entire crane rail system shall be designed by the rail supplier to resist the following maximum loads applied to the top of the rail:

Condition	Vertical Load	Horizontal Load
Operating	50.0 kips/ft of rail	1.7 kips/ft of rail
Stowed (storm)	66.5 kips/ft of rail	9.0 kips/ft of rail

PART 2 – PRODUCTS

2.0 **MATERIALS**

- 2.1 Crane Rails. ASTM A 759. All crane rails shall be 171 pounds per yard in weight and shall conform to ASTM A759-10. The rails shall be supplied head hardened per section S2 and shall have Brinell hardness number ranging from 321 to 388 when the decarburized surface has been removed. Crane rail hardness shall not exceed crane wheel Brinell hardness of 388. Provide standard rail lengths except for closure rails. Provide closure rails in one or two sections as long as practical, but in no case shall any piece be less than 13 feet long. The rails shall be square,



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either milled or ground, and prepared for welding. All burrs shall be removed. Mill certs shall be provided for rails and all rails shall be from a single rolling.

- 2.2 Rail Clips. Rail clips shall conform to AREA specifications. Clips, except where shown otherwise, shall be the manufacturer's standard clips to fit the rail section and its intended use. Where special fillers and clips are required, they shall be of the same material as the standard clips and fabricated to the details shown on the drawings. (Clips as shown on the Contract Drawings shall be supplied by Gantrex, Atlantic Track or other approved equal).
- 2.2.1 The clips shall be made of a forged steel lower piece with a cast upper piece, shall be designed to allow a lateral adjustment of at least 5/8", and shall have self-locking, self-tightening features. Lower units shall be weldable forged steel with the following properties:
- a. Minimum tensile strength – 65,000 psi
 - b. Minimum yield strength – 45,000 psi
 - c. Minimum elongation – 17.5%
 - d. Hardness (Brinell) – Minimum
- 2.2.2 The vertical constraint on the rail shall be applied through a synthetic rubber nose vulcanized to the rail clip. The mechanical properties of the rubber nose shall be as indicated in paragraph 2.3.1.
- 2.2.3 Bolts used to connect the upper and lower components shall be ASTM A325 hex head bolts with heavy hex nuts and structural washer or approved equal.
- 2.3 Shim Plate. Shim plate material shall conform to ASTM A572, Grade 50. The shim plate shall be 1/4" thick by 5.875" wide by standard length. The shim plate shall be installed the full length of the crane rail.
- 2.4 Soleplates. Soleplate material shall conform to ASTM A572, Grade 50, "Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel". Soleplate thickness and width shall be determined by the crane rail system supplier based on the design loads included in this specification. Minimum soleplate thickness shall be 1 inch. A removable jacking bolt leveling system shall be provided with the soleplates.



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2.4.1 Anchor Bolts and Nuts. Anchor bolts and nuts shall conform to ASTM A307, “Carbon Steel Externally and Internally Threaded Standard Fasteners,” Grade A. Anchor bolt size and spacing shall be determined by the crane rail system supplier based on the design loads included in this specification. Minimum anchor bolt diameter shall be ¾ inch.

2.4.2 Thermite Welding Kits. All crane rails shall be joined by the Calorite Thermal Welding method or alternate approved method. All welding shall be done by process certified welders and full preheat shall be used in accordance with the manufacturer of the weld kit. The Contractor shall provide a written, minimum 2-year warranty for all welds.

2.5 Rail Expansion Joints. Rail expansion joints and special soleplates shall be provided as required in the drawings and as specified.

2.6 Soleplate Epoxy Grout. The soleplate epoxy grout shall be Gantrex Epoxy Grout or Engineer approved equal. Epoxy grout thickness shall be determined by the crane rail system supplier based on the design loads included in this specification. Minimum epoxy grout thickness shall be 1½ inch. The grout shall have the following minimum characteristics:

- a. Compressive strength shall be 13,000 psi minimum @ 7 days at 70°F as per ASTM C579-B
- b. Tensile strength shall be 2,000 psi minimum @ 7 days per ASTM C307
- c. Flexural strength shall be 4,000 psi minimum @ 7 days per ASTM C580
- d. Creep shall be limited to 0.3% under 2,500 psi @ 80°F in one year
- e. Coefficient of linear shrinkage of 0.017 in/in @ 70°F in 28 days

3.0 SUBMITTALS

3.1 All crane rail system materials as well as thermite welding shall be supplied and performed by one manufacturer.

3.2 A complete schedule of the materials proposed for the crane rails shall be submitted for the approval of the Engineer. The schedule shall include catalogs,



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cuts, diagrams, drawings and such other descriptive data as may be required by the Engineer. No consideration will be given to partial lists submitted from time to time. Approval of equipment under this provision shall not be construed as authorizing any deviations from the specifications, unless attention of the Engineer has been directed to the specific deviations. Shop drawings for all fabricated items and the complete erection drawings with anchor bolt and clip layout shall be furnished.

- 3.3 Design calculations indicating the ability of the crane rail system components as well as the entire crane rail system to resist the design loads indicated in this specification shall be submitted for review.

PART 3 – EXECUTION

4.0 INSTALLATION

- 4.1 General. The crane rails shall be accurately aligned to the specified rail centers and grades as shown on the drawings and within the following tolerances.
- 4.1.1 Horizontal. The center line of each rail shall be a straight line parallel to the base line used for construction and the distance measured at right angles between rail center lines shall be 100'-0" +5/16" at any location along the rail length.
- 4.1.2 Vertical. The top of rail shall be within .1 inch of the specified rail elevation at any point along the rail length and the rail elevation shall not vary more than .1 inch from a 10-foot straight edge placed in any location along the rail length.
- 4.2 Preliminary Survey
- 4.2.1 The crane rail contractor shall verify, by survey, that the rail pockets have sufficient clearance for grouting and are at the correct elevation and gauge.
- 4.2.2 The crane rail contractor shall verify, by survey, the minimum, maximum and average soleplate grout cavity thickness. Any change in the rail head elevation or the grout quantity must obtain engineering approval.



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- 4.3 Anchor Bolts. Anchor bolts shall be set accurately in accordance with the approved shop drawings and shall be secured in place prior to placing concrete. The crane rail contractor shall use templates or soleplates to layout the anchor bolts.
- 4.4 Rails. Rails shall be installed on base plates in the recesses to the dimensional tolerances specified herein to the required gage. The tracks shall be gaged normal to the rails as the anchor bolts and clips are tightened. The joints in each line of rail should be not less than 3 feet along the base line from the joints in the opposite rails unless otherwise required by the installation drawings. Crane rails shall be leveled by means of the adjustable leveling nuts. After rails have been leveled to the proper grade and anchor bolts tightened, the space between the concrete and base plates shall be grouted with non-shrink epoxy grout conforming to the requirements of the rail clip manufacturer with the grout installation directed by the rail clip manufacturer. Placement of bitumastic coating, sand fill and asphalt fill in the rail pocket shall not commence until the non-shrink epoxy grout has set, the rails checked for proper positioning and the rail installation approved by the rail clip manufacturer and the Engineer.
- 4.5 Thermite Welding shall be supervised by a Thermite weld kit manufacturer's representative. Welding shall conform to manufacturer's recommendations and shall be performed under the direction of the rail clip manufacturer. A detailed welding procedure shall be submitted to the Engineer for approval prior to welding. All joints, except at expansion, shall be thermite welded.
- 4.6 Upon completion of the installation, an "As-Built" survey shall be performed by the Contractor to ensure the crane rails are installed in accordance with the acceptable tolerances.

5.0 MEASUREMENT AND PAYMENT

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

END OF SECTION



Alabama Port Authority
Specification Booklet

Project Name Choctaw Point Container Terminal – Phase V Dock Extension

Location Mobile, Alabama

Project # 11411

Task # 6

FEBRUARY 2026

APPENDIX A

MCDUFFIE ISLAND - 8 BUILDING

ACM SURVEY REPORT

October 22, 2025

Mr. Jason Goffinet
Volkert Inc.
1110 Montlimar Drive, Suite 1050
Mobile, Alabama 36609

Re: Pre-Demolition Asbestos Survey Report
McDuffie Island – 8 Buildings
1704 Yeend Street, 1710 Yeend Loop, 1760 Yeend Loop, 1903 Ezra Trice Boulevard
Mobile, Alabama 36603
SESI Project No. M25-521

Dear Mr. Goffinet:

Southern Earth Sciences, Inc. (SESI) is pleased to inform you of the results of the above-referenced asbestos containing materials (ACM) survey.

INTRODUCTION

The pre-demolition asbestos survey was performed at the above referenced buildings located in the McDuffie Island Coal Terminal in Mobile, Alabama. Mr. Horacio Martinez of SESI completed the asbestos survey on September 29 & 30, 2025. A total of one-hundred and seventeen (117) bulk samples of suspect asbestos-containing building materials were collected for analysis. The bulk samples were sent to Eurofins CEI, a National Voluntary Laboratory Accreditation Program (NVLAP) accredited analytical laboratory in Cary, NC. Bulk samples were analyzed by Polarized Light Microscopy (PLM), E.P.A. Method 600/R-93/116. Additionally, on October 17, 2025 the client, Volkert Inc., requested that an additional building be added to the scope of this asbestos survey. On October 17, 2025 SESI returned on-site to survey the building in question. An additional three (3) samples were collected of suspect asbestos-containing building material. A combined total of one-hundred and twenty (120) samples were collected for this survey.

DEFINITIONS

Asbestos Containing Materials (ACM): Building materials used for construction of a structure that are known or are suspected for containing asbestos.

Asbestos: Asbestos is the asbestiform varieties of chrysotile, crocidolite, amosite, anthophyllite, tremolite, and actinolite.

Asbestos Inspection: An evaluation performed by a trained and E.P.A. certified inspector to determine the presence or absence of Asbestos-containing materials. Asbestos inspectors engage in the survey and assessment of ACBM.

Category I non-friable ACM: asbestos-containing packings, gaskets, resilient floor covering and asphalt roofing products.

Category II non-friable ACM: any material, excluding Category I ACM, that when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Demolition: the removal of load-bearing walls or structural components.

Regulated Asbestos Containing Material (RACM): (a) Friable asbestos materials, (b) Category I non-friable ACM that has become friable, (c) Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or, (d) Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations regulated by NESHAPS.

PHYSICAL SURVEY

The survey was conducted on eight (8) buildings of an unknown age.

In Building 1 (Warehouse) (30.658053, -88.034166), the interior flooring consisted of a mixture of concrete and vinyl floor tile. The interior walls of the building are a mixture of concrete, fiberglass, and drywall. Interior ceilings consisted of metal and insulation with the occasional drywall/wood. The roof of the building consisted of metal sheeting.

In Building 2 (Warehouse) (30.658229, -88.034150), the interior flooring consisted of a mixture of concrete, vinyl floor tile, and foam floor tile. The interior walls of the building are a mixture of concrete, fiberglass, and drywall. Interior ceilings consisted of metal and insulation with the occasional drywall/wood. The roof of the building consisted of metal sheeting.

In Building 3 (Breakroom) (30.658649, -88.036310), the interior flooring consisted of a mixture of concrete, vinyl floor tile, and ceramic floor tile. The interior walls of the building are a mixture of concrete, and drywall. Interior ceilings consisted of metal and insulation with the occasional drywall/wood. The roof of the building consisted of metal sheeting.

In Building 4 (Former Foreman Office) (30.658947, -88.036309), the interior flooring consisted of a mixture of concrete, vinyl floor tile, and ceramic floor tile. The interior walls of the building are a mixture of concrete, and drywall. The exterior walls consisted of Styrofoam stucco. Interior ceilings consisted of metal, insulation, drop in-ceiling tile with the occasional drywall/wood. The roof of the building consisted of metal sheeting.

In Building 5 (Administration Office) (30.662358, -88.034712), the interior flooring consisted of a mixture of vinyl floor tile. The interior walls of the building are a mixture of concrete, and drywall. Interior ceilings consisted of insulation, drop in-ceiling tile. The roof of the building consisted of metal sheeting.

In Building 6 (Maintenance Shop) (30.662662, -88.034978), the interior flooring consisted of a mixture of vinyl floor tile, and concrete. The interior walls of the building are a mixture of concrete, metal, wood, and drywall. Interior ceilings consisted of insulation, wood, drywall, and metal sheeting. The roof of the building consisted of metal sheeting.

In Building 7 (Training Building) (30.662407, -88.035591), the interior flooring consisted of a mixture of vinyl floor tile, composite floor tile, wood, ceramic floor tile, and concrete. The interior walls of the building are a mixture of metal, wood, and drywall. Interior ceilings consisted of insulation, drywall, drop-in ceiling tile, and metal sheeting. The roof of the building consisted of metal sheeting.

In Building 8 (Electrical Sub-Station) (30.664063, -88.032988), the interior consisted of concrete. The interior and exterior walls consisted of concrete blocks. The roof consisted of metal sheeting as well as a drywall/membrane material.

Building 1 (Warehouse)

NON-FRIABLE ACM

Black mastic was found to contain 3% Chrysotile Asbestos (Samples 1-04, 1-05, 1-06). This material is considered to be Category I non-friable ACM under NESHAP regulation. This material was found underneath a layer of light brown vinyl floor tile (VFT) in the office area of Building 1. There is approximately 200 square feet of this material.

FRIABLE ACM

No friable ACM material was detected in the bulk samples taken during this ACM survey for Building 1.

Building 2 (Warehouse)

NON-FRIABLE ACM

Black mastic was found to contain 3% Chrysotile Asbestos (Samples 2-01, 2-02, 2-03, 2-13, 2-14, 2-15). This material is considered to be Category I non-friable ACM under NESHAP regulation. This material was found underneath a layer of light brown vinyl floor tile (VFT) in the office, hallway, kitchen, and weight room areas of Building 2. There is approximately 820 square feet of this material.

FRIABLE ACM

No friable ACM material was detected in the bulk samples taken during this ACM survey for Building 2.

Building 3 (Breakroom)

NON-FRIABLE ACM

No non-friable ACM material was detected in the bulk samples taken during this ACM survey for Building 3.

FRIABLE ACM

No friable ACM material was detected in the bulk samples taken during this ACM survey for Building 3.

Building 4 (Former Foreman Office)

NON-FRIABLE ACM

No non-friable ACM material was detected in the bulk samples taken during this ACM survey for Building 4.

FRIABLE ACM

No friable ACM material was detected in the bulk samples taken during this ACM survey for Building 4.

Building 5 (Administration Office)

NON-FRIABLE ACM

No non-friable ACM material was detected in the bulk samples taken during this ACM survey for Building 5.

FRIABLE ACM

No friable ACM material was detected in the bulk samples taken during this ACM survey for Building 5.

Building 6 (Maintenance Shop)

NON-FRIABLE ACM

No non-friable ACM material was detected in the bulk samples taken during this ACM survey for Building 6.

FRIABLE ACM

No friable ACM material was detected in the bulk samples taken during this ACM survey for Building 6.

Building 7 (Training Building)

NON-FRIABLE ACM

No non-friable ACM material was detected in the bulk samples taken during this ACM survey for Building 7.

FRIABLE ACM

No friable ACM material was detected in the bulk samples taken during this ACM survey for Building 7.

Building 8 (Electrical Sub-Station Building)

NON-FRIABLE ACM

No non-friable ACM material was detected in the bulk samples taken during this ACM survey for Building 8.

FRIABLE ACM

No friable ACM material was detected in the bulk samples taken during this ACM survey for Building 8.

SUMMARY OF FINDINGS

Asbestos

The E.P.A. definition for an asbestos-containing material is a building material that contains more than 1 percent asbestos when analyzed by PLM and is placed into two categories; friable and non-friable. Friable ACM is a material that can be easily pulverized with hand pressure as opposed to non-friable ACM.

Building 1 (Warehouse)

NON-FRIABLE ACM

Black mastic was found to contain 3% Chrysotile Asbestos (Samples 1-04, 1-05, 1-06). This material is considered to be Category I non-friable ACM under NESHAP regulation. This material was found underneath a layer of light brown vinyl floor tile (VFT) in the office area of Building 1. There is approximately 200 square feet of this material.

Building 2 (Warehouse)

NON-FRIABLE ACM

Black mastic was found to contain 3% Chrysotile Asbestos (Samples 2-01, 2-02, 2-03, 2-13, 2-14, 2-15). This material is considered to be Category I non-friable ACM under NESHAP regulation. This material was found underneath a layer of light brown vinyl floor tile (VFT) in the office, hallway, kitchen, and weight room areas of Building 2. There is approximately 820 square feet of this material.

A general building location map can be found as **Figure 1**.

Buildings 1 & 2 schematic maps can be found as **Figure 2, and Figure 3**.

Photos of sample locations can be found as **Attachment A**.

Test results, bulk sampling logs, and chain of custody can be found as **Attachment B**.

Consultant Inspector Certification(s) can be found as **Attachment C**.

CONCLUSIONS AND RECOMMENDATIONS

Asbestos

Out of the one-hundred and twenty (120) bulk samples taken during this survey, nine (9) samples tested positive for asbestos.

Black mastic was found to contain 3% Chrysotile Asbestos (Samples 1-04, 1-05, 1-06). This material is considered to be Category I non-friable ACM under NESHAP regulation. This material was found underneath a layer of light brown vinyl floor tile (VFT) in the office area of Building 1. There is approximately 200 square feet of this material. This Category I non-friable ACM can be left in the structure during demolition, if no materials are going to be recycled.

Black mastic was found to contain 3% Chrysotile Asbestos (Samples 2-01, 2-02, 2-03, 2-13, 2-14, 2-15). This material is considered to be Category I non-friable ACM under NESHAP regulation. This material was found underneath a layer of light brown vinyl floor tile (VFT) in the office, hallway, kitchen, and weight room areas of Building 2. There is approximately 820 square feet of this material. This Category I non-friable ACM can be left in the structure during demolition, if no materials are going to be recycled.

Buildings 3, 4, 5, 6, 7, and 8 did not report any friable or non-friable ACM material collected during the survey.

If additional suspect materials are discovered that were not assessed during this survey, work should be stopped, and the materials be tested by an Alabama Safe State licensed asbestos inspector.

GENERAL COMMENTS

Asbestos

This asbestos survey has been performed to identify asbestos containing materials in the existing building and is not intended as abatement specifications and drawings.

Comments and observations given above reflect an opinion as to the various materials and conditions visually observed during the inspection and should not be construed as a representation or warranty expressed or implied, as to scope, thoroughness or accuracy of the inspection.

**McDuffie Island 8 Building
Pre-Demolition Asbestos Survey Report**

October 22, 2025

A conscious effort is made to identify all suspect materials. There is a possibility that conditions or materials may exist which could not be identified during our survey due to physical inaccessibility and the use of nondestructive sampling methods. Materials that typically do not contain asbestos have not been sampled. These materials include but are not limited to rubber, fiberglass, etc.

Conclusions and recommendations given in this report are based upon our interpretation of current regulatory standards. Changes in regulatory standards may require changes in our conclusions and recommendations.

We appreciate the opportunity to be of service to you on this project. Should you have any questions or require additional information, please contact our office.

Sincerely,

SOUTHERN EARTH SCIENCES, INC.



Horacio Martinez Gallo
AHERA Accredited Asbestos Inspector
Certificate No. AIN102582645520

FIGURES



LEGEND



- ACM SURVEY BUILDING

MCDUFFIE ISLAND 8 BUILDING
ACM SURVEY
MCDUFFIE ISLAND
MOBILE, ALABAMA 36603



**SOUTHERN
EARTH SCIENCES**
Geotechnical | Environmental | Materials Testing

FIGURE 1
SITE AND SAMPLE LOCATION MAP
SESI PROJECT NO.: M25-521

YEEND LOOP

WAREHOUSE #2 (BUILDING 2)

STORAGE #2

OFFICE

SAMPLES
1-04, 1-05, 1-06

STORAGE #1



LEGEND



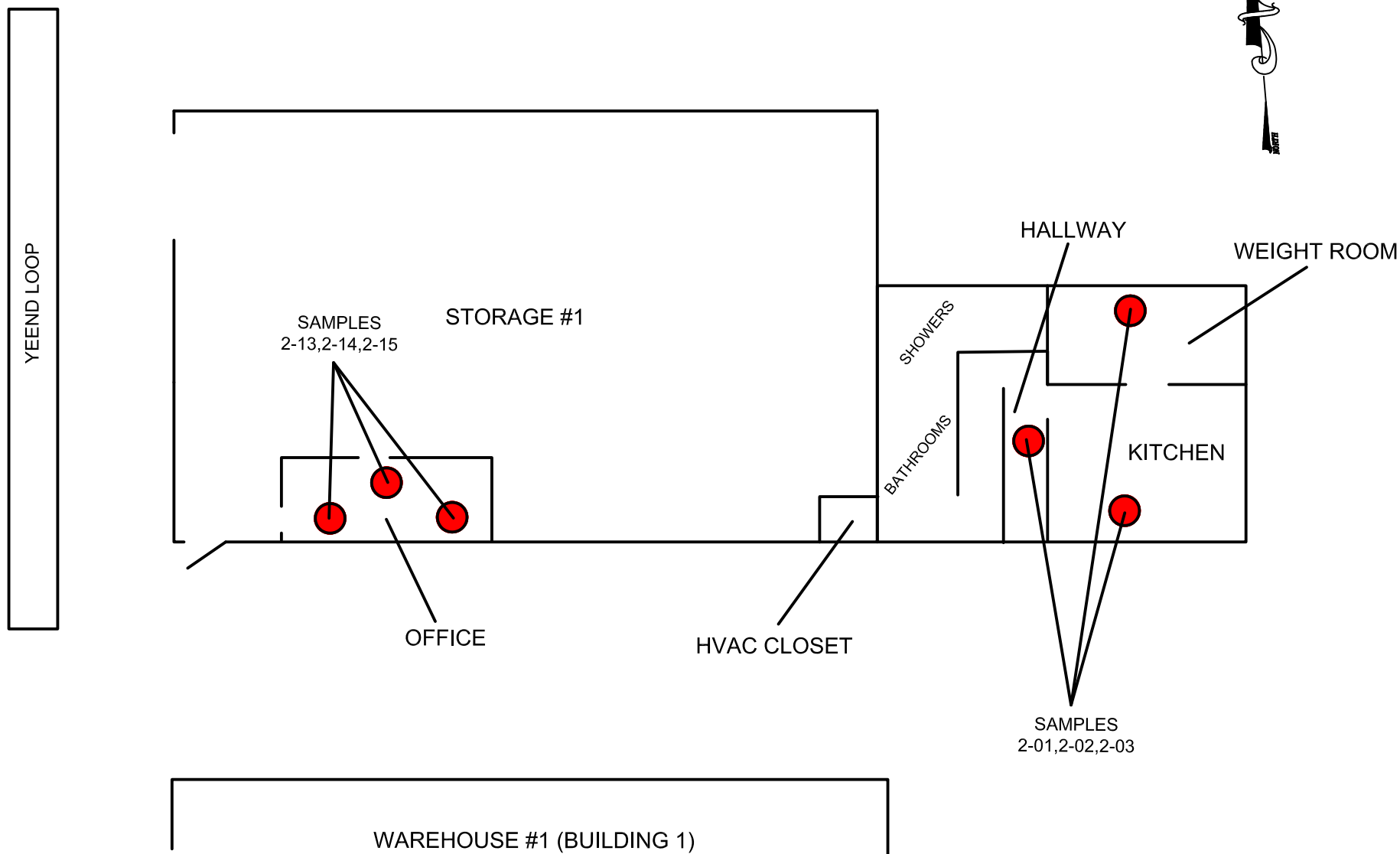
- ASBESTOS POSTIVE SAMPLE

MCDUFFIE ISLAND 8 BUILDING
ACM SURVEY
MCDUFFIE ISLAND
MOBILE, ALABAMA 36603



**SOUTHERN
EARTH SCIENCES**
Geotechnical | Environmental | Materials Testing

FIGURE 2
BUILDING 1
SCHEMATICS & SAMPLE LOCATION
MAP
SESI PROJECT NO.: M25-521



LEGEND



- ASBESTOS POSTIVE SAMPLE

MCDUFFIE ISLAND 8 BUILDING
ACM SURVEY
MCDUFFIE ISLAND
MOBILE, ALABAMA 36603



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Geotechnical | Environmental | Materials Testing

FIGURE 3
BUILDING 2
SCHEMATICS & SAMPLE LOCATION
MAP
SESI PROJECT NO.: M25-521

ATTACHMENT A PHOTOGRAPHS



Visual of Building 1 (Warehouse).



Visual of Building 2 (Warehouse).



Visual of the Front of Building 3 (Breakroom).



Visual of Building 4 (Former Foreman Office).



Visual of the Front of Building 5 (Administration Office).



Visual of Building 6 (Maintenance Shop).



Visual of Building 7 (Training Building).



Visual of Building 8 (Electrical Sub-Station Building).



Visual of Inside Building 1 (Warehouse). Office (red arrow) was found to contain black mastic containing 3% Chrysotile Asbestos underneath vinyl floor tile (VFT).



Visual of Inside Building 2 (Warehouse). Weight Room, Kitchen, and Hallway was found to contain black mastic containing 3% Chrysotile Asbestos underneath VFT.



Visual of Inside Building 2 (Warehouse). Office was also found to contain black mastic containing 3% Chrysotile Asbestos underneath VFT.



Black mastic was found to contain 3% Chrysotile Asbestos (Samples 1-01, 1-05, 1-06). This mastic can be found under a vinyl floor tile layering in the office of Building 1 and totals approximately 200 square feet in size. This material is considered to be Category I non-friable under NESHAP regulations.



Black mastic was found to contain 3% Chrysotile Asbestos (Samples 2-01,2-02,2-03,2-13,2-14,2-15). This mastic can be found under a vinyl floor tile layering in the office, hallway, kitchen, and weight room of Building 2. This material totals approximately 820 square feet in size. This material is considered to be Category I non-friable under NESHAP regulations.

**ATTACHMENT B
LABORATORY ANALYTICAL REPORT,
BULK SAMPLE LOGS, & CHAIN OF CUSTODY**

October 09, 2025

Horacio Martinez
Southern Earth Sciences, Inc. (AL)
5460 Rangeline Rd
Mobile, AL 36619

CLIENT PROJECT: McDuffie Island 7 Bldg ACM Survey
LAB CODE: 695474-1

Dear Horacio,

Enclosed are asbestos analysis results for PLM Bulk samples received at our laboratory on October 6, 2025. The samples were analyzed for asbestos using polarizing light microscopy (PLM) per the EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials and EPA 40 CFR Appendix E to Subpart E of Part 763: Interim Method of the Determination of Asbestos in Bulk Insulation Samples.

Sample results containing >1% asbestos are considered asbestos-containing materials (ACMs) per EPA regulatory requirements. The detection limit for the EPA 600 Method is <1% by calibrated visual estimate.

Thank you for your business and we look forward to continuing good relations.

Kind Regards,



Kamila Reichert,
Laboratory Director

NVLAP 101768-0

ASBESTOS ANALYTICAL REPORT
By: Polarized Light Microscopy

Prepared for

Southern Earth Sciences, Inc. (AL)

CLIENT PROJECT:	McDuffie Island 7 Bldg ACM Survey
LAB CODE:	695474-1
TEST METHOD:	EPA 600 / R93 / 116 and EPA 40 CFR Appendix E to Subpart E of Part 763
REPORT DATE:	10/09/25
TOTAL SAMPLES ANALYZED:	157
# SAMPLES >1% ASBESTOS:	9
TOTAL LAYERS ANALYZED:	183

Project: McDuffie Island 7 Bldg ACM Survey

Lab Code: 695474-1

Method: EPA 600 / R93 / 116 and EPA 40 CFR Appendix E to Subpart E of Part 763

Client ID	Lab ID	Layer	Sample Description	Asbestos %
1-01	3777132		White fibrous panel	None Detected
1-02	3777133		White fibrous panel	None Detected
1-03	3777134		White fibrous panel	None Detected
1-04	3777135		Light-brown floor tile	None Detected
1-04 (2)	3784629		Black mastic	Chrysotile 3%
1-05	3777136		Light-brown floor tile	None Detected
1-05 (2)	3784630		Black mastic	Chrysotile 3%
1-06	3777137		Light-brown floor tile	None Detected
1-06 (2)	3784631		Black mastic	Chrysotile 3%
1-07	3777138		Black cove base	None Detected
1-07 (2)	3784632		Brown mastic	None Detected
1-08	3777139		Black cove base	None Detected
1-08 (2)	3784633		Brown mastic	None Detected
1-09	3777140		Black cove base	None Detected
1-09 (2)	3784634		Brown mastic	None Detected
1-10	3777141	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
Composite (Composited Layers: A, B)				0%
1-11	3777142	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
Composite (Composited Layers: A, B)				0%
1-12	3777143	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
Composite (Composited Layers: A, B)				0%

Project: McDuffie Island 7 Bldg ACM Survey

Lab Code: 695474-1

Method: EPA 600 / R93 / 116 and EPA 40 CFR Appendix E to Subpart E of Part 763

Client ID	Lab ID	Layer	Sample Description	Asbestos %
1-13	3777144	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
		Composite (Composited Layers: A, B)		0%
1-14	3777145	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
		Composite (Composited Layers: A, B)		0%
1-15	3777146	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
		Composite (Composited Layers: A, B)		0%
1-16	3777147		Brown insulation	None Detected
1-17	3777148		Brown insulation	None Detected
1-18	3777149		Brown insulation	None Detected
2-01	3777150		Light-brown floor tile	None Detected
2-01 (2)	3784635		Black mastic	Chrysotile 3%
2-02	3777151		Light-brown floor tile	None Detected
2-02 (2)	3784636		Black mastic	Chrysotile 3%
2-03	3777152		Light-brown floor tile	None Detected
2-03 (2)	3784637		Black mastic	Chrysotile 3%
2-04	3777153	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
		Composite (Composited Layers: A, B)		0%
2-05	3777154	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
		Composite (Composited Layers: A, B)		0%

Project: McDuffie Island 7 Bldg ACM Survey

Lab Code: 695474-1

Method: EPA 600 / R93 / 116 and EPA 40 CFR Appendix E to Subpart E of Part 763

Client ID	Lab ID	Layer	Sample Description	Asbestos %
2-06	3777155	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
		Composite (Composited Layers: A, B)		0%
2-07	3777156		White ceiling texture	None Detected
2-08	3777157		White ceiling texture	None Detected
2-09	3777158		White ceiling texture	None Detected
2-10	3777159		Yellow/tan insulation	None Detected
2-11	3777160		Yellow/tan insulation	None Detected
2-12	3777161		Yellow/tan insulation	None Detected
2-13	3777162		Light-brown floor tile	None Detected
2-13 (2)	3784638		Black mastic	Chrysotile 3%
2-14	3777163		Light-brown floor tile	None Detected
2-14 (2)	3784639		Black mastic	Chrysotile 3%
2-15	3777164		Light-brown floor tile	None Detected
2-15 (2)	3784640		Black mastic	Chrysotile 3%
2-16	3777165		White fibrous panel	None Detected
2-17	3777166		White fibrous panel	None Detected
2-18	3777167		White fibrous panel	None Detected
2-19	3777168		Yellow insulation	None Detected
2-20	3777169		Yellow insulation	None Detected
2-21	3777170		Yellow/tan insulation	None Detected
2-22	3777171		Yellow/tan insulation	None Detected
2-23	3777172		Yellow/tan insulation	None Detected
2-24	3777173		Yellow/tan insulation	None Detected
3-01	3777174		Yellow insulation	None Detected
3-02	3777175		Yellow insulation	None Detected

Project: McDuffie Island 7 Bldg ACM Survey

Lab Code: 695474-1

Method: EPA 600 / R93 / 116 and EPA 40 CFR Appendix E to Subpart E of Part 763

Client ID	Lab ID	Layer	Sample Description	Asbestos %
3-03	3777176		Yellow insulation	None Detected
3-04	3777177		White/gray floor tile	None Detected
3-04 (2)	3784641		Yellow mastic	None Detected
3-05	3777178		White/gray floor tile	None Detected
3-05 (2)	3784643		Yellow mastic	None Detected
3-06	3777179		White/gray floor tile	None Detected
3-06 (2)	3784644		Yellow mastic	None Detected
3-07	3777180	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
Composite (Composited Layers: A, B)				0%
3-08	3777181	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
Composite (Composited Layers: A, B)				0%
3-09	3777182	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
Composite (Composited Layers: A, B)				0%
3-10	3777183		White insulation	None Detected
3-11	3777184		White insulation	None Detected
3-12	3777185		White insulation	None Detected
4-01	3777186		Black floor tile	None Detected
4-01 (2)	3784648		Yellow mastic	None Detected
4-02	3777187		Black floor tile	None Detected
4-02 (2)	3784649		Yellow mastic	None Detected
4-03	3777188		Black floor tile	None Detected
4-03 (2)	3784650		Yellow mastic	None Detected
4-04	3777189		Brown/white floor tile	None Detected

Project: McDuffie Island 7 Bldg ACM Survey

Lab Code: 695474-1

Method: EPA 600 / R93 / 116 and EPA 40 CFR Appendix E to Subpart E of Part 763

Client ID	Lab ID	Layer	Sample Description	Asbestos %
4-04 (2)	3784651		Black mastic	None Detected
4-05	3777190		Brown/white floor tile	None Detected
4-05 (2)	3784659		Black mastic	None Detected
4-06	3777191		Brown/white floor tile	None Detected
4-06 (2)	3784660		Black mastic	None Detected
4-07	3777192		Tan floor tile	None Detected
4-07 (2)	3784668		Yellow/black mastic	None Detected
4-08	3777193		Tan floor tile	None Detected
4-08 (2)	3784669		Yellow/black mastic	None Detected
4-09	3777194		Tan floor tile	None Detected
4-09 (2)	3784670		Yellow/black mastic	None Detected
4-10	3777195	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
Composite (Composited Layers: A, B)				0%
4-11	3777196	Layer A	White joint compound	None Detected
		Layer B	Tan drywall	None Detected
Composite (Composited Layers: A, B)				0%
4-12	3777197	Layer A	White joint compound	None Detected
		Layer B	Tan drywall	None Detected
Composite (Composited Layers: A, B)				0%
4-13	3777198		White/tan ceiling tile	None Detected
4-14	3777199		White/tan ceiling tile	None Detected
4-15	3777200		White/tan ceiling tile	None Detected
4-16	3777201		Yellow/black insulation	None Detected
4-17	3777202		Yellow/black insulation	None Detected
4-18	3777203		Yellow/black insulation	None Detected

Project: McDuffie Island 7 Bldg ACM Survey

Lab Code: 695474-1

Method: EPA 600 / R93 / 116 and EPA 40 CFR Appendix E to Subpart E of Part 763

Client ID	Lab ID	Layer	Sample Description	Asbestos %
4-19	3777204		Gray cementitious material	None Detected
4-20	3777205		Gray cementitious material	None Detected
4-21	3777206		Gray cementitious material	None Detected
4-22	3777207		Pink/black insulation	None Detected
4-23	3777208		Pink/black insulation	None Detected
4-24	3777209		Pink/black insulation	None Detected
5-01	3777210		Gray/blue floor tile	None Detected
5-01 (2)	3784684		Yellow mastic	None Detected
5-02	3777211		Gray/blue floor tile	None Detected
5-02 (2)	3784691		Yellow mastic	None Detected
5-03	3777212		Gray/blue floor tile	None Detected
5-03 (2)	3784693		Yellow mastic	None Detected
5-04	3777213		Gray/blue floor tile	None Detected
5-04 (2)	3784695		Yellow mastic	None Detected
5-05	3777214		Gray/blue floor tile	None Detected
5-05 (2)	3784696		Yellow mastic	None Detected
5-06	3777215		Gray/blue floor tile	None Detected
5-06 (2)	3784698		Yellow mastic	None Detected
5-07	3777216		Gray/blue floor tile	None Detected
5-07 (2)	3784699		Yellow mastic	None Detected
5-08	3777217	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
Composite (Composited Layers: A, B)				0%
5-09	3777218	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
Composite (Composited Layers: A, B)				0%

Project: McDuffie Island 7 Bldg ACM Survey

Lab Code: 695474-1

Method: EPA 600 / R93 / 116 and EPA 40 CFR Appendix E to Subpart E of Part 763

Client ID	Lab ID	Layer	Sample Description	Asbestos %
5-10	3777219	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
Composite (Composited Layers: A, B)				0%
5-11	3777220	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
Composite (Composited Layers: A, B)				0%
5-12	3777221	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
Composite (Composited Layers: A, B)				0%
5-13	3777222		White/tan ceiling tile	None Detected
5-14	3777223		White/tan ceiling tile	None Detected
5-15	3777224		White/tan ceiling tile	None Detected
6-01	3777225		Tan floor tile	None Detected
6-02	3777226		Tan floor tile	None Detected
6-03	3777227		Tan floor tile	None Detected
6-04	3777228		Tan floor tile	None Detected
6-04 (2)	3784739		Black mastic	None Detected
6-05	3777229		Tan floor tile	None Detected
6-05 (2)	3784745		Black mastic	None Detected
6-06	3777230		Tan floor tile	None Detected
6-06 (2)	3784746		Black mastic	None Detected
7-01	3777231		White/tan floor tile	None Detected
7-01 (2)	3784820		Yellow mastic	None Detected
7-02	3777232		White/tan floor tile	None Detected
7-02 (2)	3784823		Yellow mastic	None Detected
7-03	3777233		White/tan floor tile	None Detected

Project: McDuffie Island 7 Bldg ACM Survey

Lab Code: 695474-1

Method: EPA 600 / R93 / 116 and EPA 40 CFR Appendix E to Subpart E of Part 763

Client ID	Lab ID	Layer	Sample Description	Asbestos %
7-03 (2)	3784824		Yellow mastic	None Detected
7-04	3777234	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
		Composite (Composited Layers: A, B)		0%
7-05	3777235	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
		Composite (Composited Layers: A, B)		0%
7-06	3777236	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
		Composite (Composited Layers: A, B)		0%
7-07	3777237		White floor tile	None Detected
7-07 (2)	3784916		Yellow mastic	None Detected
7-08	3777238		White floor tile	None Detected
7-08 (2)	3784920		Yellow mastic	None Detected
7-09	3777239		White floor tile	None Detected
7-09 (2)	3784921		Yellow mastic	None Detected
7-10	3777240	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
		Composite (Composited Layers: A, B)		0%
7-11	3777241	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
		Composite (Composited Layers: A, B)		0%
7-12	3777242	Layer A	White joint compound	None Detected
		Layer B	White/tan drywall	None Detected
		Composite (Composited Layers: A, B)		0%
7-13	3777243		White/tan ceiling tile	None Detected

Project: McDuffie Island 7 Bldg ACM Survey**Lab Code:** 695474-1**Method:** EPA 600 / R93 / 116 and EPA 40 CFR Appendix E to Subpart E of Part 763

Client ID	Lab ID	Layer	Sample Description	Asbestos %
7-14	3777244		White/tan ceiling tile	None Detected
7-15	3777245		White/tan ceiling tile	None Detected
7-16	3777246		Brown insulation	None Detected
7-17	3777247		Brown insulation	None Detected
7-18	3777248		Brown insulation	None Detected

ASBESTOS BULK ANALYSIS

By: Polarized Light Microscopy

Client: Southern Earth Sciences, Inc. (AL)
5460 Rangeline Rd
Mobile, AL 36619

Lab Code: 695474-1
Date Received: 10/06/25
Date Analyzed: 10/09/25
Date Reported: 10/09/25

Project: McDuffie Island 7 Bldg ACM Survey

Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS				ASBESTOS
Lab ID	Description	Attributes	Fibrous		Non-Fibrous		%
1-01 3777132	Fibrous Panel	Heterogeneous White Fibrous Bound	50%	Glass	50%	Vinyl	None Detected
1-02 3777133	Fibrous Panel	Heterogeneous White Fibrous Bound	50%	Glass	50%	Vinyl	None Detected
1-03 3777134	Fibrous Panel	Heterogeneous White Fibrous Bound	50%	Glass	50%	Vinyl	None Detected
1-04 3777135	Floor Tile	Homogeneous Light-brown Non-Fibrous Bound			100%	Vinyl	None Detected
1-04 (2) 3784629	Mastic	Homogeneous Black Non-Fibrous Bound			97%	Mastic	Chrysotile 3%
1-05 3777136	Floor Tile	Homogeneous Light-brown Non-Fibrous Bound			100%	Vinyl	None Detected
1-05 (2) 3784630	Mastic	Homogeneous Black Non-Fibrous Bound			97%	Mastic	Chrysotile 3%

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Project: McDuffie Island 7 Bldg ACM Survey

Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS		ASBESTOS
Lab ID	Description	Attributes	Fibrous	Non-Fibrous	%
1-06 3777137	Floor Tile	Homogeneous Light-brown Non-Fibrous Bound	100%	Vinyl	None Detected
1-06 (2) 3784631	Mastic	Homogeneous Black Non-Fibrous Bound	97%	Mastic	Chrysotile 3%
1-07 3777138	Cove Base	Homogeneous Black Non-Fibrous Bound	100%	Vinyl	None Detected
1-07 (2) 3784632	Mastic	Homogeneous Brown Non-Fibrous Bound	100%	Mastic	None Detected
1-08 3777139	Cove Base	Homogeneous Black Non-Fibrous Bound	100%	Vinyl	None Detected
1-08 (2) 3784633	Mastic	Homogeneous Brown Non-Fibrous Bound	100%	Mastic	None Detected
1-09 3777140	Cove Base	Homogeneous Black Non-Fibrous Bound	100%	Vinyl	None Detected

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Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS			ASBESTOS
Lab ID	Description	Attributes	Fibrous	Non-Fibrous		%
1-09 (2) 3784634	Mastic	Homogeneous Brown Non-Fibrous Bound		100% Mastic		None Detected
1-10 Layer A 3777141	Joint Compound	Heterogeneous White Non-Fibrous Bound		65% Binder 30% Calc Carb 5% Paint		None Detected
Layer B 3777141	Drywall	Heterogeneous White/tan Fibrous Bound	15% 5%	Cellulose Glass 80%	Gypsum	None Detected
Composite (Composited Layers: A, B)						0%
1-11 Layer A 3777142	Joint Compound	Heterogeneous White Non-Fibrous Bound		65% Binder 30% Calc Carb 5% Paint		None Detected
Layer B 3777142	Drywall	Heterogeneous White/tan Fibrous Bound	15% 5%	Cellulose Glass 80%	Gypsum	None Detected
Composite (Composited Layers: A, B)						0%

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Project: McDuffie Island 7 Bldg ACM Survey

Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS			ASBESTOS
Lab ID	Description	Attributes	Fibrous	Non-Fibrous		%
1-12	Joint Compound	Heterogeneous		65%	Binder	None Detected
Layer A		White		30%	Calc Carb	
3777143		Non-Fibrous		5%	Paint	
		Bound				
Layer B	Drywall	Heterogeneous	15%	Cellulose	80%	None Detected
3777143		White/tan	5%	Glass	Gypsum	
		Fibrous				
		Bound				
Composite (Composited Layers: A, B)						0%
1-13	Joint Compound	Heterogeneous		65%	Binder	None Detected
Layer A		White		30%	Calc Carb	
3777144		Non-Fibrous		5%	Paint	
		Bound				
Layer B	Drywall	Heterogeneous	15%	Cellulose	80%	None Detected
3777144		White/tan	5%	Glass	Gypsum	
		Fibrous				
		Bound				
Composite (Composited Layers: A, B)						0%
1-14	Joint Compound	Heterogeneous		65%	Binder	None Detected
Layer A		White		30%	Calc Carb	
3777145		Non-Fibrous		5%	Paint	
		Bound				
Layer B	Drywall	Heterogeneous	15%	Cellulose	80%	None Detected
3777145		White/tan	5%	Glass	Gypsum	
		Fibrous				
		Bound				
Composite (Composited Layers: A, B)						0%

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Project: McDuffie Island 7 Bldg ACM Survey

Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS				ASBESTOS
Lab ID	Description	Attributes	Fibrous		Non-Fibrous		%
1-15 Layer A 3777146	Joint Compound	Heterogeneous			65%	Binder	None Detected
		White			30%	Calc Carb	
		Non-Fibrous			5%	Paint	
		Bound					
Layer B 3777146	Drywall	Heterogeneous	15%	Cellulose	80%	Gypsum	None Detected
		White/tan	5%	Glass			
		Fibrous					
		Bound					
Composite (Composited Layers: A, B)							0%
1-16 3777147	Insulation	Heterogeneous	10%	Cellulose	10%	Foil	None Detected
		Brown	80%	Glass			
		Fibrous					
		Loosely Bound					
1-17 3777148	Insulation	Heterogeneous	10%	Cellulose	10%	Foil	None Detected
		Brown	80%	Glass			
		Fibrous					
		Loosely Bound					
1-18 3777149	Insulation	Heterogeneous	10%	Cellulose	10%	Foil	None Detected
		Brown	80%	Glass			
		Fibrous					
		Loosely Bound					
2-01 3777150	Floor Tile	Homogeneous			100%	Vinyl	None Detected
		Light-brown					
		Non-Fibrous					
		Bound					
2-01 (2) 3784635	Mastic	Homogeneous			97%	Mastic	Chrysotile 3%
		Black					
		Non-Fibrous					
		Bound					

ASBESTOS BULK ANALYSIS

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Project: McDuffie Island 7 Bldg ACM Survey

Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS			ASBESTOS
Lab ID	Description	Attributes	Fibrous	Non-Fibrous		%
2-02 3777151	Floor Tile	Homogeneous Light-brown Non-Fibrous Bound	100%	Vinyl	None Detected	
2-02 (2) 3784636	Mastic	Homogeneous Black Non-Fibrous Bound	97%	Mastic	Chrysotile 3%	
2-03 3777152	Floor Tile	Homogeneous Light-brown Non-Fibrous Bound	100%	Vinyl	None Detected	
2-03 (2) 3784637	Mastic	Homogeneous Black Non-Fibrous Bound	97%	Mastic	Chrysotile 3%	
2-04 Layer A 3777153	Joint Compound	Heterogeneous White Non-Fibrous Bound	65% 30% 5%	Binder Calc Carb Paint	None Detected	
Layer B 3777153	Drywall	Heterogeneous White/tan Fibrous Bound	15% 5%	Cellulose Glass	80% Gypsum	None Detected
Composite (Composited Layers: A, B)						0%

ASBESTOS BULK ANALYSIS

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Project: McDuffie Island 7 Bldg ACM Survey

Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS				ASBESTOS
Lab ID	Description	Attributes	Fibrous		Non-Fibrous		%
2-05	Joint Compound	Heterogeneous			65%	Binder	None Detected
Layer A		White			30%	Calc Carb	
3777154		Non-Fibrous			5%	Paint	
		Bound					
Layer B	Drywall	Heterogeneous	15%	Cellulose	80%	Gypsum	None Detected
3777154		White/tan	5%	Glass			
		Fibrous					
		Bound					
Composite (Composited Layers: A, B)							0%
2-06	Joint Compound	Heterogeneous			65%	Binder	None Detected
Layer A		White			30%	Calc Carb	
3777155		Non-Fibrous			5%	Paint	
		Bound					
Layer B	Drywall	Heterogeneous	15%	Cellulose	80%	Gypsum	None Detected
3777155		White/tan	5%	Glass			
		Fibrous					
		Bound					
Composite (Composited Layers: A, B)							0%
2-07	Ceiling Texture	Heterogeneous			80%	Binder	None Detected
3777156		White			15%	Vermiculite	
		Non-Fibrous			5%	Paint	
		Bound					
2-08	Ceiling Texture	Heterogeneous			80%	Binder	None Detected
3777157		White			15%	Vermiculite	
		Non-Fibrous			5%	Paint	
		Bound					
2-09	Ceiling Texture	Heterogeneous			80%	Binder	None Detected
3777158		White			15%	Vermiculite	
		Non-Fibrous			5%	Paint	
		Bound					

ASBESTOS BULK ANALYSIS

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Project: McDuffie Island 7 Bldg ACM Survey

Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS				ASBESTOS
Lab ID	Description	Attributes	Fibrous		Non-Fibrous		%
2-10 3777159	Insulation	Heterogeneous Yellow/tan Fibrous Loosely Bound	10%	Cellulose	10%	Foil	None Detected
			70%	Glass	10%	Mastic	
2-11 3777160	Insulation	Heterogeneous Yellow/tan Fibrous Loosely Bound	10%	Cellulose	10%	Foil	None Detected
			70%	Glass	10%	Mastic	
2-12 3777161	Insulation	Heterogeneous Yellow/tan Fibrous Loosely Bound	10%	Cellulose	10%	Foil	None Detected
			70%	Glass	10%	Mastic	
2-13 3777162	Floor Tile	Homogeneous Light-brown Non-Fibrous Bound			100%	Vinyl	None Detected
2-13 (2) 3784638	Mastic	Homogeneous Black Non-Fibrous Bound			97%	Mastic	Chrysotile 3%
2-14 3777163	Floor Tile	Homogeneous Light-brown Non-Fibrous Bound			100%	Vinyl	None Detected
2-14 (2) 3784639	Mastic	Homogeneous Black Non-Fibrous Bound			97%	Mastic	Chrysotile 3%

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Project: McDuffie Island 7 Bldg ACM Survey

Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS				ASBESTOS
Lab ID	Description	Attributes	Fibrous		Non-Fibrous		%
2-15 3777164	Floor Tile	Homogeneous Light-brown Non-Fibrous Bound			100%	Vinyl	None Detected
2-15 (2) 3784640	Mastic	Homogeneous Black Non-Fibrous Bound			97%	Mastic	Chrysotile 3%
2-16 3777165	Fibrous Panel	Heterogeneous White Fibrous Bound	50%	Glass	50%	Vinyl	None Detected
2-17 3777166	Fibrous Panel	Heterogeneous White Fibrous Bound	50%	Glass	50%	Vinyl	None Detected
2-18 3777167	Fibrous Panel	Heterogeneous White Fibrous Bound	50%	Glass	50%	Vinyl	None Detected
2-19 3777168	Insulation	Heterogeneous Yellow Fibrous Loosely Bound	100%	Glass			None Detected
2-20 3777169	Insulation	Heterogeneous Yellow Fibrous Loosely Bound	100%	Glass			None Detected

ASBESTOS BULK ANALYSIS

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Date Received: 10/06/25
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Project: McDuffie Island 7 Bldg ACM Survey

Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS				ASBESTOS
Lab ID	Description	Attributes	Fibrous		Non-Fibrous		%
2-21 3777170	Insulation	Heterogeneous	10%	Cellulose	10%	Foil	None Detected
		Yellow/tan	70%	Glass	10%	Mastic	
		Fibrous					
		Loosely Bound					
2-22 3777171	Insulation	Heterogeneous	10%	Cellulose	10%	Foil	None Detected
		Yellow/tan	70%	Glass	10%	Mastic	
		Fibrous					
		Loosely Bound					
2-23 3777172	Insulation	Heterogeneous	10%	Cellulose	10%	Foil	None Detected
		Yellow/tan	70%	Glass	10%	Mastic	
		Fibrous					
		Loosely Bound					
2-24 3777173	Insulation	Heterogeneous	10%	Cellulose	10%	Foil	None Detected
		Yellow/tan	70%	Glass	10%	Mastic	
		Fibrous					
		Loosely Bound					
3-01 3777174	Insulation	Heterogeneous	100%	Glass			None Detected
		Yellow					
		Fibrous					
		Loosely Bound					
3-02 3777175	Insulation	Heterogeneous	100%	Glass			None Detected
		Yellow					
		Fibrous					
		Loosely Bound					
3-03 3777176	Insulation	Heterogeneous	100%	Glass			None Detected
		Yellow					
		Fibrous					
		Loosely Bound					

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Project: McDuffie Island 7 Bldg ACM Survey

Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS		ASBESTOS
Lab ID	Description	Attributes	Fibrous	Non-Fibrous	%
3-04 3777177	Floor Tile	Heterogeneous White/gray Non-Fibrous Bound	100%	Vinyl	None Detected
3-04 (2) 3784641	Mastic	Homogeneous Yellow Non-Fibrous Bound	100%	Mastic	None Detected
3-05 3777178	Floor Tile	Heterogeneous White/gray Non-Fibrous Bound	100%	Vinyl	None Detected
3-05 (2) 3784643	Mastic	Homogeneous Yellow Non-Fibrous Bound	100%	Mastic	None Detected
3-06 3777179	Floor Tile	Heterogeneous White/gray Non-Fibrous Bound	100%	Vinyl	None Detected
3-06 (2) 3784644	Mastic	Homogeneous Yellow Non-Fibrous Bound	100%	Mastic	None Detected

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Date Reported: 10/09/25

Project: McDuffie Island 7 Bldg ACM Survey

Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS				ASBESTOS
Lab ID	Description	Attributes	Fibrous		Non-Fibrous		%
3-07	Joint Compound	Heterogeneous			65%	Binder	None Detected
Layer A		White			30%	Calc Carb	
3777180		Non-Fibrous			5%	Paint	
		Bound					
Layer B	Drywall	Heterogeneous	15%	Cellulose	80%	Gypsum	None Detected
3777180		White/tan	5%	Glass			
		Fibrous					
		Bound					
Composite (Composited Layers: A, B)							0%
3-08	Joint Compound	Heterogeneous			65%	Binder	None Detected
Layer A		White			30%	Calc Carb	
3777181		Non-Fibrous			5%	Paint	
		Bound					
Layer B	Drywall	Heterogeneous	15%	Cellulose	80%	Gypsum	None Detected
3777181		White/tan	5%	Glass			
		Fibrous					
		Bound					
Composite (Composited Layers: A, B)							0%
3-09	Joint Compound	Heterogeneous			65%	Binder	None Detected
Layer A		White			30%	Calc Carb	
3777182		Non-Fibrous			5%	Paint	
		Bound					
Layer B	Drywall	Heterogeneous	15%	Cellulose	80%	Gypsum	None Detected
3777182		White/tan	5%	Glass			
		Fibrous					
		Bound					
Composite (Composited Layers: A, B)							0%

ASBESTOS BULK ANALYSIS

By: Polarized Light Microscopy

Client: Southern Earth Sciences, Inc. (AL)
5460 Rangeline Rd
Mobile, AL 36619

Lab Code: 695474-1
Date Received: 10/06/25
Date Analyzed: 10/09/25
Date Reported: 10/09/25

Project: McDuffie Island 7 Bldg ACM Survey

Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS		ASBESTOS
Lab ID	Description	Attributes	Fibrous	Non-Fibrous	%
3-10 3777183	Insulation	Heterogeneous White Fibrous Loosely Bound	100%	Glass	None Detected
3-11 3777184	Insulation	Heterogeneous White Fibrous Loosely Bound	100%	Glass	None Detected
3-12 3777185	Insulation	Heterogeneous White Fibrous Loosely Bound	100%	Glass	None Detected
4-01 3777186	Floor Tile	Homogeneous Black Non-Fibrous Bound		100% Vinyl	None Detected
4-01 (2) 3784648	Mastic	Homogeneous Yellow Non-Fibrous Bound		100% Mastic	None Detected
4-02 3777187	Floor Tile	Homogeneous Black Non-Fibrous Bound		100% Vinyl	None Detected
4-02 (2) 3784649	Mastic	Homogeneous Yellow Non-Fibrous Bound		100% Mastic	None Detected

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Project: McDuffie Island 7 Bldg ACM Survey

Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS				ASBESTOS
Lab ID	Description	Attributes	Fibrous	Non-Fibrous			%
4-03 3777188	Floor Tile	Homogeneous Black Non-Fibrous Bound		100%	Vinyl		None Detected
4-03 (2) 3784650	Mastic	Homogeneous Yellow Non-Fibrous Bound		100%	Mastic		None Detected
4-04 3777189	Floor Tile	Heterogeneous Brown/white Non-Fibrous Bound		100%	Vinyl		None Detected
4-04 (2) 3784651	Mastic	Homogeneous Black Non-Fibrous Bound	5%	Cellulose	95%	Mastic	None Detected
4-05 3777190	Floor Tile	Heterogeneous Brown/white Non-Fibrous Bound		100%	Vinyl		None Detected
4-05 (2) 3784659	Mastic	Homogeneous Black Non-Fibrous Bound	5%	Cellulose	95%	Mastic	None Detected
4-06 3777191	Floor Tile	Heterogeneous Brown/white Non-Fibrous Bound		100%	Vinyl		None Detected

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Project: McDuffie Island 7 Bldg ACM Survey

Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS			ASBESTOS
Lab ID	Description	Attributes	Fibrous	Non-Fibrous		%
4-06 (2) 3784660	Mastic	Homogeneous Black Non-Fibrous Bound	5%	Cellulose 95%	Mastic	None Detected
4-07 3777192	Floor Tile	Heterogeneous Tan Non-Fibrous Bound		100%	Vinyl	None Detected
4-07 (2) 3784668	Mastic	Heterogeneous Yellow/black Non-Fibrous Bound		100%	Mastic	None Detected
Unable to separate for individual analysis.						
4-08 3777193	Floor Tile	Heterogeneous Tan Non-Fibrous Bound		100%	Vinyl	None Detected
4-08 (2) 3784669	Mastic	Heterogeneous Yellow/black Non-Fibrous Bound		100%	Mastic	None Detected
Unable to separate for individual analysis.						
4-09 3777194	Floor Tile	Heterogeneous Tan Non-Fibrous Bound		100%	Vinyl	None Detected

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Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS		ASBESTOS
Lab ID	Description	Attributes	Fibrous	Non-Fibrous	%

4-09 (2) 3784670	Mastic	Heterogeneous Yellow/black Non-Fibrous Bound	100%	Mastic	None Detected
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Unable to separate for individual analysis.

4-10 Layer A 3777195	Joint Compound	Heterogeneous White Non-Fibrous Bound	65% 30% 5%	Binder Calc Carb Paint	None Detected
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Layer B 3777195	Drywall	Heterogeneous White/tan Fibrous Bound	15% 5%	Cellulose Glass	80% Gypsum	None Detected
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Composite (Composited Layers: A, B) 0%

4-11 Layer A 3777196	Joint Compound	Heterogeneous White Non-Fibrous Bound	65% 30% 5%	Binder Calc Carb Paint	None Detected
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Layer B 3777196	Drywall	Heterogeneous Tan Fibrous Bound	15% 5%	Cellulose Glass	80% Gypsum	None Detected
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Composite (Composited Layers: A, B) 0%

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Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS				ASBESTOS
Lab ID	Description	Attributes	Fibrous		Non-Fibrous		%
4-12 Layer A 3777197	Joint Compound	Heterogeneous White Non-Fibrous Bound			65% 30% 5%	Binder Calc Carb Paint	None Detected
Layer B 3777197	Drywall	Heterogeneous Tan Fibrous Bound	15% 5%	Cellulose Glass	80%	Gypsum	None Detected
Composite (Composited Layers: A, B)							0%
4-13 3777198	Ceiling Tile	Heterogeneous White/tan Fibrous Loosely Bound	60% 20%	Cellulose Glass	15% 5%	Perlite Paint	None Detected
4-14 3777199	Ceiling Tile	Heterogeneous White/tan Fibrous Loosely Bound	60% 20%	Cellulose Glass	15% 5%	Perlite Paint	None Detected
4-15 3777200	Ceiling Tile	Heterogeneous White/tan Fibrous Loosely Bound	60% 20%	Cellulose Glass	15% 5%	Perlite Paint	None Detected
4-16 3777201	Insulation	Heterogeneous Yellow/black Fibrous Loosely Bound	30% 50%	Cellulose Glass	20%	Tar	None Detected
4-17 3777202	Insulation	Heterogeneous Yellow/black Fibrous Loosely Bound	30% 50%	Cellulose Glass	20%	Tar	None Detected

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Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS				ASBESTOS
Lab ID	Description	Attributes	Fibrous		Non-Fibrous		%
4-18 3777203	Insulation	Heterogeneous	30%	Cellulose	20%	Tar	None Detected
		Yellow/black	50%	Glass			
		Fibrous					
		Loosely Bound					
4-19 3777204	Cementitious Material	Heterogeneous	10%	Glass	50%	Silica	None Detected
		Gray			20%	Binder	
		Non-Fibrous			<1%	Paint	
		Bound			20%	Foam	
4-20 3777205	Cementitious Material	Heterogeneous	10%	Glass	50%	Silica	None Detected
		Gray			20%	Binder	
		Non-Fibrous			<1%	Paint	
		Bound			20%	Foam	
4-21 3777206	Cementitious Material	Heterogeneous	10%	Glass	50%	Silica	None Detected
		Gray			20%	Binder	
		Non-Fibrous			<1%	Paint	
		Bound			20%	Foam	
4-22 3777207	Insulation	Heterogeneous	90%	Glass	10%	Binder	None Detected
		Pink/black					
		Fibrous					
		Loosely Bound					
4-23 3777208	Insulation	Heterogeneous	90%	Glass	10%	Binder	None Detected
		Pink/black					
		Fibrous					
		Loosely Bound					
4-24 3777209	Insulation	Heterogeneous	90%	Glass	10%	Binder	None Detected
		Pink/black					
		Fibrous					
		Loosely Bound					

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Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS		ASBESTOS
Lab ID	Description	Attributes	Fibrous	Non-Fibrous	%
5-01 3777210	Floor Tile	Homogeneous Gray/blue Non-Fibrous Bound	100%	Vinyl	None Detected
5-01 (2) 3784684	Mastic	Homogeneous Yellow Non-Fibrous Bound	100%	Mastic	None Detected
5-02 3777211	Floor Tile	Homogeneous Gray/blue Non-Fibrous Bound	100%	Vinyl	None Detected
5-02 (2) 3784691	Mastic	Homogeneous Yellow Non-Fibrous Bound	100%	Mastic	None Detected
5-03 3777212	Floor Tile	Homogeneous Gray/blue Non-Fibrous Bound	100%	Vinyl	None Detected
5-03 (2) 3784693	Mastic	Homogeneous Yellow Non-Fibrous Bound	100%	Mastic	None Detected
5-04 3777213	Floor Tile	Homogeneous Gray/blue Non-Fibrous Bound	100%	Vinyl	None Detected

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Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS		ASBESTOS
Lab ID	Description	Attributes	Fibrous	Non-Fibrous	%
5-04 (2) 3784695	Mastic	Homogeneous Yellow Non-Fibrous Bound	100%	Mastic	None Detected
5-05 3777214	Floor Tile	Homogeneous Gray/blue Non-Fibrous Bound	100%	Vinyl	None Detected
5-05 (2) 3784696	Mastic	Homogeneous Yellow Non-Fibrous Bound	100%	Mastic	None Detected
5-06 3777215	Floor Tile	Homogeneous Gray/blue Non-Fibrous Bound	100%	Vinyl	None Detected
5-06 (2) 3784698	Mastic	Homogeneous Yellow Non-Fibrous Bound	100%	Mastic	None Detected
5-07 3777216	Floor Tile	Homogeneous Gray/blue Non-Fibrous Bound	100%	Vinyl	None Detected
5-07 (2) 3784699	Mastic	Homogeneous Yellow Non-Fibrous Bound	100%	Mastic	None Detected

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Project: McDuffie Island 7 Bldg ACM Survey

Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS				ASBESTOS
Lab ID	Description	Attributes	Fibrous		Non-Fibrous		%
5-08 Layer A 3777217	Joint Compound	Heterogeneous			65%	Binder	None Detected
		White			30%	Calc Carb	
		Non-Fibrous			5%	Paint	
		Bound					
Layer B 3777217	Drywall	Heterogeneous	15%	Cellulose	80%	Gypsum	None Detected
		White/tan	5%	Glass			
		Fibrous					
		Bound					
Composite (Composited Layers: A, B)							0%
5-09 Layer A 3777218	Joint Compound	Heterogeneous			65%	Binder	None Detected
		White			30%	Calc Carb	
		Non-Fibrous			5%	Paint	
		Bound					
Layer B 3777218	Drywall	Heterogeneous	15%	Cellulose	80%	Gypsum	None Detected
		White/tan	5%	Glass			
		Fibrous					
		Bound					
Composite (Composited Layers: A, B)							0%
5-10 Layer A 3777219	Joint Compound	Heterogeneous			65%	Binder	None Detected
		White			30%	Calc Carb	
		Non-Fibrous			5%	Paint	
		Bound					
Layer B 3777219	Drywall	Heterogeneous	15%	Cellulose	80%	Gypsum	None Detected
		White/tan	5%	Glass			
		Fibrous					
		Bound					
Composite (Composited Layers: A, B)							0%

ASBESTOS BULK ANALYSIS

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Project: McDuffie Island 7 Bldg ACM Survey

Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS				ASBESTOS
Lab ID	Description	Attributes	Fibrous		Non-Fibrous		%
5-11 Layer A 3777220	Joint Compound	Heterogeneous			65%	Binder	None Detected
		White			30%	Calc Carb	
		Non-Fibrous			5%	Paint	
		Bound					
Layer B 3777220	Drywall	Heterogeneous	15%	Cellulose	80%	Gypsum	None Detected
		White/tan	5%	Glass			
		Fibrous					
		Bound					
Composite (Composited Layers: A, B)							0%
5-12 Layer A 3777221	Joint Compound	Heterogeneous			65%	Binder	None Detected
		White			30%	Calc Carb	
		Non-Fibrous			5%	Paint	
		Bound					
Layer B 3777221	Drywall	Heterogeneous	15%	Cellulose	80%	Gypsum	None Detected
		White/tan	5%	Glass			
		Fibrous					
		Bound					
Composite (Composited Layers: A, B)							0%
5-13 3777222	Ceiling Tile	Heterogeneous	60%	Cellulose	15%	Perlite	None Detected
		White/tan	20%	Glass	5%	Paint	
		Fibrous					
		Loosely Bound					
5-14 3777223	Ceiling Tile	Heterogeneous	60%	Cellulose	15%	Perlite	None Detected
		White/tan	20%	Glass	5%	Paint	
		Fibrous					
		Loosely Bound					
5-15 3777224	Ceiling Tile	Heterogeneous	60%	Cellulose	15%	Perlite	None Detected
		White/tan	20%	Glass	5%	Paint	
		Fibrous					
		Loosely Bound					

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Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS				ASBESTOS
Lab ID	Description	Attributes	Fibrous		Non-Fibrous		%
6-01 3777225	Floor Tile	Heterogeneous Tan Non-Fibrous Bound	10%	Glass	90%	Vinyl	None Detected
No mastic present.							
6-02 3777226	Floor Tile	Heterogeneous Tan Non-Fibrous Bound	10%	Glass	90%	Vinyl	None Detected
No mastic presesnt.							
6-03 3777227	Floor Tile	Heterogeneous Tan Non-Fibrous Bound	10%	Glass	90%	Vinyl	None Detected
No mastic present.							
6-04 3777228	Floor Tile	Homogeneous Tan Non-Fibrous Bound			100%	Vinyl	None Detected
6-04 (2) 3784739	Mastic	Homogeneous Black Non-Fibrous Bound	5%	Cellulose	95%	Mastic	None Detected
6-05 3777229	Floor Tile	Homogeneous Tan Non-Fibrous Bound			100%	Vinyl	None Detected

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Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS				ASBESTOS
Lab ID	Description	Attributes	Fibrous	Non-Fibrous			%
6-05 (2) 3784745	Mastic	Homogeneous Black Non-Fibrous Bound	5%	Cellulose	95%	Mastic	None Detected
6-06 3777230	Floor Tile	Homogeneous Tan Non-Fibrous Bound			100%	Vinyl	None Detected
6-06 (2) 3784746	Mastic	Homogeneous Black Non-Fibrous Bound	5%	Cellulose	95%	Mastic	None Detected
7-01 3777231	Floor Tile	Homogeneous White/tan Non-Fibrous Bound			100%	Vinyl	None Detected
7-01 (2) 3784820	Mastic	Homogeneous Yellow Non-Fibrous Bound			100%	Mastic	None Detected
7-02 3777232	Floor Tile	Homogeneous White/tan Non-Fibrous Bound			100%	Vinyl	None Detected
7-02 (2) 3784823	Mastic	Homogeneous Yellow Non-Fibrous Bound			100%	Mastic	None Detected

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Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS			ASBESTOS
Lab ID	Description	Attributes	Fibrous	Non-Fibrous		%
7-03 3777233	Floor Tile	Homogeneous White/tan Non-Fibrous Bound		100% Vinyl		None Detected
7-03 (2) 3784824	Mastic	Homogeneous Yellow Non-Fibrous Bound		100% Mastic		None Detected
7-04 Layer A 3777234	Joint Compound	Heterogeneous White Non-Fibrous Bound		65% Binder 30% Calc Carb 5% Paint		None Detected
Layer B 3777234	Drywall	Heterogeneous White/tan Fibrous Bound	15% 5%	Cellulose Glass	80%	Gypsum None Detected
Composite (Composited Layers: A, B)						0%
7-05 Layer A 3777235	Joint Compound	Heterogeneous White Non-Fibrous Bound		65% Binder 30% Calc Carb 5% Paint		None Detected
Layer B 3777235	Drywall	Heterogeneous White/tan Fibrous Bound	15% 5%	Cellulose Glass	80%	Gypsum None Detected
Composite (Composited Layers: A, B)						0%

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Lab ID	Description	Attributes	Fibrous		Non-Fibrous		%
7-06	Joint Compound	Heterogeneous			65%	Binder	None Detected
Layer A		White			30%	Calc Carb	
3777236		Non-Fibrous			5%	Paint	
		Bound					

Layer B	Drywall	Heterogeneous	15%	Cellulose	80%	Gypsum	None Detected
3777236		White/tan	5%	Glass			
		Fibrous					
		Bound					
Composite (Composited Layers: A, B)							0%
7-07	Floor Tile	Homogeneous			100%	Vinyl	None Detected
3777237		White					
		Non-Fibrous					
		Bound					
7-07 (2)	Mastic	Homogeneous			100%	Mastic	None Detected
3784916		Yellow					
		Non-Fibrous					
		Bound					
7-08	Floor Tile	Homogeneous			100%	Vinyl	None Detected
3777238		White					
		Non-Fibrous					
		Bound					
7-08 (2)	Mastic	Homogeneous			100%	Mastic	None Detected
3784920		Yellow					
		Non-Fibrous					
		Bound					
7-09	Floor Tile	Homogeneous			100%	Vinyl	None Detected
3777239		White					
		Non-Fibrous					
		Bound					

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Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS			ASBESTOS
Lab ID	Description	Attributes	Fibrous	Non-Fibrous		%
7-09 (2) 3784921	Mastic	Homogeneous Yellow Non-Fibrous Bound	100%	Mastic	None Detected	
7-10 Layer A 3777240	Joint Compound	Heterogeneous White Non-Fibrous Bound	65% 30% 5%	Binder Calc Carb Paint	None Detected	
Layer B 3777240	Drywall	Heterogeneous White/tan Fibrous Bound	15% 5%	Cellulose Glass	80% Gypsum	None Detected
Composite (Composited Layers: A, B)						0%
7-11 Layer A 3777241	Joint Compound	Heterogeneous White Non-Fibrous Bound	65% 30% 5%	Binder Calc Carb Paint	None Detected	
Layer B 3777241	Drywall	Heterogeneous White/tan Fibrous Bound	15% 5%	Cellulose Glass	80% Gypsum	None Detected
Composite (Composited Layers: A, B)						0%

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Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS				ASBESTOS
Lab ID	Description	Attributes	Fibrous		Non-Fibrous		%
7-12 Layer A 3777242	Joint Compound	Heterogeneous White Non-Fibrous Bound			65% 30% 5%	Binder Calc Carb Paint	None Detected
Layer B 3777242	Drywall	Heterogeneous White/tan Fibrous Bound	15% 5%	Cellulose Glass	80%	Gypsum	None Detected
Composite (Composited Layers: A, B)							0%
7-13 3777243	Ceiling Tile	Heterogeneous White/tan Fibrous Loosely Bound	60% 20%	Cellulose Glass	15% 5%	Perlite Paint	None Detected
7-14 3777244	Ceiling Tile	Heterogeneous White/tan Fibrous Loosely Bound	60% 20%	Cellulose Glass	15% 5%	Perlite Paint	None Detected
7-15 3777245	Ceiling Tile	Heterogeneous White/tan Fibrous Loosely Bound	60% 20%	Cellulose Glass	15% 5%	Perlite Paint	None Detected
7-16 3777246	Insulation	Heterogeneous Brown Fibrous Loosely Bound	100%	Glass			None Detected
7-17 3777247	Insulation	Heterogeneous Brown Fibrous Loosely Bound	100%	Glass			None Detected

Client: Southern Earth Sciences, Inc. (AL)
 5460 Rangeline Rd
 Mobile, AL 36619

Lab Code: 695474-1
Date Received: 10/06/25
Date Analyzed: 10/09/25
Date Reported: 10/09/25

Project: McDuffie Island 7 Bldg ACM Survey

Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS		ASBESTOS
Lab ID	Description	Attributes	Fibrous	Non-Fibrous	%
7-18 3777248	Insulation	Heterogeneous Brown Fibrous Loosely Bound	100%	Glass	None Detected

LEGEND:

Non-Anth = Non-Asbestiform Anthophyllite
Non-Trem = Non-Asbestiform Tremolite
Calc Carb = Calcium Carbonate

METHOD: EPA 600 / R93 / 116 and EPA 40 CFR Appendix E to Subpart E of Part 763

REPORTING LIMIT: 1% by calibrated visual estimation

REGULATORY LIMIT: 1%

Due to the limitations of the EPA 600 / R93 / 116 method, nonfriable organically bound materials (NOBs) such as vinyl floor tiles can be difficult to analyze via polarized light microscopy (PLM). EPA recommends that all NOBs analyzed by PLM, and found not to contain asbestos, be further analyzed by Transmission Electron Microscopy (TEM). Please note that PLM analysis of dust and soil samples for asbestos is not covered under NVLAP accreditation. Estimated measurement of uncertainty is available on request.

Eurofins Built Environment Testing East, LLC makes no warranty representation regarding the accuracy of client submitted information in preparing and presenting analytical results. Interpretation of the analytical results is the sole responsibility of the client. This report relates only to the samples tested or analyzed and may not be reproduced, except in full, without written approval by Eurofins Built Environment Testing East, LLC. Samples were received in acceptable condition unless otherwise noted. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Information provided by customer includes customer sample ID and sample description.



Regan Kerns
Analyst

DATA QA:



Samantha Webster
10/9/2025

APPROVED BY:



Kamila Reichert,
Laboratory Director



Built Environment Testing

RES Job #: 695474

Effective

SUBMITTED BY		INVOICE TO		CONTACT INFORMATION		SERIES	
Company: Southern Earth Sciences, Inc. (AL)		Company: Southern Earth Sciences, Inc. (AL)		Contact: Horacio Martinez		-1 PLM Standard 3	
Address: 5460 Rangeline Rd		Address: 5460 Rangeline Rd		Phone: (251) 344-7711			
Mobile, AL 36619		Mobile, AL 36619		Fax:			
Project Number and/or P.O. #: M25-521		Project Zip Code:		Cell: (205) 800-6401			
Project Description/Location: McDuffie Island 7 Bldg ACM Survey				Final Data Deliverable Email Address: hmartinez@soearth.com (+ 2 ADDNL CONTACTS)			

ASBESTOS LABORATORY					REQUESTED ANALYSIS										VALID MATRIX CODES					LAB NOTES									
PLM / PCM / TEM / NYS					DTL	RUSH	PRIORITY	STANDARD	ASBESTOS	TEM	PCM	NYS	DUST	METALS	ORGANICS	VIABLES	MEDICAL	MOLD	ICO	Sample Volume (L) / Area	Sample Temperature (°C)	Length (or Aliquots) x Width (or Area / Aliquot)	Matrix Code	# of Containers	Date Collected mm/dd/yy	Time Collected hh:mm	Laboratory Analysis Instructions		
1					1-01																							AL	
2					1-02																								
3					1-03																								
4					1-04																								
5					1-05																								
6					1-06																								
7					1-07																								
8					1-08																								
9					1-09																								
10					1-10																								
11					1-11																								
12					1-12																								
13					1-13																								

Eurofins Built Environment Testing East, LLC establishes a unique Lab Sample ID, for each sample, by preceding each unique Client Sample ID with the laboratory RES Job Number.
Eurofins Built Environment Testing East, LLC will analyze incoming samples based on information received and will not be responsible for errors or omissions in calculations resulting from the inaccuracy of original data. By signing, client/company representative agrees that submission of the following samples for requested analysis as indicated on this Chain of Custody shall constitute an analytical services agreement with payment terms of NET30. Failure to comply with payment terms may result in a 15% APR finance charge.

Relinquished By:	Date/Time: 10/06/2025 14:01:33	Sample Condition: Acceptable
Received By:	Date/Time: 10/06/2025 14:01:33	Carrier: UPS



RES Job #: 695474

Submitted By: Southern Earth Sciences, Inc. (AL)

eurofins

Built Environment Testing

RES Job #: 695474

Submitted By: Southern Earth Sciences, Inc. (AL)

Client Sample ID Number (Sample ID's must be unique)	REQUESTED ANALYSIS							VALID MATRIX CODES					LAB NOTES			
	ASBESTOS	CHEMISTRY	MICROBIOLOGY	ICO	DUST	METALS	ORGANICS	VIABLES	MEDICAL	MOLD	VALID MATRIX CODES					LAB NOTES
											TEM	PCM	NYS	Sample Volume (L) / Area	Sample Temperature (°C)	
14 1-14	X											Air = A	Bulk = B		AL	
15 1-15	X											Dust = D	Food = F			
16 1-16	X											Paint = P	Soil = S			
17 1-17	X											Surface = SU	Swab = SW			
18 1-18	X											Tape = T	Wipe = W			
19 2-01	X											Drinking Water = DW				
20 2-02	X											Waste Water = WW				
21 2-03	X											**ASTM E1792 approved wipe media only**				
22 2-04	X															
23 2-05	X															
24 2-06	X															
25 2-07	X															
26 2-08	X															
27 2-09	X															
28 2-10	X															
29 2-11	X															
30 2-12	X															
31 2-13	X															
32 2-14	X															
33 2-15	X															
34 2-16	X															
35 2-17	X															
36 2-18	X															
37 2-19	X															
38 2-20	X															
39 2-21	X															
40 2-22	X															
41 2-23	X															
42 2-24	X															
43 3-01	X															



RES Job #: 695474

Submitted By: Southern Earth Sciences, Inc. (AL)

eurofins

Built Environment Testing

RES Job #: 695474

Submitted By: Southern Earth Sciences, Inc. (AL)

Client Sample ID Number (Sample ID's must be unique)	REQUESTED ANALYSIS							VALID MATRIX CODES					LAB NOTES		
	TEM	PCM	NYS	DUST	CHEMISTRY	MICROBIOLOGY	ICO	Sample Volume (L) / Area	Sample Temperature (°C)	Length(or Aliquots) x Width(or Area/Aliquot)	Matrix Code	# of Containers	Date Collected mm/dd/yy	Time Collected hh:mm	Laboratory Analysis Instructions
44 3-02	X												Air = A Bulk = B		AL
45 3-03	X												Dust = D Food = F		
46 3-04	X												Paint = P Soil = S		
47 3-05	X												Surface = SU Swab = SW		
48 3-06	X												Tape = T Wipe = W		
49 3-07	X												Drinking Water = DW Waste Water = WW		
50 3-08	X												**ASTM E1792 approved wipe media only**		
51 3-09	X														
52 3-10	X														
53 3-11	X														
54 3-12	X														
55 4-01	X														
56 4-02	X														
57 4-03	X														
58 4-04	X														
59 4-05	X														
60 4-06	X														
61 4-07	X														
62 4-08	X														
63 4-09	X														
64 4-10	X														
65 4-11	X														
66 4-12	X														
67 4-13	X														
68 4-14	X														
69 4-15	X														
70 4-16	X														
71 4-17	X														
72 4-18	X														
73 4-19	X														



RES Job #: 695474

Submitted By: Southern Earth Sciences, Inc. (AL)

eurofins

Built Environment Testing

RES Job #: 695474

Submitted By: Southern Earth Sciences, Inc. (AL)

Client Sample ID Number	(Sample ID's must be unique)	REQUESTED ANALYSIS										VALID MATRIX CODES						LAB NOTES							
		TEM	PCM	NYS	DUST	CHEMISTRY	METALS	ORGANICS	VIABLES	MEDICAL	MOLD	Air = A	Bulk = B	Dust = D	Food = F	Paint = P	Soil = S		Surface = SU	Swab = SW	Tape = T	Wipe = W	Drinking Water = DW	Waste Water = WW	**ASTM E1792 approved wipe media only**
74	4-20	X																							AL
75	4-21	X																							
76	4-22																								
77	4-23	X																							
78	4-24	X																							
79	5-01	X																							
80	5-02	X																							
81	5-03	X																							
82	5-04	X																							
83	5-05	X																							
84	5-06	X																							
85	5-07	X																							
86	5-08	X																							
87	5-09	X																							
88	5-10	X																							
89	5-11	X																							
90	5-12	X																							
91	5-13	X																							
92	5-14	X																							
93	5-15	X																							
94	6-01	X																							
95	6-02	X																							
96	6-03	X																							
97	6-04	X																							
98	6-05	X																							
99	6-06	X																							
100	7-01	X																							
101	7-02	X																							
102	7-03	X																							
103	7-04	X																							



RES Job #: 695474

Submitted By: Southern Earth Sciences, Inc. (AL)

eurofins

Built Environment Testing

RES Job #: 695474

Submitted By: Southern Earth Sciences, Inc. (AL)

Client Sample ID Number	(Sample ID's must be unique)										REQUESTED ANALYSIS						VALID MATRIX CODES						LAB NOTES																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	ASBESTOS	CHEMISTRY	MICROBIOLOGY	ICO	DUST	METALS	ORGANICS	VIABLES	MEDICAL	MOLD	TEM	PCM	NYS	Sample Volume (L) / Area	Sample Temperature (°C)	Length(or Aliquots) x Width(or Area/Aliquot)	Matrix Code	Date Collected mm/dd/yy	Time Collected hh:mm																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
104 7-05	X																	Air = A Bulk = B Dust = D Food = F Paint = P Soil = S Surface = SU Swab = SW Tape = T Wipe = W Drinking Water = DW Waste Water = WW **ASTM E1792 approved wipe media only**																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														</



695 474

CEI

CHAIN OF CUSTODY

117

730 SE Maynard Road, Cary, NC 27511
Tel: 866-481-1412; Fax: 919-481-1442

LAB USE ONLY:

CEI Lab Code:

CEI Lab I.D. Range:

COMPANY INFORMATION	PROJECT INFORMATION
CEI CLIENT #:	Job Contact: <u>Horacio Martinez</u>
Company: <u>Southern Earth Sciences</u>	Email / Tel: <u>hmartinez@seearth.com</u>
Address: <u>5460 Rangeline Road</u>	Project Name: <u>McDuffie Island 7 Bldg ACM Survey</u>
<u>Mobile, AL 36619</u>	Project ID#: <u>M25-521</u>
Email: <u>hmartinez@seearth.com, eguerrero@seearth.com</u>	PO #:
Tel: <u>(251) 344-7711</u> Fax: <u> </u>	STATE SAMPLES COLLECTED IN: <u>AL</u>

IF TAT IS NOT MARKED STANDARD 3 DAY TAT APPLIES.

ASBESTOS	METHOD	TURN AROUND TIME					
		4 HR	8 HR	1 DAY	2 DAY	3 DAY	5 DAY
PLM BULK	EPA 600	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
PLM POINT COUNT (400)	EPA 600	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PLM POINT COUNT (1000)	EPA 600	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PLM GRAV w POINT COUNT	EPA 600	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PLM BULK	CARB 435	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PCM AIR	NIOSH 7400	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEM AIR	EPA AHERA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEM AIR	NIOSH 7402	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEM AIR (PCME)	ISO 10312	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEM AIR	ASTM 6281-15	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEM BULK	CHATFIELD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEM DUST WIPE	ASTM D6480-05 (2010)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEM DUST MICROVAC	ASTM D5755-09 (2014)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEM SOIL	ASTM D7521-16	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEM VERMICULITE	CINCINNATI METHOD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEM QUALITATIVE	IN-HOUSE METHOD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OTHER:		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

REMARKS / SPECIAL INSTRUCTIONS:

☒ Accept Samples
☐ Reject Samples

Relinquished By:	Date/Time	Received By:	Date/Time
<u>[Signature]</u>	<u>10/11/25 0635</u>	<u>ME</u>	<u>10/06/25 9:19</u>

Samples will be disposed of 30 days after analysis



**SOUTHERN
EARTH SCIENCES**
Geotechnical | Environmental | Materials Testing

Bulk Asbestos Sample Log

Date 9/29/25
Project No. MS-521
Project Name McDuffie Island

Inspector Horacio Martinez
Inspector License # AIN102482645520
Building Name/Area Surveyed Warehouse 2 (2) (S)

Sample #	Material Description	Sample Location	Friable
1-01	Exterior fibrous panels	Storage #2	No
1-02	LI	LI	LI
1-03	LI	LI	LI
1-04	Light Brown 12"x12" VSF w/ black matrix	Office	NO
1-05	LI	LI	LI
1-06	LI	LI [~200ft ²]	LI
1-07	Black Vinyl baseboard w/ yellow matrix	Office	NO
1-08	LI	LI	LI
1-09	LI	LI	LI
1-10	Drywall/Jc. system	Office	Yes
1-11	LI	LI	LI
1-12	LI	LI	LI
1-17	LI	Office Storage #2 & 2	Yes
1-14	LI	LI	LI
1-15	LI	LI	LI
1-16	HVAC Duct insulation	Storage #2	Yes
1-17	LI	LI	LI
1-18	LI	LI [50 linear ft]	LI

18

~~Roof~~ insulation in warehouse 2 is fiberglass



**SOUTHERN
EARTH SCIENCES**
Geotechnical | Environmental | Materials Testing

Bulk Asbestos Sample Log

Date 9/29/28
Project No. 1121-521
Project Name McDuffie Island

Inspector Horacio Martinez
Inspector License # AIN102482645520
Building Name/Area Surveyed Warehouse (2)(2)

7 Building ACM Survey

Sample #	Material Description	Sample Location	Friable
2-01	Light Brown 12" x 12" USF w/ black marble	Hallway (warehouse #2)	no
2-02	"	Kitchen	Y
2-03	"	Weight room ^{entrance}	Y
2-04	Drywall / Ic system	Kitchen	Yes
2-05	"	weight room	Y
2-06	"	Hallway	Y
2-07	Popcorn Ceiling	Kitchen	Yes
2-08	"	"	Y
2-09	"	weight room	Y
2-10	Water pipe insulation	Hallway Ceiling (attic)	Yes
2-11	"	"	Y
2-12	"	"	Y
2-13	Light Brown 12" x 12" USF w/ black marble	office	no
2-14	"	"	Y
2-15	"	" E-120 #7	Y
2-16	Exterior fibrous panels	Storage #2	no
2-17	"	"	Y
2-18	"	"	Y



Date	9/15/15	Inspector	Horacio Martinez
Project No.	M25-521	Inspector License #	AIN102482645520
Project Name	McDuffie Island 7 Building ACM Survey	Building Name/Area Surveyed	Warehouse 2

[illegible]



**SOUTHERN
EARTH SCIENCES**
Geotechnical | Environmental | Materials Testing

Bulk Asbestos Sample Log

Date 9/30/25
Project No. M25-521
Project Name McDuffie Inland ACN
7 Building Survey

Inspector Horacio Martinez
Inspector License # AIN102482645520
Building Name/Area Building 3 (Break Room)
Surveyed

Sample #	Material Description	Sample Location	Friable
3-01	Boiler Insulation	Utility / HVAC Room	Yes
3-02	LI	LI	LI
3-03	LI	LI	LI
3-04	white/grey 12" x 10" VFT w/ yellow matrix	Refrigerator Room	No
3-05	LI	LI	LI
3-06	LI	LI (in yard)	LI
3-07	Dynall / IC System	Locker Room	Yes
3-08	LI	LI	LI
3-09	LI	LI	LI
3-10	Pool Insulation	Utility Room	No
3-11	LI	LI	LI
3-12	LI	LI	LI

54

12" x 10" VFT is in Refrigerator Room and Office
no access to office at time of inspection

Makeup: Dynall, wood, LB, concrete
building



**SOUTHERN
EARTH SCIENCES**
Geotechnical | Environmental | Materials Testing

Bulk Asbestos Sample Log

Date 9/30/28
Project No. M28-521
Project Name McDuffie Island
7 Building Area Survey

Inspector Horacio Martinez
Inspector License # AIN102482645520
Building Name/Area Surveyed Building 4

(Foreman's office)

Sample #	Material Description	Sample Location	Friable
4-01	Black 12" x 12" VFT w/ yellow mastic	Main Lobby	No
4-02	4	Hallway	4
4-03	4	Storage #1 E1,000 ft ²	4
4-04	Yellow/white 12" x 12" VFT w/ black mastic	Main Lobby	No
4-05	4	Hallway	4
4-06	4	Office #1 E1,200 ft ²	4
4-07	Pink/tan 12" x 12" VFT w/ black/yel mastic	Office #2	No
4-08	4	4	4
4-09	4	4 E-200 ft ²	4
4-10	Drywall / TC System	Main Lobby	Yes
4-11	4	Bathroom #1	4
4-12	4	Bathroom #2	4
4-13	Drop-in ceiling tile	Main Lobby	Yes
4-14	4	Office #3	4
4-15	4	Storage #1	4
4-16	Wall insulation	Main Lobby	No
4-17	4	4	4
4-18	4	4	4



Date 9/30/25
Project No. 125-521
Project Name McDuffie Island
7 Birdy Area survey

Building 4 (Foreman's Office)

[illegible]



**SOUTHERN
EARTH SCIENCES**
Geotechnical | Environmental | Materials Testing

Bulk Asbestos Sample Log

Date 9/29/25
Project No. M25-521
Project Name McDuffie Island

Inspector Horacio Martinez
Inspector License # AIN102482645520
Building Name/Area Warehouse J (5)
Surveyed Administration Building

Sample #	Material Description	Sample Location	Friable
S-01	Gray 12" x 12" VSF w/ yellow matrix	Port Employee Conference Room	NO
S-02	"	office #2	11
S-03	"	office #5	11
S-04	"	Kitchen #1	4
S-05	"	Bathroom	4
S-06	"	Port Employee Entrance Lobby	11
S-07	"	Port Employee Conference Room E-6, 000 ft ²	11
S-08	Drywall / JC System	Port Employee Conference Room	Yes
S-09	"	office #2	4
S-10	"	Kitchen #1	4
S-11	"	Port Employee Entrance / Lobby	4
S-12	"	bathroom	4
S-13	Drop-in ceiling tile	Port employee conference room	Yes
S-14	"	office #2	4
S-15	"	Kitchen #1	4

93

all building has Gray 12" x 12" VSF w/ yellow matrix (6,000 ft²)



Date 9/29/28
Project No. M28-121
Project Name McDuffie Island 7
Bld. ACM Survey

Inspector	Horacio Martinez
Inspector License #	AIN102482645520
Building Name/Area Surveyed	Bulder C

Butdy 6 (Maintenance Shop)

[illegible]

all of building is metal & concrete
office #1 has 2 layers of VFT
 (Dark tan over light tan)



**SOUTHERN
EARTH SCIENCES**
Geotechnical | Environmental | Materials Testing

Bulk Asbestos Sample Log

Date 9/30/25
Project No. M25-521
Project Name McDuffie Island

Inspector Horacio Martinez
Inspector License # AIN102482645520
Building Name/Area Surveyed Building 7

Sample #	Material Description	Sample Location	Friable
7-01	white 12" x 12" VFT w/ yellow mastic	office #2	No
7-02	LI	11 hallway	No
7-03	LI	4 [2nd floor #2]	No
7-04	Drywall / IC System	office #2	Yes
7-05	LI	office #1	LI
7-06	LI	office #2 hallway	LI
7-07	white / grey 12" x 12" VFT w/ yellow mastic	Conference Room	No
7-08	LI	Hallway 2nd floor	LI
7-09	LI	Kitchen [1,200 #2]	LI
7-10	Drywall / IC System	Computer server room	Yes
7-11	LI	Women's Bathroom	LI
7-12	LI	Conference Room	LI
7-13	Drop-in ceiling tile	Conference Room	Yes
7-14	LI	Hallway	LI
7-15	LI	Kitchen	LI
7-16	B.g HVAC duct insulation	Outside unit leading into 2nd floor	Yes
7-17	LI	4	LI
7-18	LI	4	LI

117

2nd Floor 12" x 12" VFT - Conference Room, Kitchen
Hallway

October 21, 2025

Horacio Martinez
Southern Earth Sciences, Inc. (AL)
5460 Rangeline Rd
Mobile, AL 36619

CLIENT PROJECT: M25-521 McDuffie Island ACM Survey
LAB CODE: 699162-1

Dear Horacio,

Enclosed are asbestos analysis results for PLM Bulk samples received at our laboratory on October 21, 2025. The samples were analyzed for asbestos using polarizing light microscopy (PLM) per the EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials and EPA 40 CFR Appendix E to Subpart E of Part 763: Interim Method of the Determination of Asbestos in Bulk Insulation Samples.

Sample results containing >1% asbestos are considered asbestos-containing materials (ACMs) per EPA regulatory requirements. The detection limit for the EPA 600 Method is <1% by calibrated visual estimate.

Thank you for your business and we look forward to continuing good relations.

Kind Regards,



Kamila Reichert,
Laboratory Director

NVLAP 101768-0

ASBESTOS ANALYTICAL REPORT
By: Polarized Light Microscopy

Prepared for

Southern Earth Sciences, Inc. (AL)

CLIENT PROJECT:	M25-521 McDuffie Island ACM Survey
LAB CODE:	699162-1
TEST METHOD:	EPA 600 / R93 / 116 and EPA 40 CFR Appendix E to Subpart E of Part 763
REPORT DATE:	10/21/25
TOTAL SAMPLES ANALYZED:	3
# SAMPLES >1% ASBESTOS:	0
TOTAL LAYERS ANALYZED:	6

Project: M25-521 McDuffie Island ACM Survey

Lab Code: 699162-1

Method: EPA 600 / R93 / 116 and EPA 40 CFR Appendix E to Subpart E of Part 763

Client ID	Lab ID	Layer	Sample Description	Asbestos %
8-01	3817085	Layer A	White roofing membrane	None Detected
		Layer B	White roofing drywall	None Detected
8-02	3817086	Layer A	White roofing membrane	None Detected
		Layer B	White roofing drywall	None Detected
8-03	3817087	Layer A	White roofing membrane	None Detected
		Layer B	White roofing drywall	None Detected

ASBESTOS BULK ANALYSIS

By: Polarized Light Microscopy

Client: Southern Earth Sciences, Inc. (AL)
5460 Rangeline Rd
Mobile, AL 36619

Lab Code: 699162-1
Date Received: 10/21/25
Date Analyzed: 10/21/25
Date Reported: 10/21/25

Project: M25-521 McDuffie Island ACM Survey

Method: ASBESTOS BULK PLM, EPA 600 METHOD

Client ID	Lab	Lab	NON-ASBESTOS COMPONENTS			ASBESTOS	
Lab ID	Description	Attributes	Fibrous		Non-Fibrous	%	
8-01	Roofing Membrane	Homogeneous			100%	Rubber	None Detected
Layer A		White					
3817085		Non-Fibrous					
		Bound					
Layer B	Roofing Drywall	Homogeneous	10%	Glass	90%	Gypsum	None Detected
3817085		White					
		Non-Fibrous					
		Bound					
8-02	Roofing Membrane	Homogeneous			100%	Rubber	None Detected
Layer A		White					
3817086		Non-Fibrous					
		Bound					
Layer B	Roofing Drywall	Homogeneous	10%	Glass	90%	Gypsum	None Detected
3817086		White					
		Non-Fibrous					
		Bound					
8-03	Roofing Membrane	Homogeneous			100%	Rubber	None Detected
Layer A		White					
3817087		Non-Fibrous					
		Bound					
Layer B	Roofing Drywall	Homogeneous	10%	Glass	90%	Gypsum	None Detected
3817087		White					
		Non-Fibrous					
		Bound					

LEGEND:

Non-Anth = Non-Asbestiform Anthophyllite
Non-Trem = Non-Asbestiform Tremolite
Calc Carb = Calcium Carbonate

METHOD: EPA 600 / R93 / 116 and EPA 40 CFR Appendix E to Subpart E of Part 763

REPORTING LIMIT: 1% by calibrated visual estimation

REGULATORY LIMIT: 1%

Due to the limitations of the EPA 600 / R93 / 116 method, nonfriable organically bound materials (NOBs) such as vinyl floor tiles can be difficult to analyze via polarized light microscopy (PLM). EPA recommends that all NOBs analyzed by PLM, and found not to contain asbestos, be further analyzed by Transmission Electron Microscopy (TEM). Please note that PLM analysis of dust and soil samples for asbestos is not covered under NVLAP accreditation. Estimated measurement of uncertainty is available on request.

Eurofins Built Environment Testing East, LLC makes no warranty representation regarding the accuracy of client submitted information in preparing and presenting analytical results. Interpretation of the analytical results is the sole responsibility of the client. This report relates only to the samples tested or analyzed and may not be reproduced, except in full, without written approval by Eurofins Built Environment Testing East, LLC. Samples were received in acceptable condition unless otherwise noted. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Information provided by customer includes customer sample ID and sample description.



Ryan Steele
Analyst

DATA QA:



Kathryn Wescott
10/21/2025

APPROVED BY:



Kamila Reichert,
Laboratory Director



Built Environment Testing

RES Job #: 699162

Effective

SUBMITTED BY		INVOICE TO		CONTACT INFORMATION		SERIES	
Company: Southern Earth Sciences, Inc. (AL)		Company: Southern Earth Sciences, Inc. (AL)		Contact: Horacio Martinez		-1 PLM Priority	
Address: 5460 Rangeline Rd		Address: 5460 Rangeline Rd		Phone: (251) 344-7711			
Mobile, AL 36619		Mobile, AL 36619		Fax:			
				Cell: (205) 800-6401			
Project Number and/or P.O. #: M25-521		Project Zip Code:		Final Data Deliverable Email Address:			
Project Description/Location: M25-521 McDuffie Island ACM Survey				hmartinez@soearth.com (+ 2 ADDNL. CONTACTS)			

ASBESTOS LABORATORY					REQUESTED ANALYSIS					VALID MATRIX CODES					LAB NOTES										
[PLM] / PCM / TEM / NYS DTL RUSH [PRIORITY] STANDARD					PLM - PLM Short Report (EPA/600/R-93/116)										Laboratory Analysis Instructions										
CHEMISTRY LABORATORY					ASBESTOS					CHEMISTRY						MICROBIOLOGY					ICO				
Dust																					Air = A	Bulk = B			
																						Dust = D	Food = F		
																							Paint = P	Soil = S	
Metals																					Surface = SU	Swab = SW			
																							Tape = T	Wipe = W	
																								Drinking Water = DW	
Organics*																						Waste Water = WW			
																								ASTM E1792 approved wipe media only	
MICROBIOLOGY LABORATORY																									
Viable Analysis**																									
Medical Device Analysis																									
Mold Analysis																									
**Turnaround times establish a laboratory priority, subject to laboratory volume and are not guaranteed. Additional fees apply for afterhours, weekends and holidays. **																									
Special Instructions:																									
Client Sample ID Number					(Sample ID's must be unique)																				
1 8-01																									
2 8-02																									
3 8-03																									

Eurofins Built Environment Testing East, LLC establishes a unique Lab Sample ID, for each sample, by preceding each unique Client Sample ID with the laboratory RES Job Number.
Eurofins Built Environment Testing East, LLC will analyze incoming samples based on information received and will not be responsible for errors or omissions in calculations resulting from the inaccuracy of original data. By signing, client/company representative agrees that submission of the following samples for requested analysis as indicated on this Chain of Custody shall constitute an analytical services agreement with payment terms of NET30. Failure to comply with payment terms may result in a 18% APR finance charge.

Relinquished By:	Date/Time: 10/21/2025 8:08:57	Sample Condition: Acceptable
Received By:	Date/Time: 10/21/2025 8:08:57	Carrier: Dropbox



CEI

CHAIN OF CUSTODY

3

730 SE Maynard Road, Cary, NC 27511

Tel: 866-481-1412; Fax: 919-481-1442

LAB USE ONLY:

CEI Lab Code:

699162

CEI Lab I.D. Range:

COMPANY INFORMATION	PROJECT INFORMATION
CEI CLIENT #:	Job Contact: <u>Horacio Martinez</u>
Company: <u>Southern Earth Sciences, Inc.</u>	Email / Tel: <u>hmartinez@seearth.com</u>
Address: <u>5460 Rangeline Road</u>	Project Name: <u>McDuffie Island Area Survey</u>
<u>Mobile, AL 36619</u>	Project ID#: <u>M25-521</u>
Email: <u>hmartinez@seearth.com</u>	PO #:
Tel: <u>(251) 344-7711</u> Fax: <u>—</u>	STATE SAMPLES COLLECTED IN: <u>AL</u>

IF TAT IS NOT MARKED STANDARD 3 DAY TAT APPLIES.

ASBESTOS	METHOD	TURN AROUND TIME					
		4 HR	8 HR	1 DAY	2 DAY	3 DAY	5 DAY
PLM BULK	EPA 600	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PLM POINT COUNT (400)	EPA 600	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PLM POINT COUNT (1000)	EPA 600	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PLM GRAV w POINT COUNT	EPA 600	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PLM BULK	CARB 435	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PCM AIR	NIOSH 7400	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEM AIR	EPA AHERA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEM AIR	NIOSH 7402	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEM AIR (PCME)	ISO 10312	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEM AIR	ASTM 6281-15	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEM BULK	CHATFIELD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEM DUST WIPE	ASTM D6480-05 (2010)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEM DUST MICROVAC	ASTM D5755-09 (2014)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEM SOIL	ASTM D7521-16	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEM VERMICULITE	CINCINNATI METHOD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEM QUALITATIVE	IN-HOUSE METHOD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OTHER:		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

REMARKS / SPECIAL INSTRUCTIONS:

☒ Accept Samples
☐ Reject Samples

Relinquished By:	Date/Time	Received By:	Date/Time
<u>[Signature]</u>	<u>10/17/25 1245</u>	<u>[Signature]</u>	<u>10/21/25 8:00am</u>

Samples will be disposed of 30 days after analysis

DROP



**SOUTHERN
EARTH SCIENCES**
Geotechnical | Environmental | Materials Testing

Bulk Asbestos Sample Log

Date 10/17/25
Project No. M25-521
Project Name McDuffie Island 7
Building ACM Survey

Inspector Horacio Martinez
Inspector License # AIN102582645520
Building Name/Area Surveyed Building 8

Electricity
(8)

Sample #	Material Description	Sample Location	Friable
8-01	Roofing Material	Roof	no
8-02	u	u	u
8-03	u	u	u

all building is made of
Concrete blocks & metal (metal
sheeting roof)

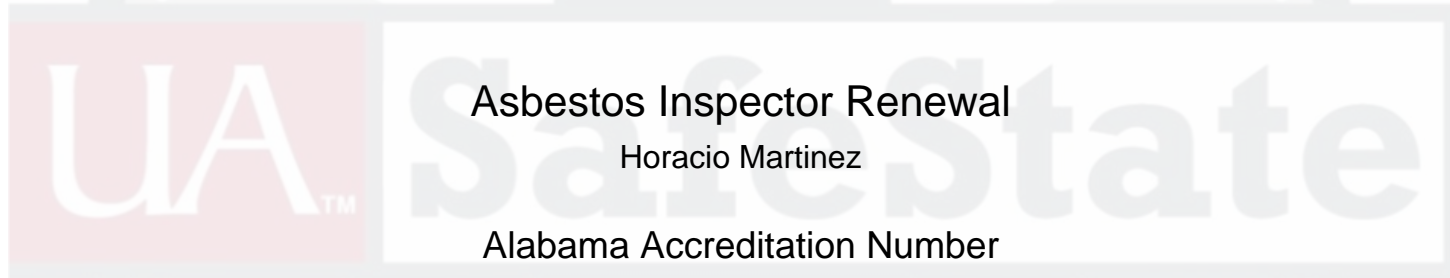
**ATTACHMENT C
INSPECTOR CERTIFICATION(S)**

THE UNIVERSITY OF ALABAMA®



has examined the documentation of asbestos training and qualifications of the person named below and confers this

Certificate of Accreditation



Asbestos Inspector Renewal

Horacio Martinez

Alabama Accreditation Number

AIN102482645520

Certificate Expiration Date

October 7, 2025

This certificate has been issued pursuant to the authority granted to The University of Alabama SafeState Program by the Alabama Asbestos Contractor Accreditation Act, Alabama Act No. 89-517, May, 1989 and Alabama Act No. 97-626, May, 1997.

A handwritten signature in blue ink that reads "Kalyn Tew".

Environmental Services Manager

A handwritten signature in blue ink that reads "Michael H. Smith".

Associate Director for Environmental Programs

THE UNIVERSITY OF ALABAMA®



has examined the documentation of asbestos training and qualifications of the person named below and confers this

Certificate of Accreditation

Asbestos Inspector Renewal

Horacio Martinez Gallo

Alabama Accreditation Number

AIN102582645520

Certificate Expiration Date

October 2, 2026

This certificate has been issued pursuant to the authority granted to The University of Alabama SafeState Program by the Alabama Asbestos Contractor Accreditation Act, Alabama Act No. 89-517, May, 1989 and Alabama Act No. 97-626, May, 1997.

A handwritten signature in blue ink that reads "Kalyn Tew".

Environmental Services Manager

A handwritten signature in blue ink that reads "Michael H. Smith".

Associate Director for Environmental Programs